RESEARCH PROJECTS

A 2D Reference Image of a 3D Object: How Much Can It Do toward Vision Problems?

- ✍ CHUNG Chi Kit Ronald
- ❑ 1 August 2001
- ❖ Research Grants Council (Earmarked Grants)

Vision is one of the most important senses of humans and other biological organisms. This project is about how vision can be implemented in machine for a number of important applications. More specifically, it is to investigate how a single image of a 3D object can be used as its reference to achieve the following applications: (1) Visual Recognition: to recognize the presence of the object in any given image of an unknown scene; (2) Image Mosaic Construction: to construct, with any given image that displays the object only partially in a scene, a mosaic (an image which displays a wider field of view) that displays the object completely in the same scene; and (3) Robot Self-localization: to use the object as a landmark of an environment, and allow a camera-mounted robot to localize itself in the environment from the sight of the object. A common feature of all these problems is that their solutions all require comparing a reference image of an object to an image of an unknown scene. A single image contains limited information about a 3D object, so certain shape model has to be assumed about the object. In this project the object is assumed to be one consisting of planar or quadric surfaces, i.e., a polyhedral shape or a multi-quadric curved shape or anything between the two, which represents a large class of 3D shapes widely occurring in human society. The project aims at solving the three vision problems altogether by devising a mechanism that could infer dense image-to-image correspondences from just a few initial correspondences. In a cluttered scene the object could very well be partially occluded and visible in a number of separate pieces. This project will also address how, through the use of the above mechanism, all these separate pieces could be pulled together and related to the same object for its recognition or mosaicking in the scene image.
(CS01177)

Intelligent e-Diagnosis of Plastic Injection Molding Machines

- ✍ DU Ruxu ● XU Yangsheng
- ❑ 1 June 2002
- ❖ Po Yuen (To's) Machine Factory Ltd. ● University-Industry Collaboration Prog.: Matching Grant for Joint Research, ITF, Innovation & Tech. Commission

As one of the major manufacturing centers in the world, Hong Kong (including the nearby Pearl River Delta Area) has over 50,000 manufacturing companies. However, it makes only one kind of manufacturing machinery: plastic machinery. Therefore, create able technologies for the plastics machinery industry is of strategically important. The objective of the proposed project is to develop an intelligent e-diagnosis system for plastic molding machines. The system will be implemented on a PC computer installed next to the plastic injection molding machine on the shop floor. It can automatically collect data, conduct data mining and intelligent diagnosis. Upon detecting possible malfunctions, it will send the data to the manufacturer through the Internet. Accordingly, prevent maintenance can be initiated to minimize the production lost and maintenance cost. In addition, the data will help to improve the design and manufacture of the plastic injection molding machines.
(EE01404)

Output Regulation in Uncertain Nonlinear Systems

- ✍ HUANG Jie
- ❑ 1 July 2001
- ❖ Research Grants Council (Earmarked Grants)

Designing a control law to achieve asymptotic tracking and disturbance rejection in a nonlinear plant where both the reference and disturbance signals are generated by an autonomous differential equation is called nonlinear output regulation problem. This problem has long been regarded as one of the central control problems, and has been active research topic since early 1990s. It is known that the key to the solvability of this problem is the availability of a feedforward function defined by the solution of a set of mixed nonlinear partial and algebraic equations

called regulator equations. Previous approaches to solving the output regulation problem rely on the solution of the regulator equations. However, solving the regulator equations is either difficult because of the nonlinearity of the plant, or even impossible when the plant is uncertain. This project proposes a completely different approach to finding the approximation solution of this feedforward function without explicitly solving the regulator equations. The approach is based on a neural network approximation of the feedforward function. Further, a control configuration is developed that allows the reduction of the tracking error by the on-line adjustment of the parameters of the neural networks. The major advantages of our proposed approach over the previous approaches incldue (1) the precise knowledge of the plant is not needed, and (2) computation complexity is significantly reduced.
(MP01181)

Representation and Deformation of 3D Shapes for Design Applications

- ✍ HUI Kin Chuen
- ❑ 1 September 2001
- ❖ Research Grants Council (Earmarked Grants)

The objective of this research is to develop a representation scheme and a modeling technique for manipulating deformable objects that can be integrated with existing solid modeling systems. The technique will allow designers to bend, twist, or deform a solid or 3D object locally without being concerned with the continuity between surfaces that occurs frequently in surface modeling. The representation is expected to represent the characteristic shape features as well as geometric information of a 3D shape. High level shape operations on the objects will thus be allowed. This provides a tool for designers to modify the shape of a solid model directly so that they are released from the tedious task of manipulating surfaces. Since no data conversion between systems is required, a better integration between the industrial design and the engineering design and manufacturing process can be expected.
(MP01182)

Computational Algebraic Geometry in Control System Analysis and Design

- ✍ KWONG Chung Ping
- ❑ 1 December 2001
- ❖ Research Grants Council (Earmarked Grants)

Historically the advancement of system and control theory received continuous impetus from mathematics. Examples are abstract algebra to algebraic system theory, differential geometry to nonlinear system analysis, and analytic operator theory to $H\infty$ robust control. Recently the mathematics of computational algebraic geometry has begun to emerge as a useful notion to study a number of problems in system and control theory. We propose two research topics along this direction. One is the application of the well-known Wu's algorithm for geometric theorem proving to the development of computing software for control system analysis and design. Another topic is the study of the output feedback pole placement problem from the viewpoint of computational algebraic geometry. Whereas the second topic has its interest in the theoretical understanding of a major control problem, the research results of the first topic will benefit the practical design of control systems.
(MP01185)

Integrated Micromechanical Switches for Adaptive Fractal Antenna Arrays

- ✍ LI Wen Jung ● KWONG Chung Ping ● LUK Kwai Man*
- ❑ 10 August 2001
- ❖ Research Grants Council (Earmarked Grants)

The proliferating demand for handheld wireless Personal Digital Assistant and mobile communication devices that require broadband capability presents the necessity for compact antenna systems with high gain and directivity. We propose to fabricate micromechanical switches to control arrays of fractal antennas and develop a novel compact antenna system that will give greater signal gain over conventional mobile phone antennas, reduce significantly the speed of convergence for beam forming, and provide the capability to operate over wide bandwidth at 10GHz to 100GHz frequencies. We intend to use MEMS technology to fabricate micromechanical switches that could be controlled by a simple adaptive algorithm to selectively activate layers of direction-oriented fractal antenna arrays

hybridly integrated with the switches. Specifically, we will focus on developing the technology to create novel polymer micromechanical structures to improve the performance and enhance the functionality of existing switches. We aim to create a low-cost, mass-producible, high-performance switched-beam smart antenna system that could be used for next generation wireless mobile communication devices. MEMS technology will be employed to build the micro-switches because it will allow us to build miniature, distributed, and highly precise mechanical switches in a small surface, and will allow these switches to be individually addressed and which could eventually be integrated with an IC controller circuit. Successful micro-fabrication of an array of novel low-power mechanical switches controllable by an adaptive controller will enable our team to build a high-gain compact smart antenna system capable of switched-beam functions.
(EE01215)

Eco-safe Human-motion-powered MEMS Energy Generator for Mobile Electronic Devices

- ✍ LI Wen Jung ● LEONG Philip Heng Wai (Dept of Computer Science and Engineering) ● YAM Yeung ● XU Yangsheng ● WONG Sai Peng Joseph (Dept of Electronic Engineering)
- ❑ 1 March 2002
- ❖ Funding from Other Sponsors ● Innovation and Technology Support Programme, ITF, Innovation & Technology Commission

Batteries add size, weight, and inconvenience to mobile computing and communication devices. This project will develop energy storage cells using MEMS resonators to harness the mechanical energy expended during a user's everyday motion to generate power for mobile consumer goods such as PDAs, mobile phones, beepers, and low-power wireless transmission devices. The development of these micro-power transduction cells will leverage off the vibration-based micro energy transducer technology invented by the Advanced Microsytems Laboratory at CUHK. The technology has gained international reputation and was highlighted by the September issue of IEEE Spectrum Magazine.
Currently, there is a steady increase in demand for environmentally safe and power-prolonging solutions for using mobile communication and computing devices. We aim to deliver prototype power-cells that will allow many Hong Kong electronic goods manufacturers to develop innovative low-power mobile-based products with chemical-free and long-lasting energy sourcex. We will, specifically, (1) develop AAA and AA size power-cells that encompass micro energy transducers and power management circuits; (2) perform detailed test and characterization of these power-cells and disseminate the results to Hong Kong mobile products manufacturers to their development of novel applications; (3) provide local companies with a MEME-based batch fabrication technology to develop non-silicon based micro resonators for potentially many other applications.
(EE01757)

Dynamics and Control of Train Suspension Systems with Smart Dampers

- ✍ LIAO Wei Hsin ● HUANG Jie
- ❑ 1 August 2001
- ❖ Research Grants Council (Earmarked Grants)

Ride quality is concerned with the sensation or feel of the passenger in the environment of a moving vehicle. Ride comfort problems mainly arise from vibrations of the vehicle body. Vibration in today's increasingly high-speed trains severely affects their ride comfort and safety. The objective of this research is to develop and characterize novel suspension systems for the vibration control of the trains, so that the passenger's comfort and safety will be greatly improved. In recent years, it has been found that magneto-rheological (MR) fluid can be quite promising for vibration control by virtue of its adaptive properties. This controllable change of state with some desirable features such as high strength, good stability, and fast response time show great potential in transportation applications. In this research, we aim to focus on studying the dynamics and control of train suspension systems with MR dampers. We will design innovative dampers with MR fluids through coupling the material characteristics with the train dynamics. We will also develop control algorithms for train suspension systems with MR dampers. The system performance will be evaluated in various conditions. The scientific knowledge base created through this project will facilitate the full realization of smart dampers for vibration control of trains and stimulate continuing research efforts in this area. The devices

and principles we are developing will be valuable to Hong Kong and Mainland China railway companies in designing new train suspension systems, or upgrading the existing suspension systems.
(MP01216)

3D Grasp Planning with Applications to Automated Fixture Layout Design

- ✍ LIU Yunhui ● WANG Michael Yu
- ❑ 1 September 2001
- ❖ Research Grants Council (Earmarked Grants)

Grasping is the first step to carry out a dexterous manipulation task using multi-fingered robot hands, and thus its planning is crucial to applications of a robot hand. A fixture used in manufacturing course is a set of locators, supports and clamps that accurately locate and securely hold a workpiece. While manufacturing technologies have advanced significantly, fixture design still relies on manual efforts of engineers. The goals of gasp planning and automated fixture design are similar: immobilizing an object by means of a set of contacts that ensure "form/force-closure". Due to high dimensionality, no efficient algorithm has been developed for solving such problems. In this project, we will develop an efficient algorithm to plan form/force-closure contacts on a 3D object. Since in a form-closure grasp the origin of the wrench space is strictly contained by the convex hull of the primitive contact wrenches, it is possible to find form-closure grasps by searching in a direction that reduces the distance between the convex hull and the origin. The ray-shooting based grasp testing algorithm allows us to efficiently calculate the searching direction using local geometry of the object surface, so the computation complexity of this approach does not increase with the combinatory number of faces/points of the object. Furthermore, this approach works efficiently not only for objects with polygonal/curved surface but also for those represented by discrete points. Practical examples, including a turbine airfoil, will be employed to validate the approaches. The research results will have direct impacts to robotics and manufacturing industry.
(MP01217)

Real-Time Bilateral Teleoperation of Internet Based Robotic Systems

- ✍ LIU Yunhui ● WANG Yuechao* ● XI Ning*
- ❑ 1 January 2002
- ❖ NSFC/RGC Joint Research Scheme

This project aims to develop a bilateral tele-operated Internet robotic system in which a human operator can control a remote robot via the Internet with real-time reflection of interaction forces of the robot with the environment. The accomplishment of this project would make the Internet not only a means to transfer information but also a means to transfer actions. A new control approach will be developed, which combines a non-time based planning method with a local time-referenced control method, to synchronize actions of the operator and the robot with respect to an implicit non-time reference parameter so as to overcome problems caused by the random communication delays. We will investigate and solve the following issues:
(1) sensor-based planning with respect to an implicit non-time parameter;
(2) integration of a local robot controller with the non-time based planning;
(3) design of a compact master arm with big reflecting force outputs; and
(4) verification of the theoretical results by experiments via the Internet between Hong Kong and the Mainland.
(CS01446)

Minimally-Invasive Techniques of Particle Vibration Damping

- ✍ WANG Michael Yu
- ❑ 1 July 2001
- ❖ Research Grants Council (Earmarked Grants)

For high-precision machines and instruments such as atomic force microscopes and wire/die bonding equipment for electronics packaging, vibration is a serious problem in their lightweight components such as the scanning probes or the head-arms. In addition to design optimization, material selection, and other measures, damping enhancement is a critical technique to suppress unwanted vibrations.
This proposed project focuses on an innovative damping technique - particle damping - as a low-cost and high-effect solution of passive damping treatments. Particle damping uses metal (e.g., tungsten) or ceramic particles (or powders) placed

inside small holes within a vibrating structure for kinetic energy dissipation. It offers significant advantages over the traditional viscoelastic materials for its temperature insensitivity, broadband applicability, and non-degradation over time.

The overall goal of the project is to develop an analysis and design method and related computer tools for "minimally invasive" or "surgical" applications of particle damping. The essential concept is to use and distribute optimally small amounts of particle materials with a maximum effect in attenuating undesirable vibrations while maintaining the strength, stiffness, and dynamic integrity of the structure. Towards that goal, it is imperative for us to develop modeling tools capable of fully capturing complex particle damping mechanisms, which will enable us to further develop a comprehensive design technique to achieve the minimally invasive particle vibration damping.
(MP01196)

Human Informed Control of Dynamically Stable Systems

- ✍ XU Yangsheng ● NECHYBA Michael*
- ❑ 15 September 2001
- ❖ Research Grants Council (Earmarked Grants)

Humans have shown themselves to be extremely adept at mastering the complex control of dynamically stable systems. Examples of such systems, which exploit dynamic forces for successful control, include gymnastics, juggling and bicycling. Present-day mechanical systems, however, fall far short of the dynamic skills routinely exhibited by humans. In this proposal, we seek to develop methods for capturing the inherent skill displayed by humans in controlling dynamically stable systems and to incorporate those skills into autonomous human-informed dynamically stable systems. Dynamically stabilized systems differ in some fundamental ways from statically stable systems. Control maneuvers tend to extend over relatively short periods of time and are often difficult to repeat from one experiment to the next. Therefore training data is scarce and more difficult to gather. Moreover, their control is much more sensitive to system dynamics, yet the dynamics are often highly nonlinear or even discontinuous, and are thus difficult to characterize analytically. Prior work in human skill transfer has dealt primarily with static or quasi-static systems, and as such is ill-equipped to cope with these additional challenges. This proposal seeks to address these weaknesses to make possible the development of human-informed dynamically stable systems.
(MP01228)

Development of Technologies on Networked Smart Toys

- ✍ XU Yangsheng ● ZHANG Ping ● LAW Kwok Ho Cedric#
- ❑ 1 April 2002
- ❖ Funding from Other Sponsors ● Innovation and Technology Support Programme, ITF, Innovation & Technology Commission

Hong Kong is the largest toy exporter in the world, however it doesn't have many of its own brands and core technologies. The reason is that its investment in research and development of new toys is very limited. It becomes more challenging when globally the toy industry has experienced a transition from traditional toys to smart toys. We propose to develop a methodology to develop network-based smart toys, which we believe will benefit the industry in Hong Kong in the long run. We plan to develop a coherent set of technologies which seamlessly integrate the computer-aided design, smart materials, learning algorithm, human interface, control strategy and network communication of the smart toys. Four unique features will be exhibited in the smart toy concept that we will develop. (1) Personalized intelligent: the toys can learn the players' intention and skills as well as identify the players; (2) Interactive: the toys allow the players to participate in competition interactively; (3) Modular: the toys are designed as assemblies of modular parts so as to allow players to reconfigurate different toys with modular parts; and (4) Networked: the toys can allow multiple players from remote sites to join together for the fun through computer networks. The new technologies developed in this project will help the Hong Kong toy and related industries to maintain a leading position by providing the tools for designing and producing innovative lines of products more efficiently at lower costs.
(EE01544)

L_2-Representation, Properties, and Applications of Fuzzy Membership Function and Rule Bases

✍ YAM Yeung

❑ 1 April 2002

❖ CUHK Research Committee Funding (Direct Grants)

Representation of membership functions as elements of a real, square integrable functional space $L_2[0,2]$ has been recently introduced. The new representation improves over the previous Cartesian representation in that an extended class of membership function comprising of an infinite number of characteristic points, e.g., bell shaped function, can also be accommodated. The new presentation converts set of general fuzzy rules to mappings between antecedent spaces and consequent space for possible analysis. This project proposes to explore in rigorous mathematical terms manifestation of the functional representation using the wealth of results existing in functional space and mappings. Areas of investigation include new derivation and results on inference paradigms, interpolation techniques, and data extraction methods. Existing works as viewed from this perspective of functional space representation will be conducted. Efficiently representation and ensuing results of fuzzy rules with multiple antecedent variables will be explored. The project will also aim at possible restrictions on the performance and properties of fuzzy framework for being an inherent part of a functional space. (EE01851)

Please refer to previous issues of this publication for more details of the following ongoing research at the department:

Edition	Title/Investigators
1998-99	Homography-based Stereo Vision for Polyhedral Reconstruction (CU98169) ✍ CHUNG Chi Kit Ronald
1999-00	Reconstruction of Generic Curved Surface from Stereo Views (EE99018) ✍ CHUNG Chi Kit Ronald
2000-01	Design a Next Generation Industrial Sewing Machine (EE00837) ✍ DU Ruxu
1998-99	An Approximation Method for the L2 Gain Attenuation Problem in Discrete-time Nonlinear Systems (CU98168) ✍ HUANG Jie
1999-00	Practical Output Regulation for Nonlinear Systems (CU99400) ✍ HUANG Jie
2000-01	Approximation Methods for the Discrete Nonlinear Servomechanism Problem (CU00209) ✍ HUANG Jie
1998-99	Volume Modeling of Deformable Objects (EE98027) ✍ HUI Kin Chuen
1999-00	Deformation of Solid Models for Design Applications (EE99019) ✍ HUI Kin Chuen
1999-00	A MEMs Vibration Electric Power Generator (CU99416) ✍ LI Wen Jung ● LEONG Philip Heng Wai (Dept of Computer Science and Engineering) ● TANG William C.*
2000-01	Micromachined Nafion Actuators for Tactile-display Systems (CU00206) ✍ LI Wen Jung ● GUO Shuxiang* ● LIU Yunhui
1999-00	Active-Passive Hybrid Structural Control Using Enhanced Self-Sensing Piezoelectric Actuators (EE99020) ✍ LIAO Wei Hsin
2000-01	Novel Technologies for High-performance Vibration Damping and Compact Motion-stages for Electronics Manufacturing Equipment (EE20004) ✍ LIAO Wei Hsin ● WANG Michael Yu ● XU Yangsheng ● YAM Yeung
2000-01	Active-Passive Hybrid Vibration Control Using Enhanced Self-sensing Piezoelectric Actuators (CU00205) ✍ LIAO Wei Hsin

1998-99 A Haptic Tactile Display Design System Integration and Applications (CU98166)
✍ LIU Yunhui

1999-00 Multisensor Based Control of Dexterous Robots (EE99036)
✍ LIU Yunhui ● XU Yangsheng ● KNOLL Alois* ● ZHANG Jianmei*

2000-01 Real-time Control of Cooperative Robots via the Internet with Force Reflection (CU00173)
✍ LIU Yunhui ● NING Xi* ● WANG Yuechao*

1998-99 Multilayer Recurrent Neural Networks for Real-time Optimization and Their Applications to Optimal Control of Kinematically Redundant Manipulators (CU98165)
✍ WANG Jun ● XU Yangsheng

2000-01 Recurrent Neural Networks for Real-time Grasping Force Optimization of Dexterous Manipulations Using Multi-fingered Robotic Hands (CU00174)
✍ WANG Jun ● LIU Yunhui

2000-01 Optimal Fixture Layout Design for Workholding Automation (EE20022)
✍ WANG Michael Yu

1998-99 Service Robotics (EE98038)
✍ XU Yangsheng ● LIU Yunhui ● TSO S. K.* ● LANG Y. T. Sherman* ● So Ting Pat Albert*

1999-00 A Single-wheel, Gyroscopically Stabilized Robot (CU99403)
✍ XU Yangsheng

1999-00 Developing an Intelligent On-line Monitoring System for Metal Stamping Operating (EE99004)
✍ XU Yangsheng ● DU Ruxu*

2000-01 Smart Wheelchair (CU00197)
✍ XU Yangsheng ● NECHYBA Michael*

1999-00 A Geometric Approach for Sparse Rule Base Interpolation and Extraction (EE99022)
✍ YAM Yeung

RESEARCH OUTPUTS AND PUBLICATIONS

<P004254> **FUNG K.M., Carmen; LAI W.C., King; LI Wen J.; LIU Yunhui; ELHAJJ Imed and XI Ning.** "Sensing and Action in a Micro Environment Via Internet". *Proceedings of the 2000 International Conference on Information Society in the 21st Century* p.5. Fukushime, Japan: The University of Aizu, 2000.11.05.

<P004261> **BARANYI Peter and YAM Yeung.** "Complexity Reducation of a Generalised Rational Form". *Fuzzy If-Then Rules in Computational Intelligence: Theory and Applications* ed. by D. Ruan and E.E. Kerre. pp.135-160. Kluwer Academic Press, 2000.04.

<P007622> **DORNAIKA Fadi and CHUNG Chi Kit Ronald.** "Cooperative Stereo-Motion: Matching and Reconstruction". *Computer Vision and Image Understanding* vol.79, pp.408-427. Academic Press, 2000.09.

<P011918> **LI S.T.; GE Q.J. and VARSHNEY A.** "Web-Based Interactive Design of Freeform Motions". *Proceedings of the 2000 ASME Design Engineering Technical Conferences* American Society of Mechanical Engineers, 2001.09.

<P011997> **CHANG Chu-Fei; VARSHNEY Amitabh and GE Q.J.** "Haptic and Aural Rendering of a Virtual Milling Process". *Proceedings of 2000 ASME Design Engineering Technical Conferences* The American Society of Mechanical Engineers, 2001.09.

<P012018> **CHUNG, Ronald and HE Yong.** "The View-Change Decision Problem in a New Concept of e-Shop". *Proceedings of the 8th IEEE Conference on Mechatronics and Machine Vision in Practice* pp.284-288. Hong Kong: IEEE, 2001.08.

<P012183> **WONG Kwok-Ming and LIAO Wei-Hsin.** "Experimental Investigation of an Enhaused Self-Seusing Active Coustrained Lager Damping Treatment". ed. by WONG Kwok Ming, LIAO Wei Hsin. California, USA, 2001.03.07.

<P012208> **KWONG Chung Ping.** "The Minimum Worst Case Error of Fuzzy Approximators". *IEEE Transactions on Systems, Man, and Cybernetics-Part A.* vol.31 no.6, pp.714-716. USA, 2001.11.

<P012759> **LAM Hiu Fung and LIAO Wei Hsin.** "Semi-Active Control of Automotive Suspension Systems with Magnetorheological Dampers". *Proceedings of SPIE Conference on Smart Structures and Materials* vol.4327, pp.125-136. CA, USA: SPIE, 2001.03.

<P012776> **FUNG Kar Man Carmen, LI Wen Jung, ELHAJJ Imad and XI Ning.** "Internet-Based Remote Sensing and Manipulation in Micro Environment". *Proceedings of the 2001 IEEE/ASME International Conference on Advanced Intellige* pp.695-700. Como, Italy, 2001.07.08.

<P012899> **BARDNYI P.; YAM Y.; YANG C.T.; VARLAKI P. and MICHELBERGER P.** "Inference Algorithm Independent SVD Fuzzy Rule Base Complexity Reduction". *Journal of Advanced Computational Intelligence* vol.5 no.1, pp.22-30. Tokyo, Japan, 2001.02.

<P012901> **YAM Yeung, LEI Kin Fong Thomas and BARANYI Peter.** "Control of a SMA Actuated Artificial Face Via Neuro-fuzzy Techniques". *Proceeding of the 10th IEEE International Conference on Fuzzy Systems* Melbourne, Australia: IEEE, 2001.12.02.

<P012902> **BARANYI Peter; VARKONYI-KOCZY Annamaria R.; YAM Yeung and MICHELBERGER Pal.** "HOSVD Based Computational Complexity Reduction of TS Fuzzy Models". *Proceeding of the Joint 9th IFSA World Congress and 20th NAFIPS International Conference* pp.2482-2487. Vancouver, Canada: IEEE, 2001.07.25.

<P012903> **BARANYI Peter, VARKONYI-KOCZY Annamaria R, YAM Yeung, VARLAKI Peter and MICHELBERGER Pal.** "An Adaption Technique to SVD Reduced Rule Bases". *Proceeding of the Joint 9th IFSA World Congress and 20th NAFIPS International Conference* pp.2488-2493. Vancouver, Canada: IEEE, 2001.07.25.

<P012904> **YAM Yeung and KOCZY Laszlo T.** "Fuzzy Interpolation with Cartesian Representation and Extensibility Functions". *Proceeding of the Joint 9th IFSA World Congress and 20th NAFIPS International Conference* pp.2852-2857. Vancouver, Canada: IEEE, 2001.07.25.

<P012905> **ELHAJJ Imad, XI Ning, FUNG Wai Keung, LIU Yunhui, LI Wen Jung, KAGA Tomoyuki and FUKUDA Toshio.** "Haptic Information in Internet-Based Teleoperation". *IEEE/ASME Transactions on Mechatronics* vol.6 no.3, pp.295-304. USA: IEEE, 2001.09.01.

<P012906> **HUI K.C.** "An Extended Axial Deformation for Free-form Design". *CAD/Graphics'2001* pp.142-147. Kumming, China: Zhejiang University, Yunnan University,Microsoft Research China, 2001.08.22.

<P012956> **HUI K.C. and LAI C.F.** "Free-Form Deformation of Solid Models in CSR". *Eurographics 2001 Short Presentations* pp.127-133. Manchester, UK: The European Association for Computer Graphics, 2001.09.

<P012959> **LIAO Wei Hsin, WANG Daihua and HUANG S.L..** "Wireless Monitoring of Cable Tension of Cable-Stayed Bridges Using PVDF Piezoelectric Films". *Journal of Intelligent Material Systems and Structures* vol.12, pp.331-339. UK: Sage, 2001.

<P012987> **SHEN Yantao, LIU Yunhui and LI Kejie.** "Adaptive Visual Feedback Control of Manipulators in Uncalibrated Environment". *Proceedings of the 2001 IEEE/RSJ International Conference on Intelligent Robots and Systems* pp.7-12. Maui, Hawaii: IEEE, 2001.11.03.

<P012999> **WANG Daihua and LIAO Wei Hsin.** "Neural Network Modeling and Controllers for Magnetorheological Fluid Dampers". *Proceedings of the 10th IEEE International Conference on Fuzzy Systems* Melbourne, Australia: IEEE, 2001.12.

<P013000> **LIAO Wei Hsin and WANG Daihua.** "Vibration Control of Train Suspension Systems Via MR Fluid Dampers". *Proceedings of the 12th International Conference on Adaptive Structures and Technologies* pp.137-146. USA: University of Maryland, 2001.10.

<P013001> **DAN Ding, LIU Yunhui, WANG Michael Yu and WANG Shuguo.** "Automatic Selection of Fixturing Surfaces and Fixturing Points for Polyhedral Workpieces". *IEEE Transctions on Robotics and Automation* vol.17 no.6, pp.833-841. USA: IEEE, 2001.12.01.

<P013002> **DAN Ding; LIU Yun-Hui and WANG Shuguo.** "Computation of 3-D Form-Closure Grasps". *IEEE Transctions on Robotics and Automation* vol.17 no.4, pp.515-522. USA: IEEE, 2001.08.01.

<P013003> **DAN Ding, LIU Yunhui and WANG Michael Yu.** "On Computing Immobilizing Grasps of 3-D Curved Objects". *Proceedings of 2001 IEEE International Symposium on Compoutational Intelligence* pp.11-16. Banff, Alberta, Canada: IEEE, 2001.07.29.

<P013004> **DING Dan; LIU Yun-Hui and WANG Yu Michael.** "Automatic Selection of Fixturing Surfaces and Fixturing Points for Polyhedral Workpieces". *Proceedings of 2001 IEEE/RSJ Int. Conf. on Intelligent Robots and Systems* pp.1147-1152. USA: IEEE, 2001.11.03.

<P013014> **LO Wang Tai, SHEN Yantao and LIU Yunhui.** "An Integrated Tactile Feedback System for Multifingered Robot Hands". *Proceeding of 2001 IEEE/RSJ International Conference on Intelligent Robots and Systems* pp.680-685. Maui, Hawaii, USA: IEEE, 2001.10.29.

<P013022> **LAM Miu Ling, DING Dan and LIU Yunhui.** "Grasp Planning with Kinenatic Constraints". *Proceedings of the 2001 IEEE/RSJ International Conference on Intelligent Robots* vol.2 no.1, pp.943-948. Maui, Hawaii, USA: IEEE, 2001.10.29.

<P013028> **QIN Shui Jie Julia and LI Wen Jung.** "Fabrication of Micro Channels Using Laser-Induced Plasma Ablation of Quartz with Q-Switched Nd: YAG Laser". *Piezoelectrics & Acoustooptics (National Conference on Micro and Nano Svstems)* vol.23 no.5, pp.139-143. Chongqing, China: Chinese Academy of Sciences (CAS), 2001.10.

<P013029> **QIN Shui Jie Julia and LI Wen Jung.** "Fabrication of Nano Channel Systems in Quartz by Laser-Induced Splitting". *Proceedings of IEEE-Nano 2001* pp.233-237. Hawaii, USA: IEEE, 2001.10.

<P013030> **ZHOU Wenli; LEI Kin-fong; LI Wen J. and YAM Yeung.** "A Proposal for Manipulating Nafiion Micro Actuators Using Neural-Fuzzy Based Control". *2001 IEEE International Fuzzy Systems Conference* vol.2 no.1, pp.1327-1330. Melbourne, Australia: IEEE, 2001.12.

<P013031> **Zhou Wen Li Jennifer, HUI P. Allan, LI Wen Jung and XI Ning.** "Development of a Force-Reflection Controlled Micro Underwater Actuator". *Proceedings of the 2001 IEEE/RSJ Internation Confernece on Intelligent Robots and Systems* pp.363-368. Maui, Hawaii: IEEE, 2001.10.29.

<P013373> **TO K.H. Tony; SUN Winston and LI Wen J.** "Wireless Self-Powered Rotation Sensing System Using a Vibration-Based Micro Power Transducer". *IEEE International Conference on Mechatronics and Machine Vision in Practice, 2001* pp.382-386. Hong Kong: IEEE, 2001.08.27.

<P016007> **ZHU W. D.; NI J. and HUANG Jie.** "Active Control of Translating Media with Arbitrarily Varying Length". *ASME Journal of Vibration and Acoustics, 2001* vol.123, pp.347-358. 2001.07.

<P016051> **ZHANG Yunong and WANG Jun.** "Recurrent Neural Networks for Nonlinear Output Regulation" *Automatica (Special Issue on Neural Networks for Feedback Control)* vol.37 no.8, pp. 1161-1173. 2001.08.

<P016078> **FUNG Wai Keung and LIU Yunhui.** "A Game-theoretic Adaptive Categorization Mechanism for ART-type Network" *Proceedings of International Conference on Artificial Neural Networks* Viena, 2001.08.

<P016139> **LAW Ngai Fong and CHUNG Chi Kit Ronald.** "Multiresolution Discontinuity-preserving Surface Reconstruction" *Pattern Recognition* vol.34 no.11, pp. 2133-2144. 2001.11.

<P016244> **LIU X. Peter, MENG Max Qing Hu and GU J. Jason.** "Adaptive Scaling Control for the Internet-based Teleoperation". *Proceedings of 2001 IEEE International Symposium on Computational Intelligence i* pp.242-247. Banff, Alberta, Canada: IEEE, 2001.07.29.

<P016592> **TANG Wai Sum, LAM Miu Ling and WANG Jun.** "Kinematic Control and Obstacle Avoidance for Redundant Manipulators Using a Recurrent Neural Network". *Artifical Neural Networks - Proceedings of International Conference on Artificial Neural Networks* pp.922-929. Vienna, Australia: Springer-Verlag Berlin Heidelberg, 2001.08.

<P016601> **LAW T.W., CHOW Man Kit, LIU Yunhui, XU Yangsheng, CHAN W., FUNG Wai Keung and LEUNG Yun Yee Martin.** "Navigation of a Hospital Transport Robot using Natural Landmarks". *Proceedings of the 2001 IEEE Int. Conf. on Merchatroncis and Machine Vision in Practice* pp.446-451. Hong Kong SAR: IEEE, 2001.08.24.

<P016669> **TAN Ying and WANG Jun.** "Nonlinear Blind Source Separation Using Higher-order Statistics and a Genetic Algorithm". *IEEE Transactions on Evolutionary Computation* vol.5 no.6, pp.600-612. 2001.12.

<P016675> **CHEN Zhiyong and HUANG Jie.** "A Complete Solution of Output Regulation of Singular Nonlinear Systmes by Normal Output Feedback". *Proceedings of 2001 Chinese Control Conference* pp.167-172. Dalin, 2001.08.

<P016684> **DORNAIKA Fadi and CHUNG Chi Kit Ronald.** "An Algebraic Approach to Camera Self-calibration" *Computer Vision and Image Understanding* vol.83 no.3, pp.195-215. 2001.09.

<P016834> **WANG Dan and HUANG Jie.** "Neural Network Based Adaptive Dynamic Surface Control for Nonlinear Systems in Strict-Feedback Form". *Proceedings of the 40th IEEE Conference on Decision and Control* pp.3524-3529. Oriando, Florida, USA: IEEE, 2001.12.

<P016900> **LIU X. Peter; MENG Max Qing Hu and ZUO Ming J.** "Optimal Design of Continuous-state Parallel-series Systems Using Neural Networks". *Proceedings of the 2001 European Safety and Reliability International Conference (ESREL 2001)* 6pgs. Torino, Italy, 2001.09.16.

<P016994> **XU Yangsheng.** "Intelligent Machines and Machine Intelligence: Where The Intelligence Comes From". *Proceedings Of Chinese National Conference On Intelligent Automation -- Keynote Speech* pp.22-28. Kuming, China, 2001.08.

<P017000> **LI Wen Jung, ELHAJJ Imad, XI Ning, FUNG Kar Man Carmen and LAI Wai Chiu King.** "Transmission of Multimedia Information on Micro Environment Via Internet" *Proceedings of IEEE IECON 2000 IEEE* 2001.10.

<P017020> **GONG W., CALABIA A. and DU Ruxu.** "Automatic Robot Path Generation for Welding on Sculpture Surfaces". *Proceedings of the IASTED International Conference Robotics and Applications 2001* Tempa, Florida, USA: International Association of Science and Technology for Development, 2001.11.

<P017024> **HUANG Jie.** "Remarks on the Robust Output Regulation Problem for Nonlinear Systems". *IEEE Transactions on Automatic Control* vol.46 no.21, pp.2028-2031. USA, 2001.12.

<P017067> **YANG X. Simon and MENG Max Qing Hu.** "Neural Network Approaches to Dynamic Collision-free Trajectory Generation". *IEEE Transactions on Systems, Man, and Cybernetics - Part B: Cybernetics* vol.31 no.3, pp.302-318. IEEE, 2001.06.

<P017141> **CHEN Zhiyong and HUANG Jie.** "Robust Output Regulation of Singular Nonlinear Systems". *Communications in Information and Systems* vol.1 no.4, pp.381-394. USA: International Press, 2001.12.

<P017326> **WANG Dan and HUANG Jie.** "Asymptotic Tracking of a Class of Uncertain Nonlinear Systems in Strict-feedback Form". *IFAC Symposium on System Structure and Control* Prague, Czech Republic, 2001.08.29.

<P017337> **GU Jason J., MENG Max Qing Hu, COOK Albert, FAULKNER M. Gary and LIU Peter X..** "Sensing and Control of A Robotic Prosthetic Eye for Ocular Implant". *Proceedings of the 2001 IEEE/RSJ International Conference on Intelligent Robots and Systems* pp.2166-2171. Maui, Hawaii, USA: IEEE, 2001.10.29.

<P017408> **ZHANG Yunong and WANG Jun.** "Recurrent Neural Networks for Nonlinear Output Regulation" *Proceedings of First IFAC/IEEE Symposium on System Structure and Control* Prague, Czech Republic, 2001.08.

<P017517> **CHEN Anshi, ZOU Huijun and DU Ruxu.** "Modeling of Industrial Sewing Machines and Balancing of Thread Requirement and Thread Supply". *The Textile Institute* pp. 982-990. 2001.

<P017548> **ZHANG Yunong and WANG Jun.** "Toque Minimization of Kinematically Redundant Manipulators Using a Dual Neural Network". *Proceedings of International Conference on Neural Imformation Processing* Shanghai, China: Fudan University Press, 2001.11.

<P017634> **YANG X Simon, YUAN Xiaobu, MENG Max Qing Hu, YUAN Guangfeng and LI Hao.** "Real-time Planning and Control of Robots Using Shunting Neural Networks". *Proceedings of 2001 IEEE/RSJ International Conference on Intelligent Robots and Systems* pp.1590-1595. Maui, Hawaii, USA: IEEE, 2001.10.29.

<P017659> **LEE Ka Keung and XU Yangsheng.** "Input Reduction in Human Sensation Modeling Using Independent Component Analysis". *IEEE/RSJ International Conference on Intelligent Robots and Systems* pp.1854-1859. 2001.

<P017924> **GU Jason J., MENG Max Qing Hu, COOK Albert, FAULKNER M. Gary and LIU Peter X..** "Multiple Sensor Data Fusion in Robotic Prosthetic Eye System". *Proceedings of 2001 IEEE International Symposium on Computational Intelligence i* pp.65-70. Banff, Alberta, Canada: IEEE, 2001.07.29.

<P017941> **DING Dan, LIU Yunhui and WANG Michael Yu.** "Automatic Selection of Fixturing Surfaces and Fixturing Points for Polyhedral Workpieces". *Proceedings of 2001 IEEE/RSJ International Conference on Intelligent Robots and* vol.2, pp. 1147-1152. Maui, Hawaii, USA: IEEE, 2001.10.29.

<P018066> **YEUNG Kin and HUANG Jie.** "Development of the Internet Based Control Experiment". *Proceedings of the 40th IEEE Conference on Decision and Control* pp.2809-2815. Oriando, Florida, USA: IEEE, 2001.12.

<P018129> **DENG Feiqi and HUANG Jie.** "Computer-aided Design of Nonlinear H-infinity Control Law: The Benchmark Problem". *Proceedings of 2001 Chinese Control Conference* pp.840-845. Dalin, China, 2001.08.

<P018151> **GE Ming, ZHANG Guicai and XU Yangsheng.** "Fault Diagnosis of Stamping Processes Using Wavelet Packet and Neural Networks". *International Conference on Computational Intelligence for Modelling, Control an* pp.20-29. Las Vegas, USA, 2001.07.

<P018453> **ZHOU Wen Li; LEI Kin Fong Thomas; LI Wen Jung and YAM Yeung.** "A Proposal for Manipulating Nafion Micro Actuators Using Neural-Fuzzy Based Control". *Proceedings of the 10th IEEE International Conference on Fuzzy Systems* Melbourne: IEEE, 2001.12.02.

<P018525> **ZUO Ming, LIU Xiaoping Peter and MENG Max Qing Hu.** "Using Neural Network Function Approximation for Optimal Design of Continuous-state Parallel-series Systems" *Computers and Operations Research* 2001.09.

<P018745> **NECHYBA Michael and XU Yangsheng.** "On Learning Discontinuous Human Control Strategies". *International Journal of Intelligent Systems* vol.16 no.4, pp. 547-570. 2001.

<P018759> **YE Xudong and HUANG Jie.** "Decentralized Adaptive Output Regulation for Large-scale Nonlinear Systems". *Proceedings of IFAC Symposium on Nonlinear Control Design* 2001.07.

<P018822> **HE Chao, ZHANG Yuhe and MENG Max Qing Hu.** "Backlash Compensation by Neural-network Online Learning". *Proceedings of 2001 IEEE International Symposium on Computational Intelligence i* pp.161-165. Banff, Alberta, Canada: IEEE, 2001.07.29.

<P018864> **XU Yangsheng, LI Wen Jung, ZHOU Wen Li and KWOK Yiu Fai Michael.** "Micro Nafion Actuators For Cellular Motion Control And Underwater Manipulation" *Experimental Robotics* VII, pp. 471-480. Springer-Verlag Berlin Heidelberg, 2001.

<P018869> **D. Pelinescu and WANG Michael Yu.** “Multi-Objective Optimal Fixture Layout Design in a Discrete Domain”. *Proceedings of 2001 IEEE/ASME International Conference on Advanced Intelligent M* vol.1, pp.201-206,. USA: IEEE, 2001.07.

<P018964> **YANG X. Simon, YUAN Guangfeng and MENG Max Qing Hu.** "Real-time Collision-free Path Planning and Tracking Control of a Nonholonomic Mobile Robot Using a Biologically Inspired Approach". *Proceedings of 2001 IEEE International Symposium on Computational Intelligence i* pp.113-118. Banff, Alberta, Canada: IEEE, 2001.07.29.

<P018973> **YANG X. Simon and MENG Max Qing Hu.** "Real-time Fine Motion Control of Robot Manipulators with Unknown Dynamics". *Dynamics of Continuous, Discrete and Impulsive Systems, Series B: Applications & Algorithms* vol.8 no.3, pp.339-358. Watam Press, 2001.

<P019007> **CHEN Pengnian; QIN Huashu and HUANG Jie.** "Local Stabilization of a Class of Nonlinear Systems by Dynamic Output Feedback". *Automatica* vol.37, pp.969-981. Elsevier Science Ltd, 2001.07.

<P019168> **WANG Jin and HUANG Jie.** "Neural Network Enhanced Output Regulation in Nonlinear Systems". *Automatica* vol.37, pp.1189-1200. USA: Elsevier Science Ltd, 2001.08.

<P019236> **LIU X Peter, MENG Max Qing Hu and GU J Jason.** "A Study on the Interface of the Internet-based Teleoperation". *Proceedings of 2001 IEEE International Symposium on Computational Intelligence i* pp. 326-331. Banff, Alberta, Canada: IEEE, 2001.07.29.

<P019338> **LI Qinwen, LIASI Evangelos, DAN Simon and DU Ruxu.** "A Study on the Needle Heating in Heavy Industrial Sewing Part 2: Finite Element Analysis and Experiment Verification". *International Journal of Clothing Science and Technology* vol.13 no.5, pp.351-367. MCB University Press, 2001.

<P019590> **ZHANG Guicai, GE Ming, DU Ruxu and XU Yangsheng.** "Feature Extraction for Stamping Operation Monitoring using Bispectral Analysis". *International Conference on Computational Intelligence for Modelling, Control an* pp.294-302. Las Vegas, USA, 2001.07.

<P019625> **TO K. H. Tony, SUN Winston and LI Wen Jung.** "A Wireless Self-Powered Rotation Sensing System Using a Vibration Based Micro Power Transducer". Paper presented in the IEEE/ASME M2VIP, organised by the IEEE. Hong Kong SAR, 2001.08.

<P019715> **LIANG Xuebin and WANG Jun.** "An Additive Diagonal Stability Condition for Absolute Exponential Stability of a General Class of Neural Networks". *IEEE Transactions on Circuits and Systems - Part I: Fundamental Theory and Applications* vol.48 no.11, pp.1308-1317. 2001.11.

<P019952> **I. ELHAJJ, XI N., FUNG Wai Keung, LIU Yunhui, KAGA T. and FUKUDA T.** "Supermedia in Internet Based Telerobotic Operations". *Proceedings of IFIP/IEEE International Conference on Management of Multimedia Networks and Services* Chicago, USA, 2001.

<P020006> **LAU Sheck Kwan Mark and KWONG Chung Ping.** "Analysis of Echoes in Single-Image Random-Dot-Stereograms". *Journal of Mathematical Imaging and Vision* vol.16, pp.69-79. The Netherlands, 2002.

<P020082> **CHUNG Chi Kit Ronald and HE Yong.** "e-Shop with the Atmosphere of Physical Shop". *Proceedings of the 6th Conference on Digital Image Computing Techniques and Appl* pp.169-173. Melbourne, Australia: Australian Pattern Recognition Society, 2002.01.21.

<P02441> **JIANG Danchi and WANG Jun.** "Augmented Gradient Flows for On-line Robust Pole Assignment Via State and Output Feedback". *Automatica* vol.38 no.2, pp.279-286. Elsevier Science Ltd, 2002.02.

<P02442> **TAN Ying and WANG Jun.** "An RBF Network Method for Blind Signal Separation". *Proceedings of International Joint Conference on Neural Networks* pp.665-668. Honobulu, Hawaii: Hong Kong Government Printer, 2002.05.

<P02443> **TANG Wai Sum and WANG Jun.** "A Lagrangian Network for Multifingered Hand Grasping Force Optimization". *Proceedings of IEEE Intl Joint Conference on Neural Networks* pp.177-182. 2002.05.

<P02444> **LI Yuanqing and WANG Jun.** "Sequential Blind Extraction of Instantaneously Mixed Sources". *IEEE Transactions on Signal Processing* vol.50 no.5, pp.997-1006. USA: IEEE Press, 2002.05.

<P02445> **HU Sanqing and WANG Jun.** "Global Asymptotic Stability and Global Exponential Stability of Continuous-Time Recurrent Neural Networks". *IEEE Transactions on Automatic Control.* vol.Vol.47 no.5, pp.802-807. USA: IEEE Press, 2002.05.

<P02446> **HU Sanqing and WANG Jun.** "Global Exponential Stability of Continuous-Time Interval Neural Networks". *Physical Review E* vol.65 no.3, pp.036133-1-16. USA: Hong Kong Government Printer, 2002.03.

<P02447> **XIA Youshen, LEUNG Henry and WANG Jun.** "A Projetion Neural Network and Its Application to Constrained Optimization Problems". *IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications* vol.49 no.4, pp.447-458. USA: IEEE Press, 2002.04.

<P02448> **HUANG He, CAO Jinde and WANG Jun.** "Global Exponential Stability and Periodic Solutions of Recurrent Neural Networks with Delays". *Physics Letters A* vol.298, pp.393-404. Hong Kong Government Printer, 2002.06.17.

<P02456> **FUNG Kar Man Carmen, ELHAJJ Imad, LI Wen Jung and XI Ning.** "A 2-D PVDF Force Sensing System for Micro-manipulation and Micro-assembly". *Proceedings of the 2002 IEEE International Conference on Robotics and Automation* vol.2, pp.1489-1494. Washington, USA, 2002.05.11.

<P02559> **LO Hok-Chun and CHUNG Ronald.** "Facial Expression Recognition That Allows Face Motion in Depth". *Proceedings of the IASTED International Conference on Signal Processing, Pattern Recognition & Applications* pp.235-242. Crete, Greece: IASTED, 2002.06.

<P02560> **CHUNG Chi Kit Ronald and SU J.B..** "Stereo Vision Without Using the Smoothness Constraint". *Proceedings of the IASTED International Conference on Signal Processing, Pattern* pp.342-347. Crete, Greece: IASTED, 2002.06.

<P026075> **XIANG Guoliang; LIU Yunhui; DAN Ding and SHEN Yantao.** "An Internet Based Pulse Palpation System for Chinese Medicine". *Proceedings of IEEE International Conference on Intelligent Robots and Systems* 2002.

<P026101> **WANG Michael Yu.** "Characterizations of Positioning Accuracy of Deterministic Localization of Fixtures". *Proceedings of IEEE Int. Conference on Robotics and Automation* pp.2894-2899. Washington DC, USA: IEEE, 2002.05.

<P026153> **CHUNG Chi Kit Ronald.** "Relative Viewing Distance: A Correspondence Invariance Under Paraperspective Projection" *Computer Vision and Image Understanding* vol.86 no.1, pp. 1-31. USA, 2002.04.

<P026197> **WANG Michael Yu.** "A full-kinematic model of fixtures for precision locating applications". *Proceedings of IEEE International Conference on Intelligent Robots and Systems* pp.1135-1140. Maui, Hawaii, USA: IEEE, 2001.10.

<P026471> **LIU Xiaoping Peter and MENG Max Qing Hu.** "Internet-based Teleoperation with Time Delay Estimation Using MEP Method". *Proceedings of the 2002 International Conference on Control and Automation (ICCA* pp.1637-1641. Xiamen, China: IEEE, 2002.06.16.

<P026545> **CHEN Zhiyong and HUANG Jie.** "Solution of Output Regulation of Singular Nonlinear Systems by Normal Output Feedback". *IEEE Transactions on Automatic Control* vol.47 no.5, pp.808-813. IEEE, 2002.05.

<P026581> **LAI Chun Yu and LIAO Wei Hsin.** "Vibration Control of a Suspension System via a Magnetorheological Fluid Damper". *Journal of Vibration and Control* vol.8, pp.527-547. UK: Sage, 2002.05.

<P02659> **YAM Yeung and BARANYI Peter.** "Control Design Based on Local Linearization and SVD Consolidation". *Proceedings of the 2002 International Conference on Control and Automation* pp.1659-1663. Xiamen, China: IEEE, 2002.06.16.

<P02660> **BARANYI Peter, YAM Yeung, VARKONYI-KOCZY Annamaria R., PATTON Ron J., MICHELBERGER Pal and SUGIYAMA Masaharu.** "SVD-Based Complexity Reduction to TS Fuzzy Models". *IEEE Transactions on Industrial Electronics* vol.49 no.2 pp.433-443. New York, USA: IEEE, 2002.04.

<P026736> **ZHANG Guizai; GE Ming; TONG Hang; XU Yangsheng and DU Ruxu.** "Bispectral Analysis for On-line Monitoring of Stamping Operation". *Engineering Applications of Artificial Intelligence* vol.15, pp.97-104. Elsevier Science Ltd, 2002.

<P026843> **GU Jason; MENG Max Qing Hu; COOK Al and LIU X. Peter.** "Sensor Fusion in Mobile Robot: Some Perspectives". *Proceedings of the 4th World Congress on Intelligent Control and Automation (WCICA 2002)* pp.1194-1199. Shanghai, China: IEEE, 2002.06.10.

<P026853> **SHEN Yantao; LO Wang Tai; LIU Yunhui and LI K.** "Haptic Tactile Feedback in Teleoperation of Multi-fingered Hands". *Proceedings of IEEE International Conference on Mechtronics and Machine Vision in Practice* 2002.

<P027146> **HU Chao and MENG Max Qing Hu.** "Improve the Resolution of Analog Digital Conversion by Software Processing". *Proceedings of the 4th World Congress on Intelligent Control and Automation* pp. 2176-2180. Shanghai, China: IEEE, 2002.06.10.

<P027149> **WANG Dan and HUANG Jie.** "Adaptive Neural Network Control for a Class of Uncertain Nonlinear Systems in Pure-feedback Form". *Automatica* vol.38, pp. 1365-1372. Elsevier Science Ltd, 2002.

<P02715> **XU Yangsheng, SONG J. Y., NECHYBA C. Michael and YAM Yeung.** "Performance Evaluation and Optimization of Human Control Strategy". *Journal of Robotics and Autonomous Systems* vol.965 no.1, pp.1-18. New York, USA: Hong Kong Government Printer, 2002.04.

<P02723> **ZHANG Yunong and WANG Jun.** "Global Exponential Stability of Recurrent Neural Networks for Synthesizing Linear Feedback Control Systems Via Pole Assignment". *IEEE Transactions on Neural Networks* vol.13 no.3, pp.633-644. USA: IEEE Press, 2002.05.

<P02725> **ZHANG Yunong and WANG Jun.** "A Dual Neural Networks for Convex Quadratic Programming Subject to Linear Equality and Inequality Constraints". *Physics Letters A* vol.298, pp.271-278. The Netherlands: Hong Kong Government Printer, 2002.06.10.

<P02726> **FOK Lo Ming and WANG Jun.** "Two Recurrent Neural Networks for Grasping Force Optimization of Mulfi-fingered Robotic Hands". *Proceedings of the 2002 World Congress on Computational Intelligence (Internatio* pp.35-40. Honolulu, Hawaii, USA, IEEE, 2002.05.13.

<P027312> **LUO Chaomin; YANG X. Simon and MENG Max Qing Hu.** "Entire Region Filling in Indoor Environments Using Neural Networks". *Proceedings of the 4th World Congress on Intelligent Control and Automation (WCICA 2002)* pp.2039-2044. Shanghai, China: IEEE, 2002.06.10.

<P027320> **XIONG Yulong; DING Han and WANG Michael Yu.** "Quantitative Analysis of Inner Force Distribution and Load Capacity of Grasps and Fixtures". *Trans. of ASME, Journal of Manufacturing Science and Engineering* vol.124 no.2, pp.444 - 455. USA: ASME, 2002.05.01.

<P027356> **DU Ruxu and XU Yangsheng.** "On-line Monitoring of Sheet Metal Stamping Operations". *The 5th S. M. Wu Conference on Manufacturing Science and Engineering* Dalin, China, 2002.06.

<P027386> **SHEN Yantao; XIANG Guo Liang and LIU Yunhui.** "Adaptive Motion Control of Manipulators Using Un-claibrated Visual Feedback". *Proceedings of IEEE International Conference on Intelligent Robots and Systems* 2002.

<P027405> **HONG Yiguang; XU Yangsheng and HUANG Jie.** "Finite-time Control for Robot Manipulators". *Systems and Control Letters* vol.46, pp.243-253. Elsevier Science BV, 2002.01.15.

<P02742> **FUNG Wai-Keung, XI Ning, LO Wang Tai and LIU Yunhui.** "Improving Efficiency of Internet Based Teleoperation Using Network QoS". *Proceedings of the 2002 IEEE International Conference on Robotics & Automation* pp.2707-2712. Washington DC: IEEE, 2002.05.01.

<P02743> **ELHAJJ Imad, XI Ning, SONG BooHeon, YU Meng-Meng, LO Wang Tai and LIU Yunhui.** "Transparency and Synchronization in Supermedia Enhanced Internet-Based Teleoperation". *Proceedings of the 2002 IEEE International Conference on Robotics & Automation* pp.2713-2718. Washington DC: IEEE, 2002.05.01.

<P02744> **FOK Lo-Ming and WANG Jun.** "Two Recurrent Neural Networks for Grasping Force Optimization of Multi-fingered Robotic Hands". *Proc. of Intl. Joint Conference on Neural Networks* pp.35-40. Hawaii, USA: IEEE Press, 2002.05.

<P027454> **YANG Juhchin A.; JAGANATHAN Venkatraman and DU Ruxu.** "A New Dynamic Model for Drilling and Reaming Processes". *International Journal of Machine Tools & Manufacture* vol.42 no.2, pp.299-311. Elsevier Science Ltd, 2002.

<P027484> **GUO W. Z. and DU Ruxu.** "Conceptual Design of Mechantronic Products and Systems with Motions". *Proceedings of the International Conferences on Information and Knowledge Engineering* pp.178-183. Las Vegas, USA, 2002.06.24.

<P027682> **MA Shugen, LI Wen Jung, XI Ning and WANG Yue Chao.** "Internet-Enchanced Automation in Micro Environment". *Proceedings of the 4th World Congress on Intelligent Control and Automation (WCI* pp.1306-1310. Shanghai, China: IEEE, 2002.06.14.

<P027684> **CHEN Zhiyong and HUANG Jie.** "Global Robust Stabilization of Cascaded Polynomial Systems". *Proceedings of the 2002 International Conference on Control and Automation* Xiamen, China: IEEE, 2002.06.

<P02776> **LAI Wai Chiu King, HUI Allan Poon and LI Wen Jung.** "Non-Contract Batch Micro-assembly by Centrifugal Force". *IEEE Micro Electro Mechanical Systems Conference 2002* 4pgs. Las Vegas, Nevada, 2002.01.20.

<P028050> **HUANG Jie and CHEN Zhiyong.** "A General Framework for Output Regulation Problem". *Proceedings of the American Control Conference* pp.102-109. Anchorage, AK, USA: American Automatic Control Council, 2002.05.

<P02809> **LIAO Wei Hsin and WONG Kwok Ming.** "Active-Passive Hybrid Control of Smart Structures with Enhanced Self-Sensing Piezoelectric Actuators". *Proceedings of the 2002 International Conference on Control and Automation* SML03-4, pp.1223-1227. Xiamen, 2002.06.

<P02810> **LIAO Wei Hsin and LAI Chun Yu.** "Harmonic Analysis of Semi-Active Control with MR Dampers". *Proceedings of the SPIE Conference on Smart Structures and Materials* SPIE vol.4697, pp.370-381. CA, USA: SPIE, 2002.03.

<P02811> **LIAO Wei Hsin and LAI Chun Yu.** "Harmonic Analysis of a Magnetorheological Damper for Vibration Control". *IOP Journal Smart Materials and Structures* vol.11, pp.288-296. UK: IOP, 2002.04.

<P02812> **HUI Kin Chuen and WONG Ngai Ning.** "Hands on a Virtually Elastic Object". *The Visual Computer Germany* vol.18 no.3, pp.150-163. Springer - Verlag, 2002.05.

<P028132> **GU J. Jason; MENG Max Qing Hu; COOK Albert; FAULKNER M. Gary and LIU X. Peter.** "Neural Network Based Sensor Fusion and Dynamic Motion Control of a Robotic Eye System". *Dynamics of Continuous, Discrete and Impulsive Systems, Series B: Application & Algorithms* vol.9 no.1, pp.101-113. 2002.

<P028291> **GE Ming; ZHANG Guizai; DU Ruxu and XU Yangsheng.** "Feature Extraction from Energy Distribution of Stamping Processes Using Wavelet Transform". *Journal of Vibration and Control* vol.8. Sage Publications, 2002.

<P028310> **ZHANG Guicai; GE Ming; TONG Hang; XU Yangsheng and DU Ruxu.** "Bispectral Analysis for On-line Monitoring of Stamping Operation". *International Journal of Intelligent Real-time Automation: Engineering Applications of Artificial Intelligence* vol.15, pp.97-104. Elsevier Science Ltd, 2002.

<P02835> **DAN Ding, XIANG Guo Liang, LIU Yunhui and WANG Michael Yu.** "Fixture Layout Design for Curved Workpieces". *Proceedings of the 2002 IEEE International Conference on Robotics and Automation* pp.2906-2911. Washington DC: IEEE, 2002.05.01.

<P02836> **SHEN Yantao, XIANG Guo Liang, LIU Yunhui and LI Kejie.** "Uncalibrated Visual Servoing of Planar Robots". *Proceedings of the 2002 IEEE International Conference on Robotics and Automation* SPIE vol.4701, pp.580-585. Washington DC: IEEE, 2002.05.01.

<P02837> **LAW Wai Wing, LIAO Wei Hsin and HUANG Jie.** "Implementation of Structures with Self-sensing Piezoelectric Actuators Incorporating Adaptive Mechanisms". *Proceedings of the SPIE Conference on Smart Structures and Materials* SPIE vol.4701, pp.304-315. CA, USA: SPIE, 2002.03.

<P02838> **LAM Raymong H. W., ELHAJJ Imad, LI Wen Jung and XI Ning.** "A Guide-Rod with Internet-Based Temperature Sensation Display System for Bone Internal Fixation Surgery". *Proceedings of the International Conference on Control and Automation, June 2002* Xiamen, China: Xiamen Universtiy, China, 2002.06.

<P02839> **LAM Alan H. F. and LI Wen Jung.** "MIDS: GUI and TUI in Mid-Air Using MEMS Sensors". *Proceedings of the 2002 International Conference on Control and Automation* pp.1218-1222. Xiamen, China, 2002.06.

<P028405> **LIU Xiaoping Peter; MENG Max Qing Hu; YE Xiufen and GU Jason.** "An UDP-based Protocol for Internet Robots". *Proceedings of the 4th World Congress on Intelligent Control and Automation (WCICA 2002)* pp.59-65. Shanghai, China: IEEE, 2002.06.10.

<P028439> **LI Xiaoli and DU Ruxu.** "Analysis and Compensation of Workpiece Error in Turning ". *International Journal of Production Research* vol.40 no.7, pp. 1647-1667. Taylor & Francis Ltd., 2002.

<P028450> **LAW Kwok Ho Cedric and XU Yangsheng.** "Shared Control for Navigation and Balance of a Dynamically Stable Robot". *Proceedings of the 2002 IEEE International Conference on Robotics & Automation* pp.1985-1990. Washington DC, USA, 2002.05.

<P028544> **WANG Michael Yu.** "Efficient Prediction of Workpiece-fixture Contact forces". *WSEAS Intl. Conf. on Signal Processing, Robotics, and Automation* pp.1041-1047. USA: WSEAS, 2002.06.

<P028581> **LI Xiaoli and DU Ruxu.** "Analysis and Compensation of Workpiece Errors in Turning". *International Journal of Production Research* vol.40 no.7, pp.1647-1667. Taylor & Francis Ltd., 2002.

<P02860> **ZHANG Yunong and WANG Jun.** "Bi-Criteria Kinematic Control of Redundant Manipulators Using a Dual Neural Network". *Proceedings of the 2002 International Joint Conference on Neuval Networks of the* Session 10, no.1, pp.41-47. Hawaii: IEEE Neural Networks Society, INNS, IEE, EPS, 2002.05.

<P028661> **CHING Ngai Hung Neil; WONG Hiu Yung; LI Wen Jung; LEONG Philip Heng Wai and WEN Zhiyu.** "A Laser-Micromachined Multi-Model Resonating Power Transducer for Wireless Sensing Systems". *Sensors and Actuators A: Physical* vol.97-98, pp.685-690. Elsevier, 2002.

<P028785> **YANG X. Simon; LUO Chaomin and MENG Max Qing Hu.** "A Neural Computational Algorithm for Coverage Path Planning in Changing Environments". *Proceedings of International Conference of Communication Circuits and Systems (ICCCAS 2002)* pp.1174-1178. Chengdu, China: IEEE, 2002.06.28.

<P028886> **OU Yongsheng and XU Yangsheng.** "Stabilization and Line Tracking of the Gyroscopically Stabilized Robot". *Proceedings of the 2002 IEEE International Conference on Robotics and Automation* pp.1753-1758. Washington DC, USA: IEEE, 2002.05.

<P028936> **WANG Michael Yu.** "Tolerance Analysis in Automated Design of Fixture Layout". *Assembly Automation* vol.2 no.2, pp.153-162. UK: MCB University Press, 2002.04.01.

<P02901> **QIN Shui Jie Julia and LI Wen Jung.** "Micromachining of Complex Channel Systems in 3D Quartz Substrates Using Q-Switched Nd: YAG Laser". *Applied Physics A - Materials Science & Procecssing* vol.74 no.6, pp.773-777. Germany: Springer-Verlag, 2002.03.

<P029010> **HUI P., QIN S., LI Wen Jung and WANG Michael Yu.** "High Aspect Ratio Nano Fluidic Channels by Laser-controlled Fracturing". *Proceedings of IEEE MEMS Conference 2001* pp.156-159. Las Vegas, Nevada, USA: IEEE, 2002.01.

<P02902> **QIN Shui Jie Julia and LI Wen Jung.** "Process Characterization of Fabricating 3D Micro Channel Systems by Laser-Micromachining". *Sensors and Actuators A : Physical* vol.97-98, pp.749-757. New York, USA: Elsevier Sciences B.V., 2002.05.

<P029314> **LAN Weiyao and HUANG Jie.** "Neural-based Output Feedback Output Regulation: Case Study ". *Proceedings of the 2002 International Conference on Control and Automation* pp.1154-1158. Xiamen, China: IEEE, 2002.06.

<P029725> **LIU Xiaoping Peter; MENG Max Qing Hu; YE Xiufen and GU Jason.** "End-to-end Delay Boundary Prediction Using Maximum Entropy Principle (MEP) for Internet-based Teleoperation". *Proceedings of the 2002 IEEE International Conference on Robotics and Automation (ICRA 2002)* pp.2701-2706. Washington, DC, USA: IEEE, 2002.05.11.

<P029771> **DU Ruxu and XU Yangsheng.** "On-line Monitoring of Sheet Metal Stamping Operations" *The 5th S. M. Wu Conference on Manufacturing Science and Engineering* Dalin, China, 2002.06.

see also <P016937>

RESEARCH PROJECTS

Efficient Algorithms for a Contamination Control Problem on Graphs

- ✍ CAI Leizhen
- ❑ 1 December 2001
- ❖ Research Grants Council (Earmarked Grants)

This project is concerned with the following contamination control problem on a graph, which can be used to study macro-level controls of the spread of diseases, fire, computer viruses and suchlike. Initially, a single vertex in the graph is contaminated and all other vertices are unprotected. Contamination spreads to unprotected vertices through edges and it takes one unit of time to spread contamination from tainted vertices to all their unprotected neighbouring vertices. To control the spread of contamination, one can protect a certain number of uncontaminated vertices in each unit of time, and the objective is to minimize the number of contaminated vertices.

In this project, we study the algorithmic aspects of the contamination control problem. We will consider computational complexity, efficient approximation algorithms, and efficient algorithms for important classes of graphs.

(CS01165)

Financial Application of Neuro-Dynamic Programming

- ✍ CHAN Lai Wan
- ❑ 31 December 2001
- ❖ Research Grants Council (Earmarked Grants)

Deciding the trading signals, such as buy, sell or hold decisions, from the historical asset prices and other market variables has been an attractive research area. It supports decision making in the trading of securities or currency exchange. At present, most trading systems with learning ability use supervised learning methods. For examples, the feedforward neural network and the recurrent neural networks have been applied to the prediction of stock prices. The future values of the assets are predicted and trading signals are generated based on the predicted prices. In this proposal, an alternative approach using neuro-dynamic programming would be applied to tackle the trading of stocks and portfolio.

Neuro-dynamic programming, also known as Reinforcement Learning, has been successfully applied to many AI problems, such as playing backgammon, pole balancing and sequence tracking. It is different from the supervised learning method that no exact target values of each action is required during the training process. The total reward or penalty is obtained at the end of the operation. Reinforcement learning estimates the goodness of each possible action at each stage. These characteristics make reinforcement learning an excellent tool to the trading problem. In this proposal, we will design a trader using Q-learning to determine the trading signals at each time. Variants of the learning methods will be investigated and applied to the trader system to improve the system performance.

(CS01170)

Server-assisted Wireless Public-key Infrastructure

- ✍ FU Wai Chee Ada
- ❑ 1 June 2001
- ❖ Industrial Support Fund, Industry & Technology Development Council

Mobile connections for e-commerce require the mediation of a wireless gateway which is where the client-side WTLS protocol would meet the server-side SSL protocol. This protocol junction unfortunately leaves open a large gap for potential security attacks. Implementing PKI at a layer above WTLS and SSL fixes the problem, but the resource-demanding PKI processing would normally call for additional power on the handheld, which can come from SIM/WIM smartcards plugged into the device.

Smartcard technologies could be expensive as low-cost handheld devices are becoming commonplace. We propose to implement a low-cost alternative based on the concept of what we call server-assisted public-key technology. In the server-assisted scheme, a client would accomplish the PKI functions by drawing upon the processing power of a server. The server takes care of all the heavy processing that is part of the RSA algorithm implementation, and yet is shielded from the full picture with all the key parameters being held in secrecy by the client.

The project deliverables include an implementation of the server-assisted scheme in the form of a software toolkit, and an SDK for integration with a full PKI implementation for mobile commerce based on the server-assisted scheme. The SDK will be used in the development of a wireless storefront to demonstrate the practicality of our solutions. The outcome of our project will benefit many parties, including the network operators, device manufacturers, solution providers, and online merchants. The general public will be the ultimate beneficiaries when provably secure m-commerce becomes a part of our daily life.
(EE00720)

Where is the Beef? Data Mining in High Dimensional Space

- ✍ FU Wai Chee Ada ● KING Kuo Chin Irwin
- ❑ 1 October 2001
- ❖ Research Grants Council (Earmarked Grants)

In recent research work, it is discovered that if we have a dataset of vectors in high dimensional space, and a query point, it may not make sense to ask for a small number of nearest neighbor since probably more than half of the data points are very nearly at the "nearest distance" to the query point [BGRS99]. In real life, high dimensional data are common since many applications have a large number of attributes in their databases, and each attribute can be treated as one of the dimensions. However, patterns involving many dimensions represents very complicated association among many attributes. We believe that such patterns are rare. Interesting patterns would usually exists among a small subsets of the attributes. Although many excellent data mining techniques are known, we find that they are not adequate in handling the problem of high-dimensionality, and in particular the added complication of patterns in subspaces. In this project, we propose to tackle these problems. We shall target at three important problems in data mining which are clustering, association rule mining and classification. We observe that these three problems are related, since the frequent itemsets in association rule mining can be seen as clusters, and classification and clustering both partition data into related groups. Therefore, we may be able to find common features and solutions for these important problems.
(EE01179)

High Performance Computing for Centers, Distinguisher and Clusters in Projected Subspace (and Applications to Intelligent Information Retrieval on the Web)

- ✍ FU Wai Chee Ada
- ❑ 1 April 2002
- ❖ National Natural Science Foundation of China (NSFC)

The widespread use of the Internet has posed novel challenges to every aspect of computer science. Information retrieval on the web, in particular, has attracted researchers from different disciplines to offer solutions out of a variety of ideas and methodologies. In this project, we propose to study several related algorithmic problems with the asymptotic analytic method for algorithms and high performance computing techniques. Central to our study is to develop robust and efficient solutions to automatically abstracting succinct information that characterize classes of large data set, that distinguish one from another and that group them in clusters. Since data processing for such problems becomes much tedious because of a large amount of data that are involved, we apply optimization techniques that have been developed to achieve asymptotically good performance, and techniques to utilize the power of multiprocessor environment, such as cluster of SMP computers. In addition, we will fine-tune our algorithmic results with the existing meta-search engine platform to improve the interpretability of solutions and integrate it with high performance computing techniques to make realistic performance testing of the results.
(EE01492)

Comprehensive Analysis and Interactive Visualization of Cardiac MR Data

- ✍ HENG Pheng Ann ● SHI Peng Cheng* ● WANG Yongmei (Dept of Information Engineering)#
- ❑ 15 December 2001
- ❖ Research Grants Council (Earmarked Grants)

Recent advances in fast Cardiovascular Magnetic Resonance (MR) imaging has enabled the acquisition of detailed anatomical and functional information of

the heart within a short period of time. Being non-invasive and versatile, MR imaging is ideal for monitoring the progression of cardiovascular diseases and the effectiveness of therapeutic or interventional procedures. Parallel progresses made in computerized interactive visualization and image enhancement techniques have augmented the ability of clinicians in grasping and conceptualizing the vast amount of information inherent within the multi-dimensional MR image data. The combination of these new visualization and processing tools with the rapid MR image acquisition techniques will enable clinicians to interactively acquire and visualize detailed anatomical and functional information focused to the region of interest. It will therefore improve the effectiveness of imaging examinations, avoid the costly procedure of reassessment, and minimize the possibility of misdiagnosis.

To implement this concept and in order to facilitate the optimal use of MR image data, we propose in this project to develop an intelligent virtual environment with the ability of providing knowledge-based image segmentation, multi-modal cardiac image fusion, image data mining, and dynamic cardiac feature visualization with multi-sensory feedback. The proposed interactive visualization environment benefits not only cardiologists but also research scientists and medical students in that it allows an in-depth understanding of the physiology and pathophysiology of the heart. The system is expected to improve the overall quality of non-invasive cardiovascular imaging examination and directly benefit the management of patients with heart disease. Today, cardiovascular disease is the direct cause of death of some 15 million people each year, accounting for 45% of all deaths in industrialized countries and 25% in developing countries.

(CS01180)

Distributed Content-based Image Search Engine

- ✍ KING Kuo Chin Irwin
- ❑ 1 January 2002
- ❖ CUHK Research Committee Funding (Direct Grants)

Being stand-alone systems, many multimedia information and database system do not share their information with other similar content-based image retrieval systems due to issues such as system incompatibilities, different low-level image feature extraction formats, and inconsistent high-level knowledge representations. These issues cause problems for users to query, retrieve, and share relevant information efficiently and effectively across different image databanks over the network.

We propose to design and implement a distributed and interoperable image retrieval system framework to provide interactive and intelligent sharing of image information. We plan to have a set of agent-based toolkits (functional libraries) to achieve this goal.

The long-term significance of this proposal is to provide a uniform way to access content-based image information on the network across from a diverse image banks. This will reduce inefficiency of interfacing among various image database systems.

(EE01791)

Reducing Search Space in Local Search for Constraint Satisfaction

- ✍ LEE Ho Man Jimmy ● LEUNG Ho Fung ● STUCKEY P. J.*
- ❑ 1 December 2001
- ❖ Research Grants Council (Earmarked Grants)

Constraint satisfaction problems (CSPs) occur in all walks of industrial applications and computer science, such as scheduling, bin packing, transport routing, type checking, diagram layout, among others. These are all difficult applications. Rapid growth of modern industrial sectors and higher degree of automation suggest the appearance of even more difficult constraint problems in the foreseeable future. Constraint problems are NP-complete in general. The traditional approach to solving CSPs uses a combination of backtracking tree search and constraint propagation, the latter of which increases search efficiency by pruning search space dynamically during search. Another class of solution techniques is based on local search, which has been shown to be effective and efficient in solving some large-scale and some computationally hard classes of CSPs. Local search methods work by traversing the entire search space non-systematically as guided by some heuristic functions and trap-escaping strategies. The aim of the proposed project is to investigate how the search space for local search methods can be pruned by exploiting the structure of the constraints and the

constraint graph. From the theoretical point of view, this project will advance the understanding of the relationship between local search methods and the structure of constraints and constraint graphs. From the practical point of view, the developed technique will be applicable to tackling large-scale and difficult constraint problems.
(CS01204)

Fast Approximate Feature Extraction for Content-based Visual Databases

- ✍ LEE Moon Chuen
- ❑ 1 January 2002
- ❖ CUHK Research Committee Funding (Direct Grants)

Recent advances in computing power and innovations in technology have led to the emergence of new leading edge applications, such as internet image/video search engines, image-based e-commerce, video on demand systems, and general multimedia information systems. An underlying part of these applications is a content-based visual database capturing different types of visual data. Content-based visual databases however require the analysis of huge volumes of data. In particular, the feature extraction process is a major bottleneck in the management and operation of such databases, due to the enormous amount of computation involved. The primary aim of this project is to investigate and to develop methods for improving the efficiency of feature extraction for content-based visual databases. From the theory of statistical occupancy, it proposes to develop a model for approximate feature extraction. This requires a formal selection of the minimal subset of the image data involved in the feature extraction process. Such minimal proportions of image data selected for approximate feature computation should guarantee that the analysis results for different databases functions should be the same as (or close to) those from using the image features based on all the image data. In this project, we plan to provide a formal theoretical basis for the use of approximate features as a paradigm in image analysis and content-based visual information systems, and to derive the equivalent approximate features for the traditional image features, such as shape, colour and texture. The reliability of the results from using such features is a critical factor. Therefore, we will also perform a comprehensive empirical and theoretical investigation on the reliability of such results.
(EE01903)

Interface Software for Cluster Computing: Providing Cost Effective Computational Turn-key Solutions to Local Industries

- ✍ LEONG Philip Heng Wai ● LEUNG Kwong Sak ● SUEN Wai Mo* ● CHOW Kenneth*
- ❑ 1 September 2001
- ❖ Cluster Technology ● University-Industry Collaboration Prog.: Matching Grant for Joint Research, ITF, Innovation & Tech. Commission

Parallel technologies on commodity-computer based clusters are used extensively in academic research, and have been demonstrated to have price-performance ratios more than an order of magnitude better than supercomputers, mainframe computers and high-end servers. The cluster approach is sufficiently mature for mission critical commercial and industrial applications. We propose to develop a software package called “Socket” to enable the efficient deployment of two types of commercial/industrial applications on cluster computers: (1) Partial differential equation based applications—applications ranging from pricing and risk management of derivatives to environmental engineering, and (2) Data-mining applications—applications ranging from discovery of consumer patterns to insurance pricing. Socket will enable us to build turn-key computational solutions for companies in the targeted industries. Furthermore, Socket will be extensible to other applications (although the R&D of such extensions are not covered in this proposal): based on Socket, the specific applications of the companies can be integrated as plug-ins with only minimum modification, and deployed on cluster computers custom-designed for the companies. Availability of such excellent price-performance turn-key solutions will provide companies in Hong Kong the computational power they need to compete with overseas companies which have access to large computers. The software package “Socket”, enabling computationally intensive commercial codes to be easily deployed and efficiently run on a parallel cluster environment, will also have a broad market worldwide. Users can develop high performance parallel solutions with excellent price-performance

ratios without having to explicitly parallelize their codes.
(MD01951)

Integration of Constraint Satisfaction Techniques and Mixed Integer Programming

- ✍ LEUNG Ho Fung ● LEE Ho Man Jimmy
- ❑ 1 October 2001
- ❖ Research Grants Council (Earmarked Grants)

Constraint satisfaction and mixed integer programming are two research areas originating from two different fields of artificial intelligence (AI) and operations research (OR), respectively. Developing largely independently, they are actually different approaches tackling related classes of problems, such as resources allocation, scheduling, human resources management, and timetabling. They have different strengths and weaknesses. Constraint satisfaction is usually more expressive, but it is in general slower and less efficient in solving problems. It does not attempt to reach optimality, either. Mixed integer programming, nevertheless, solves a problem only if the problem is expressible in a particular mathematical form, although it is in general more efficient. In addition, mixed integer programming has a goal to look for an optimal value.

The proposed project aims at the investigation of design and implementation of models of integration of constraint satisfaction and mixed integer programming. Based on the previous work done by the investigators and others, we aim at achieving the following closely related particular objectives. First, we shall propose models of integration and evaluate the performance of these models. Second, we shall tackle the problem of 'generally constrained optimisation,' which we refer to the class of optimisation under both symbolic and linear numeric constraints.

The outputs of this research project include academic publications and prototype implementations. On the academic aspect, this project bridges the research in AI and OR, and benefits both of them. On the application aspect, the results of the project can directly be applied to a large number of real life problems in the areas of resources allocation, scheduling, human resource management and timetabling. These problems arise in virtually every commercial and industrial sector in Hong Kong, China, and worldwide.
(CS01211)

A Novel Fast Evolutionary Algorithm and Its Application in Unsupervised Learning

- ✍ LEUNG Kwong Sak ● WONG Man Leung*
- ❑ 1 September 2001
- ❖ Research Grants Council (Earmarked Grants)

Evolutionary algorithms (EAs) are accurate and reliable but slow in finding global optimal solutions for many classes of problems such as optimisation, unsupervised learning and clustering. The project is to perform a thorough study on the factors causing the inefficiency of EAs and develop techniques and strategies to improve their performance for solving real-life problems such as clustering. We will develop a novel fast evolutionary algorithm (fast-EA) to eliminate the causes of the inefficiency and to exploit all information available for optimisation in general and clustering in particular with the following new features:

The fast-EA uses a variable length representation scheme that can (a) adaptively provide encoding of problem variables in non-uniform length binary code; (b) encode by splicing and decode by decomposition; (c) yield high-precision results by using low-resolution encoding; and (d) adapt to the varying number of clusters and representation resolutions.

(1) A number of *exclusion-based* selection operators will be exploited.
(2) New problem specific (for clustering) scalable genetic operators will be explored including an adaptive mutation operator, local-heuristics based mutation operators, and a hierarchical agglomerative clustering crossover operator.
(3) The fast-EA uses a new powerful *environment-driven* population evolution model to improve the efficiency by influencing or directing the search based on the global information collected so far.

(CS01212)

Object Synchronization, Dynamic Resource Allocations and Admission Control Policies for Distributed Streaming Multimedia Systems: Design, Analysis and Implementation

- ✍ LUI Chi Shing John
- ❑ 15 September 2001

❖ Research Grants Council (Earmarked Grants)

The goal of this research is to help computer system designers and engineers to understand various design issues and different tradeoff in designing a DSMS system. We propose to build a prototype DSMS system which can provide distributed multimedia streaming services such as delivery of educational video material to students and provide a collaborative work environment for engineers and scientists who are working in different parts of the Internet. This prototype system will allow us to take various measurement and fine tune different algorithms so that the system can operate at an optimal operating point. Lastly, we expect this research will contribute both to the body of theoretical knowledge and give insight to the system implementation in the fields of computer and information technologies, such as distributed multimedia system, high performance network and storage system.
(CS01220)

Engineering Distributed Objects for Reliability and Interoperability

✍ LYU Rung Tsong Michael

❑ 1 September 2001

❖ Research Grants Council (Earmarked Grants)

In this project, we propose to investigate reliability and interoperability paradigms for distributed object techniques regarding their architectural support, development process, and testing/evaluation schemes. We engage fault tolerance, fault removal, and fault analysis mechanisms to assure reliability for object construction, and formulate interface specification techniques for object distribution and integration. We further design a generic object-based supporting infrastructure, which can be applied to distributed clients and servers for their reliability and interoperability support. This infrastructure provides a dynamic object supporting middle-ware to enforce object interoperability, and makes use of group multicasting facilities to enhance system fault tolerance. Finally, we apply this distributed object infrastructures to a digital video library system, allowing heterogeneous, distributed objects to search, retrieve and deliver multiple video streams from various sources.
This research is important to the software industry for the development, testing and quality assurance of reliable systems based on components and distributed objects. As modern Information Technologies (IT) and E-commerce applications heavily depend on distributed, reusable, and interoperable objects, this project plays a crucial factor for the advancement of our society. This investigation is particularly critical to the software acquisition, integration, and operation effort of most major industry in Hong Kong, including the software vendors who provide E-commerce and IT integration solutions, and the corporations whose daily operations rely on the quality, reliability, and interoperability of these integrated services.
(CS01222)

Fixed-Point Algorithms for In-Card Fingerprint Recognition

✍ MOON Yiu Sang ● LUK Franklin Tai Cheung#

❑ 1 November 2001

❖ Research Grants Council (Earmarked Grants)

Smart card plays an important role in e-commerce security. Ownership authentication is crucial in card transactions. An emerging method is to use the cardholder's fingerprint for verification. A current implementation has an owner's fingerprint stored inside a smart card. For authentication, the owner's (master) fingerprint is retrieved from the card and sent to a computer for matching against another fingerprint captured live from a fingerprint-reading device connected to the same computer. Such an approach can be insecure because the master fingerprint is shipped out from a secure device (a smart card) to a potentially insecure device (for example, a possibly hacked computer).
A more secure way to carry out the verification process is to have the smart card perform the matching; that is, we send the captured fingerprint to the smart card. A major shortcoming of this choice is the slow speed (about 5 MHz) of the processor resident on the smart card. To alleviate this problem, we will develop a suite of fast matrix-based algorithms. We have two goals: first, provide the necessary theoretical foundations for our algorithms; second, study the implementation of our algorithms using fixed-point arithmetic since no existing smart card processor can perform floating-point computation. The results of our study will have significant impact on the implementations of biometrics authentication methods for all personal

devices such as smart cards, mobile phones and personal digital assistants.
(CS01224)

Synthesizing Multidimensional Applications on Reconfigurable Computing Systems

- ✍ NG Kam Wing
- ❑ 1 January 2002
- ❖ CUHK Research Committee Funding (Direct Grants)

Field-Programmable Gate Arrays (FPGAs)-based configurable computing systems have been shown to outperform general-purpose systems for computationally intensive applications. Many such applications, such as digital library, image processing and computer vision, involve multi-dimensional computations. These computations often consist of loop structures in the form of iterations or recursions. There have been very few studies on solving the problem of mapping such computations onto reconfigurable architectures from a behavioral description. This project concerns a high-level synthesis framework for mapping time-critical sections of multi-dimensional computations into hardware.
(EE01437)

A Multisensory Virtual Environment for Dental Surgical Simulation & Training

- ✍ SUN Hanqiu ● LEONG Philip Heng Wai ● QIN Kaihuai* ● TO Wai Hei Edward (Dept of Surgery)# ● TSANG Wai Kit Ricky (University Health Service)
- ❑ 1 September 2001
- ❖ Research Grants Council (Earmarked Grants)

Dental surgical preparations are an essential and important step in clinical oriented training and complex care of dental diseases. Improper handling of complex procedures can lead to long-term patients' suffering and irreversible side effects. We plan to develop innovative methods for 3D reconstruction of dentition models from volume and range data, and carry out research in real-time dental VR training and computerized treatment. We will develop non-uniform subdivision surfaces that can easily deal with geometric features (e.g. creases, darts, sharp edges, corners) and complex objects with arbitrary topology. We will investigate methods for real-time volume rendering of virtual dental models, and develop optimal control of integrated modalities that can provide accurate spatial and temporal information for trainees to better control the sensational dental procedures. The outcome of this research will develop innovative algorithms for complex dental modeling and sensational intervention, and provide cutting-edge computer technologies and intelligent capabilities that are required for optimal dental care and professional training.
(CS01189)

Image-based Synthesized Techniques for Augmented Reality

- ✍ SUN Hanqiu
- ❑ 1 May 2002
- ❖ CUHK Research Committee Funding (Direct Grants)

Augmented Reality (AR) creates the hybrid worlds consisting of both computer-generated virtual objects and real images taken from the scene. It is the world that permits the real scene manipulated by imposing the virtual objects onto the scene seamlessly, to form the novel AR scenes. To achieve the realistic effect, it is not necessary to expensively construct complex geometric models, but integrate the synthesized images with the high photographic realism and approximated geometric structure. Our goal is to utilize both graphics and image-based techniques to generate the highly realistic virtual-scenes synthesized by simplified geometric models and real-image textures representing material & lighting details.
This project aims at investigate and develop a unified rasterization pipeline based on image-synthesized techniques for augmented reality applications. The unified rendering pipeline will simplify the rendering processes in the AR scenes and overcome the difficulties such as complicated composition & expensive rendering due to the separate representations of digital modalities. Our study will focus on studying the unified representation and processing pipeline based on virtual object/real-scene image conversion, virtual/real primitive rendering & composition, and the dynamic behavior of image-synthesized scenes in 3D direct manipulation. For the novel views in augmented reality, the virtual

objects have to be positioned correctly in the real scene and appear without any artifacts. To tackle the problem, we will investigate efficient algorithms to obtain the relative positioning information in the AR scene so that the virtual object/real-scene image can be composed in the same coordinate system to keep the consistency. The advanced image-synthesized techniques to be developed will facilitate the augmented reality applications with the quality of image realism and real-time interaction of the virtual worlds. The outcomes of this project will promote the advanced AR technologies and related R&D industries in Hong Kong, including TV & film producing, art & industrial design, surgical simulation and training, virtual tourism, and rich-media E-commence applications.
(EE01459)

Effective and Efficient Compression for Image-based Modeling and Rendering

- ✍ WONG Tien Tsin
- ❑ 1 October 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

Image-based computer graphics has been introduced as an alternative to traditional geometry-based computer graphics. Unlike the geometry-based computer graphics, the rendering time of image-based computer graphics can be independent of scene complexity. Arbitrarily complex scene can be rendered in interactive speed. The trade-off is the tremendous increase of data size because image-based computer graphics trades memory and storage for rendering speed. Effective and efficient data compression is crucial to the success of any image-based systems, especially when the application is Internet-oriented.

The data of image-based systems shares some common properties as that in digital video systems. However, while video systems involve only minimal user interaction, image-based systems offer substantial user interaction including navigation and illumination control. Compression schemes that are useful for video systems may no longer be applicable to image-based systems.

In this project, we will investigate the compression problem in image-based computer graphics systems. By identifying the characteristics that are unique to image-based systems, we propose to develop a set of compression and decompression algorithms that can effectively and efficiently compress the enormous amount of image-based data to allow efficient transfer through Internet while preserving the interactive response rate.
(EE01369)

A Graph-based Rewiring Scheme for Boolean Networks and Its Applications for New FPGA Design Automations

- ✍ WU Yu Liang ● HONG Xian Long* ● MAREK-SADOWSKA Malgorzata* ● WONG Chak Kuen
- ❑ 30 December 2001
- ❖ Research Grants Council (Earmarked Grants)

The objective of this project is to develop a flexible, general-purpose interconnect synthesis framework in order to rewire spotted target wires for various optimization needs. As today's VLSI technology has been moving towards deep sub-microns, the interconnect estimation gap between the logical and physical design phases is tending to be more and more diverged, what makes the entitled technique more useful and desirable. Applying this technique, when the physical design phase fails, the designers can fix the problems by applying rewiring upon the spotted connections that cause the problems. As the re-synthesis process can be applied upon problematic connections directly in any Design Automation (DA) phase, from logical (logic synthesis) to physical (floorplanning, partitioning, place&route, and engineering change, ... etc.) domains, it reduces the chance of looping the design phase too far backward to repeat the whole laborious effort with little guarantee of timing closure. During the past decade, rewiring techniques have been centered in the ATPG-based implication techniques: e.g. RAMBO, IBBT (recursive learning). In this project, we propose to further develop our recently proposed *Graph-Based Alternative Wiring (GBAW)* technique, which is today's known fastest circuit rewiring technique, to form a flexible framework adaptable to various DA optimization stages above mentioned. Particularly, we also propose to adapt this framework for today's increasingly popular circuit design media: FPGAs.
(EE01236)

Unsupervised Learning with Automated Model Selection and Applications to Data Mining

- ✍ XU Lei
- ❑ 1 November 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

Tasks of discovering model or knowledge for data, usually referred as unsupervised learning, have been encountered widely not only in many classical fields but also in the emerging areas such as data mining, knowledge discovery in databases, and various internet based data processing problems. Each learning task consists of parameter learning for estimating each of parameters in a structure at a given scale, and model selection for selecting an appropriate scale. Model selection is very important but difficult to implement, due to its intrinsic nature. The existing model selection principles or theories are usually implemented in a tedious two-stage way, by which a large number of scales must be enumerated and at each scale a parameter learning process must be made, which not only consumes a huge computing cost but also can not be implemented adaptively. Thus, it is not appropriate to applications of data mining and analysis on large database or via internet. This proposal is motivated to develop a general framework as well as effective implementing algorithms that solves the problems adaptively with model selection realized implicitly and automatically during learning. Though it is a hard task, the previous the results of the PI on RPCL learning and BYY learning have laid on a quite solid foundation for this proposal. Specifically, our major objectives consists of systematically investigating typical existing model selection principles and developing a cost function theory for RPCL learning on clustering analyses, as the simplest exemplar of our proposed approach; as well as developing a powerful and general BYY unsupervised harmony learning framework for implementing parameter learning with automated model selection.
(EE01998)

Interconnect-Driven Multilevel Floorplan Design

- ✍ YOUNG Fung Yu ● WONG Martin D F* ● YANG Honghua Hannah*
- ❑ 1 October 2001
- ❖ Research Grants Council (Earmarked Grants)

Floorplan design is an important step in physical design of VLSI circuits to place the logic on a chip in such a way to minimize the total chip area and optimize the circuit performance. Traditional floorplanning algorithms excel in minimizing the chip area but have not paid enough attention to interconnect optimization. Advances in the deep sub-micron technology have brought many changes and challenges to this. As technology continues to scale down, the total number of transistors inside a chip has grown tremendously and a significant portion of the circuit delay is coming from the interconnect. In some advanced designs, as much as 80% of a clock cycle is consumed by the interconnect, and interconnect delay is expected to dominate the system performance in the future. Besides this timing issue, modern design technology has also brought to the floorplanning tools some new requirements that many classical floorplanners have neglected. A scalable interconnect-driven floorplanner applicable to today's circuit design technology is of utmost need.
The objective of this project is to develop a *scalable* multilevel floorplanning system that
(1) focuses on *achieving timing closure*, and
(2) satisfies *modern floorplanning requirements*.
To achieve this purpose, we will study several important issues that many classical floorplanners have overlooked. They include scalability, interconnect-driven packing, 2D/3D-interconnect planning, buffer block planning and new floorplanning requirements like fixed die regime and module shape flexibility. We will use an idea originating from multilevel circuit partitioning to achieve scalability.
(EE01231)

Please refer to previous issues of this publication for more details of the following ongoing research at the department:

Edition	Title/Investigators
1999-00	Intersection Graphs and Their Recognition Algorithms (CU99410) ✍ CAI Leizhen
1999-00	A Portfolio Management System for the Hong Kong Market (CU99428)

✍ CHAN Lai Wan ● KING Kuo Chin Irwin

1999-00 An Intelligent System for Satellite Meteorological Data Mining and Its Applications (CU99436)
✍ FU Wai Chee Ada ● LIN Hui (Dept of Geography & Resource Management) ● KING Kuo Chin Irwin ● HUANG Qian*

1998-99 An Intelligent System for Medical Data Mining and Visualization (CU98306)
✍ HENG Pheng Ann ● FU Wai Chee Ada ● LEUNG Kwong Sak ● CHENG Chun Yiu Jack (Dept of Orthopaedics & Traumatology)

1998-99 Virtual Reality, Visualization and Imaging Research Centre (EE98037)
✍ HENG Pheng Ann ● LEUNG Kwong Sak ● SUN Hanqiu ● TSUI Hung Tat (Dept of Electronic Engineering) ● WONG Chak Kuen ● XU Yangsheng (Dept of Auto. & Computer-Aided Engin.) ● ZHANG Yuanting (Dept of Electronic Engineering) ● HJELM Nils Magnus (Dept of Chemical Pathology)# ● CHAM Wai Kuen (Dept of Electronic Engineering) ● FU Wai Chee Ada ● HUI Kin Chuen (Dept of Auto. & Computer-Aided Engin.) ● KING Kuo Chin Irwin ● LEE Tong (Dept of Electronic Engineering) ● LI Wen Jung (Dept of Auto. & Computer-Aided Engin.) ● LIAO Wei Hsin (Dept of Auto. & Computer-Aided Engin.) ● WONG Kin Hong ● XU Jianbin (Dept of Electronic Engineering)

2000-01 An Intelligent Virtual Environment for Chinese Acupuncture Learning and Training (CU00185)
✍ HENG Pheng Ann ● LEUNG Kwong Sak ● LEUNG Ping Chung (Dept of Orthopaedics & Traumatology) ● WONG Tien Tsin

2000-01 Augmented Reality System for Endoscopic Surgery Simulation and Operations (CU00012N)
✍ HENG Pheng Ann ● LEUNG Kwong Sak ● WONG Tien Tsin ● SUNG Joseph Jao Yiu (Dept of Medicine & Therapeutics) ● CHUNG Sheung Chee Sydney (Dept of Surgery) ● Prof. Tang Zesheng* ● Prof. Chai Jianyun*

1999-00 Apparel Manufacturing Knowledge Portal Site (EE99031)
✍ KING Kuo Chin Irwin ● FU Wai Chee Ada ● CHAN Lai Wan ● NEWTON Edward* ● FAN Jin Tu* ● NG Roger*

1999-00 The Design and Analysis of Stochastic Clustering Methods for Generating Indexing Structure for Information Retrieval in Image Database Applications (CU99407)
✍ KING Kuo Chin Irwin ● FU Wai Chee Ada ● CHAN Lai Wan

1998-99 Using Stochastic Methods to Guide Search in Constraint Programming (CU98302)
✍ LEE Ho Man Jimmy ● LEUNG Ho Fung ● STUCKEY P. J.*

2000-01 Collaborating Redundant Models in Constraint Satisfaction (CU00183)
✍ LEE Ho Man Jimmy ● LEUNG Ho Fung ● STUCKEY P. J.*

1999-00 Adaptive Transform Domain Video Indexing (EE99011)
✍ LEE Moon Chuen

1998-99 Architectures and Implementations of Constraint Systems on FPGA Hardware (EE98011)
✍ LEONG Philip Heng Wai

2000-01 A Micropower Analogue VLSI Implementation of a Scale Invariant Phase Encoded Neural Network and Its Application to a Wordspotting Speech Recognition System (EE20008)

✍ LEONG Philip Heng Wai

2000-01 Automatic Design and Prototyping of Digital Baseband Algorithms for Future Mobile Communication Applications (EE20025)
✍ LEONG Philip Heng Wai

1999-00 To Develop a New Class of Fast Genetic Based Evolutionary Algorithms Using Splicing/Decomposable Representation Scheme and Exclusion-based Operators (EE99012)
✍ LEUNG Kwong Sak

2000-01 A New Class of Genetic Algorithms with Applications on Data Mining (EE20009)
✍ LEUNG Kwong Sak

1999-00 Design, Analysis and Implementation of Mixed Workload Schedulers with Application to the Multimedia Digital Library System (CU99430)
✍ LUI Chi Shing John

2000-01 Design and Implementation of a Scalable Reliable Media Streaming Server (CS00477)
✍ LUI Chi Shing John

2000-01 Providing Quality-of-Service on the Internet2 via the Differentiated Service Technique (EE20001)
✍ LUI Chi Shing John ● Shankar A U* ● Golubchik L* ● Giuliana Franceschinis*

2000-01 Design, Analysis and Implementation of Resource Allocation and Object Synchronization Protocols for Collaborative Distributed Multimedia System (EE20010)
✍ LUI Chi Shing John

1999-00 Architecture-based Software Reliability Engineering Techniques (CU99432)
✍ LYU Rung Tsong Michael ● LAPRIE Jean Claude*

1999-00 The Effect of Diversity in Large-scale Distributed Systems (EE99033)
✍ LYU Rung Tsong Michael ● LORENZO Strigini* ● BEV Littlewood*

2000-01 A Multilingual Digital Video Content Hub (EE20006)
✍ LYU Rung Tsong Michael ● YEN Jerome (Dept of Systems Engineering & Engin. Management) ● WONG Wing Shing (Dept of Information Engineering) ● KWAN Tze Wan (Dept of Philosophy) ● Shen Vincent*

2000-01 Dependability and Security Paradigms for Mobile Agent Systems (CU00193)
✍ LYU Rung Tsong Michael

2000-01 The Development of a Chinese Linux Operating System for Embedded System (EE00961)
✍ MOON Yiu Sang

1999-00 High-level Synthesis Framework and Tools for Dynamically Reconfigurable Systems (CU99408)
✍ NG Kam Wing ● LUK Wayne*

2000-01 Recovery in Mobile Agent Systems (EE20026)
✍ NG Kam Wing ● Rothermel K*

2000-01 A Multisensory Virtual Environment for Dental Surgical Simulation and Training (EE20011)
✍ SUN Hanqiu

2000-01 Hybrid Approach in Virtual Reality Based on a Combination of Graphics and Images (CS00928)
✍ SUN Hanqiu

2000-01 Advanced Knowledge Discovery & Spatial-temporal Visualization for Georeferenced Information (CU00016N)
✍ SUN Hanqiu ● LEUNG Yee (Dept of Geography & Resource Management) ● LEUNG Kwong Sak ● LIN Hui (Dept of Geography & Resource Management) ● Dr. Peng Qunsheng* ● Dr. Bao Hujun*

1994-95 Research on a New Class of Optimization Problems Related to the Handling of Elastic 3-D Objects by Robots and Its Application in Industry (CS95008)
✍ WONG Chak Kuen ● LEUNG Kwong Sak ● HUI Kin Chuen (Dept of Auto. & Computer-Aided Engin.) ● LEUNG Yee (Dept of Geography & Resource Management) ● ALBRECHT Andreas*

1999-00 New Stochastic Approaches for Job Shop Scheduling (CU99367)
✍ WONG Chak Kuen

1999-00 Applying Computer Vision Techniques in the Construction of a Virtual Walk-through System (CU99389)
✍ WONG Kin Hong ● OR Siu Hang

1999-00 Indexing Methods for Numeric Sequence Databases (CU99437)
✍ WONG Man Hon

1999-00 Interactive Illumination Control for Image-based Computer Graphics (EE99009)
✍ WONG Tien Tsin

2000-01 Accelerating High-quality Volume Visualization with Image-based Computer Graphics (CU00186)
✍ WONG Tien Tsin ● HENG Pheng Ann

1999-00 A Performance-driven Synthesis System Targeted for Deep Sub-micron Technology (CU99412)
✍ WU Yu Liang ● WONG Chak Kuen ● MAREK-SADOWSKA Malgorzata* ● HONG Xian Long*

2000-01 A General Rewiring Based Circuit Transformation Framework for Deep Sub-micron Designs (EE20012)
✍ WU Yu Liang

1998-99 Adaptive Learning for Temporal Radial Basis Function Network and Financial Investment Analysis Environment on Microsoft Window (CU98297)
✍ XU Lei

1999-00 High Dimensional Data Mining and Visualization: An Integrated Approach and Financial Data Mining Application (CU99383)
✍ XU Lei

2000-01 "Extending APT Financial Modeling by State Space Approach, Kalman Filtering and Temporal BYY Learning" (CU00169)
✍ XU Lei

1999-00 A Unified Method to Handle All Placement Constraints in Floorplan Design (EE99008)
✍ YOUNG Fung Yu ● CHU Chris C. N.*

RESEARCH OUTPUTS AND PUBLICATIONS

<P011777> **CHAN Roy and LEE Kin Hong.** "Towards a Robust Unification-Based Parser for Chinese NLP". *Proceedings of 19th International Conference on Computer Processing of Oriental Languages* p.478. Seoul, Korea, 2001.05.14.

<P012188> **CHUNG Tsang Hin; SAK Leung Kwong and KONG Lee Kin.** "Design and Andysis of Smart Card Based Remote Authertraction Protocol for Internet System". Paper presented in the IEEE

10th Intl. Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises, organized by Massachusetts Institute of Technology. MIT, Boston, USA, 2001.06.22.

<P012756> **CHEUNG Yu Hoi, Ocean; HUNG Tsoi Kuen; LEONG Heng Wai, Philip and LEONG Monk Ping.** "Tradeoffs in Parallel and Serial Implementations of the International Data Encryption Algorithm IDEA". *Cryptographic Hardware and Embedded Systems-Ches2001 Third International Workshop Proceedings* ed. by PAAR Christof, KOC Keya Cetin and NACCAC HE David. vol.2001 no.1, pp.333-347. Paris, France: Springer/Novamedia, 2001.05.14.

<P012757> **LEONG M.P.; JIN C.T. and LEONG P.H.W.** "Parameteriged Module Generator for an FPGA-Electronic Cochlea". *Proceedings of the 2001/IEEE Symposium on Field-Programable Custom Compicting Machine* CA, USA: IEEE, 2001.05.

<P012953> **WU Fei and NG Kam Wing.** "Design Issues in Operating Systems for RTR Systems". *Proceedings of the Int. Symposium on Distributed Computing and Applications to Business, Engineering and Science* pp.149-152. Wuhan, China: Hubei Science and Technology Press, Wuhan, China, 2001.10.

<P012975> **ZHU Zhongyao and LEUNG Kwong-Sak.** "Non-Dominated Sorting Annealing Genetic Algorithms for Multi-Objective Optimization Problems". *International Conference on Computational Intelligence, Robotics and Autonomous Systems (CIRAS 2001)* pp.1-6. Singapore: National University of Singapore, 2001.11.

<P013041> **YUEN Wing Seung and YOUNG Fung Yu.** "Shcing Floorplan with Clustering Constraints". *Proceedings of the Asia and South Pacific Design Antomation Conference* pp.503-508. Yokohama, Japan: ACM, 2001.01.30.

<P013072> **YUE Ho Yin; KING Irwin and LEUNG Kwong Sak.** "Clustering Method For Content - Based Indexing". *2001 WSES International conference on: Fuzzy Sets and Fuzzy Systems, FSFS '01* vol.1 no.1, pp.138-143. Canary Islands, Spain, 2001.02.14.

<P013264> **LEE T.O.; YIP Y.L.; TSANG C.M. and NG K.W.** "An Agent-Based Micropayment System for E-Commerce". *LNAI 2033:E-Commerce Agents* ed. by LIU J. and YE Y. 13 pgs. Berlin Heidelberg: Springer - Verlag, 2001.

<P013265> **NG K.W. and LEE T.O.** "The CoDAC Collaboration Framework". *Intelligent Agent Technology: Research and Development* ed. by ZHONG N. pp.390-394. Singapore: World Scientific Publishing Co. Pte. Ltd., 2001.

<P016166> **ALBRECHT Andreas Alexander; STEINHOFEL K.; TAUPITZ M. and WONG Chak Kuen.** "Logarithmic Simulated Annealing For X-ray Diagnosis". *Artificial Intelligence in Medicine* vol.22, pp.249-260. Elsevier Science, 2001.

<P016281> **MOON Yiu Sang; ZHANG Tianxu; ZUO Zhengrong and ZUO Zhen.** "Detection Of Sea Surface Small Targets in Infrared Images Based on Multilevel Filter and Minimum Risk Bayes Test". *Multispectral Image Processing and Pattern Recognition* Series in Machine Perception Artificial Intelligence vol.44, pp.49-60. Singapore: World Scientific Publishing Company, 2001.

<P016528> **GUO Ping and LYU Rung Tsong Michael.** "Pseudoinverse Learning Algorithm for Feedforward Neural Networks". *Advances in Neural Networks and Applications* Artificial Intelligence Series - A Series of Reference Books and Textbooks pp.321-326. World Scientific and Engineering Society Press, 2001.

<P016773> **PUN Chi Man and LEE Moon Chuen.** "Texture Classification using Shift-Invariant Wavelet Packet Decomposition". *Advances in Scientific Computing, Computational Intelligence and Applications* (Mathematics and Computers in Science and Engineering - A Series of Reference Books and Textbooks) pp.7-11. Greece: WSES, 2001.07.

<P016880> **KING Kuo Chin Irwin and JIN Zhong.** "Relevance Feedback Content-Based Image Retrieval Using Query Distribution Estimation Based on Maximum Entropy Principle". *Proceedings of 8th International Conference on Neural Information Processing (ICONIP 2001)* vol.2, pp.699-704. China: Fudan University Press, 2001.

<P016942> **FAN Hongbing; WU Yu Liang and WONG Chak Kuen.** "On Fixed Edges And Edge-Reconstruction Of Series-Parallel Networks". *Graphs and Combinatorics* vol.17, pp.213-225. Springer - Verlag, 2001.

<P017394> **MOON Yiu Sang and TIAN Jinwen.** "Near-Lossless Image Compression Based On Integer Wavelet Transforms". *Image Compression and Encryption Technologies, Proceedings of SPIE-The Internati* pp.21-26. USA: SPIE, 2001.10.22.

<P017665> **LEUNG Kwong Sak, LEE Kin Hong and CHEANG Sin Man.** "Balancing Samples' Contributions On GA Learning". *Proceedings of 4th International Conference Evolvable Systems: From Biology to H* pp.256-266. Germany: Springer, 2001.

<P017684> **黃健康、陳志安、劉國威.** 〈信號分析技術在粵曲研究的應用〉，《粵劇音樂的探討》 頁 105-117. 香港: 香港中文大學音樂系粵劇研究計劃出版, 2001.07.

<P017806> **STEINHOFEL K.; ALBRECHT Andreas Alexander and WONG Chak Kuen.** "Fast Parallel Heuristics For The Job Shop Scheduling Problem". *Computers & Operations Research* vol.29, pp.151-169. Elsevier Science Ltd, 2002.

<P017893> **LEE Jin-Fuw, OSTAPKO D.L., SOREFF Jeffery and WONG Chak Kuen.** "On The Signal Bounding Problem In Timing Analysis". *Proceedings of IEEE/ACM International Conference on Computer Aided Design (ICCAD* pp.507-514. IEEE, 2001.

<P018358> **GURUSWAMI V.; RANGAN C. Pandu; CHANG M.S.; CHANG G.J. and WONG Chak Kuen.** "The Kr-Packing Problem". *Computing* vol.66, pp.79-89. Austria: Springer - Verlag, 2001.

<P018580> **LIN Zhouchen, WONG Tien Tsin and SHUM Heung-Yeung.** "Relighting with the Reflected Irradiance Field: Representation, Sampling and Reconstruction". *Proceedings of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR 2001)* pp.561-567. IEEE Computer Society, 2001.

<P018604> **CHEUNG Wing Hang; LYU Rung Tsong Michael and NG Kam Wing.** "Tunneling Across Firewalls by Using XML And Servlets: An Experiment On CORBA". *Proceedings of the International Conference on Internet Computing (IC'2001)* vol.I, pp.379-385. CSREA Press, 2001.

<P018732> **WAN Po Man Polly and WONG Man Hon.** "Efficient And Robust Feature Extraction And Pattern Matching Of Time Series By A Lattice Structure". *Proceedings of the 2001 Tenth International Conference on Information and Knowle* pp.271-278. 2001.

<P018818> **ALBRECHT Andreas Alexander; CHEUNG Shing Kwong; LEUNG Kwong Sak and WONG Chak Kuen.** "On the Convergence of Inhomogeneous Markov Chains Approximating

Equilibrium Placements of Flexible Objects". *Computational Optimization and Applications* vol.19, pp.179-208. The Netherlands: Kluwer Academic Publishers, 2001.

<P019091> **DONG Sheqin; HONG Xianlong; WU Yu Liang; XIU Zhong and GU Jun.** "VLSI Placement With Pre-placed Modules Based On Less Flexibility First Principles". Proceedings of 2001 4th International Conference on ASIC, organized by IEEE Press pp.106-109. 2001.

<P019115> **YUE Ho Yin; KING Kuo Chin Irwin and LEUNG Kwong Sak.** "Using Natural Clusters Information to Build Fuzzy Indexing Structure". *Proceedings of 8th International Conference on Neural Information Processing (ICONIP 2001)* vol.3, pp.1559-1564. China: Fudan University Press, 2001.

<P019357> **Vincentius Felix HARTANTO KWEE and SIRISENA Harsha R.** "Cumulative Inter-ADU Jitter Concept and Its Applications". *Processings of IEEE ICCCN 2001* IEEE pp. 531-534. Processings of IEEE ICCCN 2001, 2001.10.

<P019806> **ALBRECHT Andreas Alexander and WONG Chak Kuen.** "Combining the Perceptron Algorithm with Logarithmic Simulated Annealing". *Neural Processing Letters* vol.14, pp.75-83. The Netherlands: Kluwer Academic Publishers, 2001.

<P026147> **ALBRECHT Andreas A.; VINTERBO Staal A.; WONG Chak Kuen and OHNO-MACHADO Lucila.** "A Simulated Annealing and Resampling Method for Training Perceptrons to Classify Gene-Expression Data". *Proceedings of International Conference on Artificial Neural Networks - ICANN 2002* pp.401-407. Springer, 2002.

<P026892> **LEUNG Kwong Sak; LEE Kin Hong and CHEANG Sin Man.** "Evolving Parallel Machine Programs for a Multi-ALU Processor". *Proceedings of 2002 IEEE World Congress on Computational Intelligence (WCCI 2002)* IEEE, 2002.

<P027183> **JIN Huidong; LEUNG Kwong Sak and WONG Man Leung.** "Scaling-Up Model-Based Clustering Algorithm by Working on Clustering Features". *Proceedings of Third International Conference Intelligent Data Engineering and Automated Learning - IDEAL 2002* pp.569-575. Germany: Springer, 2002.

<P027397> **WU Yu Liang; HUANG Wenqi; LAU Siu Chung; WONG Chak Kuen and YOUNG H. Gilbert.** "An Effective Quasi-human Based Heuristic for Solving the Rectangle Packing Problem". *European Journal of Operational Research* vol.141, pp.341-358. Elsevier Science BV, 2002.

<P027453> **LIANG Yong and LEUNG Kwong Sak.** "Two-way Mutation Evolution Strategies". *Proceedings of the 2002 Congress on Evolutionary Computation (CEC'02)* pp.789-794. IEEE, 2002.

<P027642> **STEINHOFEL K.; ALBRECHT A. and WONG Chak Kuen.** "The Convergence of Stochastic Algorithms Solving Flow Shop Scheduling". *Theoretical Computer Science* vol.285, pp.101-117. Elsevier Science BV, 2002.

<P027704> **ALBRECHT Andreas Alexander; HEIN E.; STEINHOFEL K.; TAUPITZ M. and WONG Chak Kuen.** "Bounded-depth Threshold Circuits for Computer-assisted CT Image Classification". *Artificial Intelligence in Medicine* vol.24, pp.179-192. Elsevier Science BV, 2002.

<P02773> **CHAN Cheuk Yin.** "Personal Information Desktop". Paper presented in the 11th International World Wide Web Conference, organized by Pacific Telecommunication Council vol.11, p.2. Hawaii, USA, 2002.05.08.

<P027746> **XU Zong-Ben; JIN Huidong; LEUNG Kwong Sak; LEUNG Yee and WONG Chak Kuen.** "An Automata Network for Performing Combinatorial Optimization". *Neurocomputing* vol.47 issue 2, pp.59-83. USA: Elsevier Science BV, 2002.

<P027767> **FAN Hong bing, WU Yu Liang and CHANG Yao-Wen.** "Comment On Generic Universal Switch Blocks ". *IEEE Transactions on Computers* vol.51 no.1, pp.93-95. IEEE, 2002.01.

<P027775> **Vincentius Felix HARTANTO KWEE, ROSS Keith W., KANGASHARJU Jussi and REISSLEIN Martin.** "Distributing Layered Encoded Video through Caches". *IEEE Transactions on Computers* IEEE Transactions on Computers vol.51 no.6, pp. 622-636. IEEE, 2002.06.

<P027816> **WANG Lisheng; HENG Pheng Ann; WONG Tien Tsin and BAI Jing.** "Multiple Isovalues Selection by Clustering Gray Values of the Boundary Surfaces within Volume Image". *Medical Imaging 2002: Image Processing, Proceedings of SPIE* vol.4684 (Part Two of Three Parts), pp.1195-1203. USA: SPIE - The International Society for Optical Engineering, 2002.

<P027834> **CAI Xia; LYU Rung Tsong Michael and WONG Kam Fai William.** "Component-based Embedded Software Engineering: Development Framework, Quality Assurance and A Generic Assessment Environment". *International Journal of Software Engineering and Knowledge Engineering* vol.12 no.2, pp.107-133. USA: World Scientific Publishing Company, 2002.

<P028014> **WANG Lisheng; BAI Jing; HENG Pheng Ann and WONG Tien Tsin.** "Extraction of Polygonal Boundary Surfaces from Volume Image". *Medical Imaging 2002: Image Processing, Proceedings of SPIE* vol.4684 (Part Three of Three Parts), pp.1439-1447. USA: SPIE - The International Society for Optical Engineering, 2002.

<P028542> **XU Dan and HENG Pheng Ann.** "Object Image Synthesis under Changing of Illumination". *Journal of Software* vol.13 no.4, pp.501-509. 2002.

<P02857> **NG Ka Ka and FU Wai Chee Ada.** "Efficient Algorithm for Projected Clustering". *Porceedings of the Eighteenth International Conference on Data Engineering* p.273. San Jose, California: IEEE Computer Society, 2002.02.26.

<P02862> **CHIU Kai Chun and XU Lei.** "A Comparative Study of Gaussian TFA Learuing and Statistical Tests on the Factor Number in APT". *Proceedings of the 2002 International Joint Conference on Neural Networks* vol.3, pp.2243-2248. Honolulu, Hawaii, USA: The Institute of Electrical and Electronics Engineers, 2002.05.12.

<P02863> **SIA K. C. and KING Irwin.** "Relevance Feedback Based on Parameter Estimation of Target Distribution". Paper presented in the International Joint Conference on Neural Networks '02, organized by IEEE NNS. pp.1974-1979. Honolul, Hawaii, 2002.05.12.

<P02864> **ZHANG Wan and KING Irwin.** "A Study of the Relationship between Support Vector Machine and Gabriel Graph". Paper presented in the International Joint Conference on Neural Network, organized by IEEE, IEEE Neural Networks Society, INNS. 6 pgs. Honolulu, Hawaii, USA, 2002.05.12.

<P02871> **LEE C.M. Sam; LUI C.S. John and YAU K.Y. David.** "Admission Control and Dynamic Adaptation for a Proportional - Delay Diffserv - Enabled Web Server". *ACM Sigmetrics' 02* vol.30, pp.172-182. Marina Del Rey, California: ACM Sigmetrics, 2002.06.15.

<P02888> **Yu Chiu Man and NG Kam Wing.** "A Flexible Tamper-detection Protocol for Mobile Agents on Open Networks". *Proceedings of the International Conference on Information and Knowledge Engineering (IKE'02).* pp.248-254. Nevada, USA: CSREA Press, 2002.06.27.

<P02908> **WING Sham Chiu and YU Young Fung.** "Routability Driven Floorplanner with Buter Block Planning". Paper presented in the 2002 International Symposium on Physical Design, organized by ACM/SIGDA Cooperation with IEEE. 208 pgs. CA, USA, 2002.04.08.

<P029112> **LEUNG Kwong Sak; LEE Kin Hong and CHEANG Sin Man.** "Genetic Parallel Programming - Evolving Linear Machine Codes on a Multiple-ALU Processor". *Proceedings of the International Conference on Artificial Intelligence in Engineering & Technology (iCAiET)* pp.207-213. Malaysia: Universiti Malaysia Sabah, Malaysia, 2002.

<P02913> **CHOI Kup Sze; SUN Hanqiu; HENG Pheng Ann and CHENG Chun Yiu Jack.** "A Scalatle Force Propagation Approach for Web-Based Deformatle Simulation of Soft Tissues". *The 7th International Conference on 3D Web Technology* pp.185-193. Arizona, USA: The Association for Computing Machinery, 2002.02.24.

<P02914> **TSOI Kuen Hung; LEONG Heng Wai Philip and LEE Kin Hong.** "A Massively Parllel RC4 Encryption Engine". *FCCM 2002 (2002 IEEE Symposium on Field-Programmable Custem Computing Machines)* CA, USA: FCCM 2002, 2002.04.22.

<P029186> **SHEN Hao, HENG Pheng Ann, TANG Zesheng and CHENG Chun Yiu Jack.** "Collision Detection and Tetrahedral Mesh Simplification in Surgery Simulation System". *Proceeding of the International Conference on Diagnostic Imaging and Analysis (I* pp.300-305. China: Shanghai Scientific and Technological Literature Publishing House, 2002.

<P02935> **FUNG Chun-Kan and LEE M.C.** "A Denial-of-Service Resistant Public-Key Authentication and Key Establishment Protocol". *Proceedings of the 21st IEEE International Performance, Computing, and Communications Conference* pp.171-178. Arizona, USA: IEEE Computer Society, IEEE Communications Society, 2002.04.04.

<P029684> **WANG Yuanmei; CHENG Jianping and HENG Pheng Ann.** "Vector Entropy Imaging Theory with Application to Computerized Tomography". *Physics in Medicine and Biology* vol.47, pp.2301-2310. UK: Institute of Physics Publishing Ltd, 2002.

<P029777> **REISSLEIN Martin, Vincentius Felix HARTANTO KWEE and ROSS Keith W.** "Interactive Video Streaming with Proxy Servers". *Information Sciences: An International Journal* vol.140 no.1-2, pp. 3-31. Information Sciences, 2002.01.

<P029876> **FAN Hongbing; LIU Jiping; PORTO Dinah de and WU Yu Liang.** "A Detailed Routing Algorithm for Switch Boxes". *Proceedings of 2002 International Technical Conference on Circuits/Systems, Computers and Communications (ITC-CSCC 2002)* vol.2, pp.1732-1735. 2002.

<P029888> **LEUNG Cheung Chi; MOON Yiu Sang; YUEN Ka Nang and HO Ho Ching.** "Software Architecture for Automatic Call Distribution in a VOIP Based Call Center". *Proceedings of the 4th International Conference on Advanced Communication Technology (ICACT 2002)* pp.777-782. 2002.

<P029986> **NG Anny and LEE Kin Hong.** "Event Extraction from Chinese Financial News". *Proceedings of 2002 International Conference on Chinese Language Computing (ICCLC 2002)* pp.9-16. Chinese Language Computer Society, 2002.

<P029995> **ZHU Zhongyao and LEUNG Kwong Sak.** "Asynchronous Self-Adjustable Island Genetic Algorithm for Multi-Objective Optimization Problems". *Proceedings of the 2002 Congress on Evolutionary Computation (CEC'02)* pp.837-842. IEEE, 2002.

see also <P017153>, <P017373>, <P017993>, <P018748>, <P019360>, <P028661>, <P029104>, <P029812>

RESEARCH PROJECTS

Generation of 3D Wireframe Face Model from Movies and Face Animation

- ✍ CHAM Wai Kuen ● TSUI Hung Tat
- ❑ 1 October 2001
- ❖ Research Grants Council (Earmarked Grants)

Today human modeling and simulation techniques are widely used to generate virtual characters and models which are used in movies, computer games, advertising and other activities. Commercial animation software is available to animate realistic and lively faces with subtle movement. However, the skill to create faces and expressions that are attractive, exciting, touching or scary remains an art. Also, people who are most talented in this art may not be able to use animation software due to insufficient computer training or other reasons. In fact, the best people to create expressive facial expressions are actors themselves.

We propose to develop a two-stage method to capture expressive facial expressions of an actor in movies. In the first stage, the method will estimate a 3D wireframe model of the actor's neutral face (i.e. face with a deadpan expression) from images which capture different views of the neutral face. In the second stage, a video sequence of a movie that contains a wanted facial expression under an even lighting condition is first identified and extracted manually by experts. We shall develop a computer program that accepts the video sequence as input and generates a sequence of 3D face models of the expression based on a generic wireframe. The generic wireframe should have sufficient nodes at appropriate positions to represent facial expressions accurately. The results will allow us to regenerate the facial expressions in different scenes, different face positions and different scales.

(CS01167)

A 900 MHz Double-IF Receiver Integrated Circuit

- ✍ CHAN Cheong Fat
- ❑ 1 January 2002
- ❖ CUHK Research Committee Funding (Direct Grants)

We have been using the super-heterodyne receiver architecture since Armstrong invented it in 1918. Existing radio frequency super-heterodyne designs use different discrete bipolar and gallium arsenide circuit components to construct receiver circuits. The industry trend is to replace existing receiver designs with a single CMOS integrated circuit to reduce cost, size, and power consumption. However, we cannot implement the existing super-heterodyne architecture on a single CMOS integrated circuit because we cannot fabricate the surface-acoustics-wave (SAW) filter required for super-heterodyne design on an integrated circuit. Recently, the Berkeley group proposed a zero-IF architecture and the Katholieke group proposed a low-IF architecture. Both of these two new designs have eliminated the SAW filter and have demonstrated that it is possible to fabricate a single chip CMOS receiver circuit. However, both of these two designs have introduced new problems – the zero-IF design generate a self-mixing and DC offset errors, while the low-IF design requires a complicated poly-phase filter to replace the SAW filter. We have developed a new double-IF architecture which does not require any complicated filters; moreover, simulation results have indicated that the new design does not have any self-mixing and DC offset errors. The main objective of this work is to demonstrate that the double-IF architecture is suitable for single chip design by building a hardware prototype.

(EE01709)

Study of Coherent and Incoherent Optical Pulse Coding Techniques for Fiber-Optic CDMA

- ✍ CHAN Kam Tai ● LOU Caiyun*
- ❑ 1 November 2001
- ❖ Research Grants Council (Earmarked Grants)

Fiber-optic code division multiple access (FO-CDMA) is a novel attractive broadband fiber-optic access technology especially suitable for local area network (LAN) applications owing to its unique attributes of all optical processing, asynchronous transmission, soft capacity, low delay access and high information security. For this access technology, one of the critical issues is the optical pulse coding/decoding technique, which is still far from being practical to date. The aim of this project is to search for a practical means of

implementing optical pulse coding/decoding for FO-CDMA systems. We propose to design fiber Bragg grating gratings (FBG) or other optical components to implement the encoder/decoder operations while both coherent and incoherent broadband optical sources needed to construct the codes will also be investigated. The configuration and optimization of the encoder/decoder will be studied in detail, with emphasis on minimizing cross-talk and how to achieve multi-gigabit data rates. Applicable multi-wavelength lasers as the light source for the corresponding encoder/decoder will be developed. Next, a theoretical and numerical study of the suitable code sets relevant to the encoder/decoder will also be carried out.
(EE01169)

Novel RF Power Amplifier Linearization Techniques for Next Generation Wireless Communication Systems

- ✍ CHENG Kwok Keung Michael
- ❑ 1 October 2001
- ❖ Research Grants Council (Earmarked Grants)

The hardware requirements of modern digital wireless communications systems have become very stringent due to the limited availability of frequency spectrum, which results in the desire to use more complex modulation formats. In most cases, nonlinear amplification of the non-constant envelope signals results in unacceptable levels of interference to adjacent channels. Therefore, modern wireless communication systems have placed additional requirements for increasing the linearity of power amplifiers. The high peak-to-average power ratios associated with many digital modulation formats as well as multi-carrier applications are forcing circuit designers to explore various linearization techniques. Along with the need for highly linear hardware is the demand for reduced power consumption and size for portability. This results in the need for the development of highly linear yet efficient amplifiers. In this project, a novel pre-distortion technique will be investigated for the linearization of multi-carrier and broadband communication systems. The technique will offer a greater potential for design flexibility and significantly improve efficiencies over conventional technologies.
(EE01174)

CMOS Implementation of RF Predistortion Circuits for Mobile Phone Application

- ✍ CHENG Kwok Keung Michael
- ❑ 1 December 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

In the past, most communication systems prefer to use constant envelope modulation such as FM or GMSK. Recently, due to the rapid development of modern wireless communication system and the limited available spectrum, spectral efficiency has become a very important factor. Linear modulation schemes such as QPSK and QAM that offer better spectral efficiency have attracted much attention nowadays. Nevertheless, nonlinear amplification of the non-constant envelope signals results in unacceptable levels of interference to adjacent channels. Therefore, modern wireless communication systems have placed additional requirements for increasing the linearity of power amplifiers. Along with the need for highly linear hardware is the demand for reduced power consumption and size for portability. In this project, the implementation of CMOS pre-distortion circuit for the linearization of RF power amplifiers will be investigated. This technology is essential to emerging 3G applications and will have a significant impact on the design of future mobile phone sytems.
(EE01440)

Adaptive Beamforming and Spectral Filtering for Speech Source Tracking and Recognition

- ✍ CHING Pak Chung ● SO Hing Cheung* ● WONG Kon Max
- ❑ 1 November 2001
- ❖ Research Grants Council (Earmarked Grants)

There is an increasing desire for an all-pervasive, human-centered environment in which computing and communication facility is available whenever and wherever we need it. One obvious solution is to use natural speech to interact with machines, to control physical devices and to access information. While real time speech recognition is feasible, it requires directional and close-talking microphones as well as 'friendly' acoustic environments. However, there is a great demand for more human-centered applications,

eg. hands-free in-car voice control and camera-pointing in video conferencing. The objective of this research project is to investigate advanced signal processing techniques and their properties that will provide effective interfacing with embedded devices and microphone arrays, thereby enabling us to communicate naturally using speech in the spaces they define. We propose to study an efficient subspace method to jointly estimate the time delay and fundamental frequency (pitch) of a speech signal received at spatially separated sensors. The time delay information will be exploited to determine the acoustic source location with the knowledge of the microphone array geometry. On the other hand, the cyclostationary features of the speech signal will be derived from its pitch frequency and other acoustic cues. By making use of the cyclic adaptive beamforming and blind adaptive frequency shift algorithms to steer the beam towards the speech source, we can track the speaker even when he is moving around in the presence of spectrally overlapped interference.
(EE01175)

A Contactless Java Card Chip Using Asynchronous Circuit Techniques

- ✍ CHOY Chiu Sing Oliver ● CHAN Cheong Fat
- ❑ 31 December 2001
- ❖ Research Grants Council (Earmarked Grants)

Smart cards are already a part of everyday life. We use smart cards in transportation, banking, personal identity etc. In general, smart cards can either be the contact or contactless type. Obviously, contactless smart cards are more convenient to use and are preferred in many applications.
However, contactless smart cards are usually less powerful in terms of functionality and security level as compared with the contact type. This is very much due to the constrain in power consumption as power is derived from a card reader through wireless means. The speed of operation is also demanding otherwise the convenience of use cannot be realized.
It has been proven that asynchronous techniques are particularly suitable in such demanding circumstances. Asynchronous circuits can continue to work in widely fluctuating supply level and their performance is self-adjusting accordingly. Our research group has developed a new asynchronous technique that probably represents the fastest technique to date. Therefore, by putting the power consumption advantage of asynchronous circuits and the performance edge of our technique, we will design a smart card chip that will offer functionality and security level as that of a contact smart card.
The most sophisticated contact smart card in market today is probably the java card. This type of card can be readily programmed by a hardware independent language (Java). This simplifies the application development process hence opens the door to a standardized multi-application card. The final goal of this project is to design such a card for contactless operation.
(EE01176)

Use of Prosodic Information in Chinese Continuous Speech Recognition

- ✍ LEE Tan ● XU Bo*
- ❑ 1 December 2001
- ❖ Research Grants Council (Earmarked Grants)

Prosodic information refers to the temporal and rhythmic structure in human speech, which is highly correlated to its linguistic content. For many years it has been said that prosodic information is useful for automatic speech recognition and understanding. However, as the main-stream speech recognition technologies develop rapidly, little progress has been seen on the use of prosody, particularly for Chinese spoken languages. In this research, we investigate the use of prosodic information in automatic recognition of continuous Cantonese speech.
Duration, fundamental frequency (or F0) and signal intensity are known to be the major acoustic correlates for various prosodic events. For example, intonation is produced by utterance-level F0 movement, while words at the end of a sentence are usually lengthened, to signify the occurrence of a pause. In this research, we will develop automatic methods of detecting major prosodic events from given acoustic evidences. The major challenges will be due to that these acoustic features are affected by many co-functioning factors. We are going to analyze how prosody is actually realized in acoustic signals and ho it is affected b various linguistic and extra-linguistic factors. We will also investigate different strategies of integrating the prosodic models into conventional HMM-based speech recognition framework.

The proposed project is made possible by the joint effort between two experienced research teams at The Chinese University of Hong Kong and the Chinese Academy of Sciences in Beijing.
(EE01206)

Visual Learning of Models of Articulated Objects

- ✍ LEE Tong
- ❑ 1 July 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

Modelling of a free-form 3D object from its images is a central problem in computer vision with many applications. If the images are taken using the same camera, vision geometry based techniques can recover the shape of an object theoretically provided that camera model can be correctly estimated and sufficient feature correspondence are established and known between the images. Unfortunately till today, vision geometry based techniques are still not very satisfactory and their applications are limited to rigid objects only. This project addresses the problem of automatic model acquisition of free-form articulated objects from images. Articulated objects are objects with rigid components. Each pair of components may be related by simple geometric relation, such as rotation about a rotary axis or translation along another component of the object. We do no restrict ourselves to images taken by the same camera. We intend to derive the structural information of an articulated object from a small number of images. The model is built by accumulating the structural information obtained from a series of images. For simple objects, as little as two images are sufficient to build the required model. This project will consist of two parts, identifying each rigid component of an articulated object invariant to similarity, affine, and perspective transformations and discover the geometric relations between each pair of rigid components. The results could find applications in robotics, object modeling for animation, and human motion analysis.
(EE01671)

A CMOS RF Front-end Chip for 3G WCDMA Applications

- ✍ PUN Kong Pang
- ❑ 1 October 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

The era of third generation (3G) cellular communication is just over the horizon. Fast wireless Internet access is available in a 3G receiver. A critical part of the receiver is the radio frequency (RF) front-end which can determine its overall performance in terms of bit-error-rate. Currently, this part is usually implemented in GaAs or silicon bipolar technology. These technologies are not only expensive, but also incompatible with the digital parts of the receiver, for which CMOS is definitively the technology of choice. With its continuously increased speed, CMOs is now a competitive technology in RF arena. RF CMOS is economic and has the potential of integration with other parts of the receiver to achieve the goal of "system-on-a-chip". In this project, a receiver front-end chip for the demanding 3G WCDMA specifications will be designed for fabrication in deep sub-micron CMOS technology. The chip will be designed to operate over the globally allocated frequency range of 1.9-2.2GHz. It will include a low noise amplifier, a pair of quadrature mixers and a polyphase filter for the generation of quadrature local oscillator. The power budget is very tight in a 3G receiver as more and more (power consuming) functions are being added. Low power consumption will thus be major design concern of this project and low supply voltage of 1.5 volt will be used.
(EE01690)

Ultrafast Photonic Analog-to-digital Converters

- ✍ SHU Ching Tat C. ● LIU Hai Feng* ● CHIANG Kin Seng*
- ❑ 1 November 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

To meet the growing demand for the processing of high frequency microwave signals in radar and wireless communications, technological advances in both the analog-to-digital converters (ADCs) and the digital signal processors have to be matched. While the rapid development in CMOs technology has led to the realization of digital processors at hundreds of giga-flops, the progress in electronic ADCs is relatively slow. State-of-the-art technology has

demonstrated a speed of 8 giga-samples per second. However, the resolution is very limited and the power dissipation is excessive. An elegant approach to solve the problem is to apply emerging photonic technology in the ADCs to increase their sampling bandwidth. Through the use of a high-speed optical modulator, the analog electrical signal can be rapidly sampled by optoelectronic means and transmitted on an optical carrier. By making use of the unique features of optics, including wavelength multiplexing/demultiplexing and time stretching of pulses in a dispersive fiber, the effective sampling rate can be significantly enhanced. In this project, we propose to develop new optical sources capable of generating high-repetition-rate time and wavelength interleaved pulses. The outputs will be relatively stable and uniform and suitable for use as sampling pulses in the ADCs. A simple laser configuration and minimal optical loss in the system are distinct features of our approach. An added advantage is that the source can be electronically reconfigured to produce a different number of wavelengths for applications in various architectures.
(EE01680)

Components for Next Generation All-Optical Wavelength-Division-Multiplexing Networks

- ✍ TSANG Hon Ki ● SHU Ching Tat C.
- ❑ 16 August 2001
- ❖ Research Grants Council (Earmarked Grants)

In the current generation of Wavelength-Division-Multiplexing (WDM) networks, switching, routing and network management functions are performed in the electrical domain. Present day systems therefore require the conversion of the optical signal to an electrical signal for processing before regeneration of the optical signal for onward transmission. Such optical-electrical-optical conversion is a potential bottleneck hindering future increase in per-channel bit-rates. One way forward is to perform the switching and network management functions in the optical layer. The advantages of all-optical WDM communication networks can include lower cost, faster switching (allowing a higher per channel bit-rate), scaleability and, in most cases, a transparency to data format and bit-rate. New optoelectronic components are needed to provide the new functionality in the optical layer. The new devices needed include all-optical wavelength converters, re-configurable optical-add-drop multiplexers and tunable filters. Wavelength converters solve the problem of channel contention or link failure by re-routing blocked traffic onto alternate wavelength channels. Re-configurable optical add-drop multiplexers are needed to dynamically drop and add desired wavelength channels into the WDM network. Real-time network monitoring need tunable optical switches to enable one set of instrumentation to sample and monitor different wavelength channels. The development of novel components to fulfill these functions is the main aim of this project.
(EE01192)

Enhancement of Electron Field Emission Properties by Surface Engineering and Ion Beam Processing

- ✍ WONG Sai Peng Joseph
- ❑ 1 November 2001
- ❖ Research Grants Council (Earmarked Grants)

The field of vacuum microelectronics (VME), which is the integration of vacuum electron technology with microelectronics manufacturing processes, has been experiencing tremendous growth in recent years. The operation of VME devices involves collision-free motion of electrons in vacuum. Hence, compared with their semiconductor counterparts, VME devices have higher frequency limit and can in principle operate up to tera hertz. They are also less sensitive to temperature variation, less susceptible to radiation damage, and have higher current capabilities. Applications of VME devices include high-voltage and high-power vacuum switches, microwave tube power amplifiers, miniature electron guns, field emission flat-panel displays, sensors, x-ray sources, high-energy accelerators, electron-beam lithography, free-electron lasers, electron microscopes and microprobes. It is the aim of this project to search for superior electron field emissive materials, with low turn-on field, high current capability and good stability. We shall develop ion implantation and thermal annealing processes to engineer the surface morphology and the work function of the sample in order to achieve this goal.
(EE01200)

A Multi-institutional Effort to Establish an Advanced Surface Technology Development Centre

- ✍ WONG Sai Peng Joseph ● LAU Leo Woon Ming (Dept of Physics) ● WONG Hong Kuen (Dept of Physics) ● TSUI Yun Cheong Ricky* ● YEUNG Lee Kin Kinny* ● ONG Chung Wo*
- ❑ 1 December 2001
- ❖ Innovation and Technology Support Programme, ITF, Innovation & Technology Commission

Advanced surface coatings are new engineering materials with a combination of outstanding decorative, protective, or "smart" functional properties, and are overlaid in the form of a micrometer thin film on inexpensive substrates to raise their values. Their global market demands have grown rapidly in sectors including surface finishing of metals and plastics, and manufacture of critical components of many products. This has brought both threats and opportunities to local manufacturers as many of them are producing or using various surface coatings. The proposed project is a cost-effective approach to overcome such threats of technology deficiency and capture the opportunities of a growing global market, by forging relevant experts and facilities from the Hong Kong Productivity Council, the Chinese University of Hong Kong, and the Polytechnic University of Hong Kong into a task force team and an advanced surface-technology development center (ASDC) with particular reference to Physical Vapour Deposition (PVD) Technology.

In the 2.5-year project, the team will complete its inventions and development of (a) not less than three new PVD coatings, (b) a novel "facing-target" PVD coating technology, (c) a prototype PVD coating machine, and (d) the cost-effective design and fabrication technology of cathode target sources required in PVD coatings production. In addition, the center will provide local manufacturers with professional services including (1) modification of their processes and equipment to enhance the productivity in their PVD coating business, and (2) coatings testing, evaluation and trouble shooting to maintain and upkeep their product quality. The results will demonstrate the effectiveness and economic benefits of ASDC which will continue to market and create innovation of advanced surface coating technology.

In summary, the ASDC is:

(1) a center virtually combining multiple institutions to promote advanced surface technologies to industry;
(2) a bridge between academics and manufacturers;
(3) a framework to stimulate future market-driven R&D works and to deliver results in a timely manner to industry.

(EE01769)

Integrated LTCC Antenna Array and Front-end Passive Modules for Millimeter Wave Wireless Communication Systems

- ✍ WU Ke Li
- ❑ 1 November 2001
- ❖ Research Grants Council (Earmarked Grants)

Low Temperature Cofire Ceramics (LTCC) provides us a new technology horizon to integrate multi-disciplinary sub-systems in a 3D compact fashion. In this research, a new concept of passive integration for the microwave front-end of LMDS will be investigated from theory to practice. Particularly, a novel patch antenna array will be integrated with laminated waveguide low pass filter and diplexer into an LTCC entity. Therefore, the module will be ultra thin, lightweight and low-cost.

Three major issues will be addressed:

(1) a novel efficient patch antenna array, which suppresses the unwanted surface wave;
(2) investigations of inter-connections between antenna array and the common port of the diplexer via the low pass filter. The I/O configurations of the transmitter and receiver ports to the external circuit will be studied for surface mounted applications; and
(3) design of novel low pass filter and diplexer using the laminated waveguide technology.

A special attention will be paid to the theoretic leakage model of the laminated waveguide. A number of LTCC integrated antenna and microwave front-end modules will be built and tested to demonstrate the feasibility and validation of the new concept of passive integration.

(EE01202)

Engineering and Characterization of Low-Dimensional Group IV Materials by Scanning Probe Microscopy

✍ XU Jianbin ● HE James Zhongqing#

❑ 15 September 2001

❖ Research Grants Council (Earmarked Grants)

The basic idea of band gap engineering is to alter the electronic properties of certain materials to desired ones that are not available in their natural forms. This can be realized by confining the motion of electrons, in most cases to lower dimensions. Quantum well is one of good examples toward this approach. Recent experiments have shown that lithographically made silicon nanowires exhibit unique characteristics. From the application point of view, however, non-lithographic grown wires that can be manufactured in mass production may be of higher importance. We have devoted large efforts to the post-growth sample treatment and refinement of silicon nanowires. A unique technique has been developed to make a suspension that consists of free-standing wires (not sticking to each other as they are in the raw materials) that are manageable for device processing. We have also developed a triple-electrode electrophoresis method to make a prototype device. To our knowledge, this is the first nanowire-based device made by non-microactuation method, which has an optimistic opportunity to be adopted by the existing IC processing technologies.

In this project we propose to study the surface or interface electrical properties of low-dimensional group IV materials, e.g., C, Ge, and Si. We will examine them and their interfaces with metals by several different techniques. In particular, we will perform atomic scale characterization of surfaces after the post-growth sample treatment and refinement, and hydrogen passivation or nitridation ***in-situ***. The use of in-situ techniques when combined with SPMs means that the surface modification will be examined on the nanometer scale.

(EE01203)

Development of Medical Devices and Nano-biosensors to Promote Biomedical Electronic industry in Hong Kong

✍ ZHANG Yuanting ● CHAN Kam Tai ● CHING Pak Chung ● WONG Sai Peng Joseph ● LEE Tan ● HENG Pheng Ann (Dept of Computer Science and Engineering) ● LEONG Philip Heng Wai (Dept of Computer Science and Engineering) ● CHENG Chun Yiu Jack (Dept of Orthopaedics & Traumatology) ● SUNG Joseph Jao Yiu (Dept of Medicine & Therapeutics) ● WOO Jean (Dept of Medicine & Therapeutics) ● NG Ho Keung (Dept of Anatomical & Cellular Pathology) ● LI Wen Jung (Dept of Auto. & Computer-Aided Engin.) ● TSUI Kwok Wing (Biochemistry) ● WAYE Mary Miu Yee (Biochemistry) ● FUNG Kwok Pui (Biochemistry) ● CHUNG Sheung Chee Sydney (Dept of Surgery) ● LEE Cheuk Yu (Biochemistry) ● CHOU Chien* ● Dov Jaron* ● LU Z H* ● ONARAL B* ● POURREZAEI Kambiz* ● TAMURA T* ● XU Y H*

❑ 1 January 2002

❖ Funding from Other Sponsors ● Innovation and Technology Support Programme, ITF, Innovation & Technology Commission

In order to stimulate the growth of technology-based biomedical electronics industries in Hong Kong, three highly interdisciplinary, multi-institution R&D thrust areas are identified: medical devices, nano-biosensors, and their applications to tele-medicine.

The specific aims of this project are: (1) to develop a series of biosensor-based modules and medical-systems-on-chips for monitoring, diagnosis, and treatment of chronic diseases; (2) to provide technological know-how for the design and fabrication of nano-biosensors; (3) to promote rapid commercialization of biosensors and medical electronic devices; and to provide a technical service focal point for industries during commercialization; (4) to train and attract a group of highly skilled R&D experts with entrepreneurial capacity and global outlook; and (5) to enhance close cooperation among industries, academics, and hospitals for promoting biomedical electronic industry in Hong Kong.

(BL01873)

Please refer to previous issues of this publication for more details of the following ongoing research at the department:

Edition	Title/Investigators
2000-01	900 and 1800 MHz Digital Controlled Oscillators for Wireless Communication (CU00218)

✍ CHAN Cheong Fat ● CHOY Chiu Sing Oliver

1998-99 High Repetition Rate Fiber Laser Source with Ultrashort Pulse Duration for Very Large Capacity Optical Communication (CU98311)
✍ CHAN Kam Tai ● LI Shenping# ● LOU Caiyun*

1999-00 Stability Improvement Studies of Harmonic Active Mode-locking of Fiber Ring Lasers (CU99434)
✍ CHAN Kam Tai ● HO HO-pui, Aaron*

2000-01 High-energy and High-repetition Rate Mode-locked Fiber Laser (EE20013)
✍ CHAN Kam Tai

2000-01 Harmonic Tuning of Source and Load Impedance to Improve Phase Linearity of Microwave Power Amplifiers for Wireless Digital Communications (CU00210)
✍ CHENG Kwok Keung Michael

1998-99 Wavelet Packet Division Multiplexing (CU98105)
✍ CHING Pak Chung ● WONG Kon Max

1999-00 Chinese Speech Recognition Infrastructure for Hong Kong's Technology Developers (EE99005)
✍ CHING Pak Chung ● MENG Mei Ling Helen (Dept of Systems Engineering & Engin. Management) ● LEE Tan

2000-01 Design of an IP Asynchronous Cross-pipelined 16x16-bit Multiplier (EE20014)
✍ CHOY Chiu Sing Oliver

1999-00 Smart Antenna Technologies for Wireless Communication Systems (EE99010)
✍ Ian Howard WILSON ● CHENG Kwok Keung Michael ● WONG Kainam Thomas# ● WONG Kon Max*

1999-00 Automatic Speech-to-Speech Conversion Between Cantonese and Putonghua (EE99015)
✍ LEE Tan

2000-01 Development of a Cantonese Text-to-Speech System with High Naturalness (CU00219)
✍ LEE Tan ● MENG Mei Ling Helen (Dept of Systems Engineering & Engin. Management) ● ZEE Yun Yang Eric*

1999-00 Novel Wavelength-tunable Devices for Broadband Optical Communications (EE99034)
✍ SHU Ching Tat C. ● MARSH H. John*

2000-01 A New Family of Electrically Wavelength-tunable Semiconductor and Fiber Lasers (CU00220)
✍ SHU Ching Tat C. ● TSANG Hon Ki ● CHIANG Kin Seng*

1999-00 Ultrafast Optical Characterization of New Semiconductor Materials for Optoelectronics (EE99016)
✍ TSANG Hon Ki

2000-01 Measurement of All-optical Nonlinearities in Ion-Implanted Materials (CU00221)
✍ TSANG Hon Ki ● WONG Sai Peng Joseph

1998-99 3D Shape Reconstruction from an Image Sequence Captured by a Hand-Held Camera (CU98310)
✍ TSUI Hung Tat ● ZHANG Zhongying#

1999-00 3-D Model-based Video Coding for Videoconferencing Applications (CU99402)
✍ TSUI Hung Tat ● CHAM Wai Kuen ● NGAN King Ngi*

1999-00 Electrical Transport Properties of Ion Beam Synthesized Low Dimensional Metal Silicide Structures (CU99405)
✍ WONG Sai Peng Joseph

1999-00 Ion Beam Synthesis of Silicon Carbide (EE99035)
✍ WONG Sai Peng Joseph ● Dr. Lindner J. K. N.*

2000-01 Nano-granular Metal-carbon Thin Films by Pulsed Filtered Vacuum Arc Deposition (CU00216)
✍ WONG Sai Peng Joseph

1999-00 Design Methodology of Advanced Multi-chip Modules Using LTCC Technology for Wireless Applications (EE99040)
✍ WU Ke Li ● CHENG Kwok Keung Michael ● W. Richard Smith* ● Chen Xiao Jian*

2000-01 Simulation and Design Methodology of Advanced Multi-Chip Module (MCM) System for Wireless Communication Applications (CU00213)
✍ WU Ke Li ● CHENG Kwok Keung Michael

1997-98 Nano-Characterization and -Fabrication of Dielectrics and MIS Junctions on Silicon (CU97530)
✍ XU Jianbin ● WONG Sai Peng Joseph ● CHEUNG Wing Yiu ● Ian Howard WILSON ● KWOK Wai Man Raymund (Dept of Chemistry)

1998-99 Investigation of Low-dimensional Silicon Based Materials by Scanning Probe Microscopy (CU98172)
✍ XU Jianbin ● CHEN Kun Ji* ● WONG Sai Peng Joseph ● Ian Howard WILSON ● HARK Sui Kong (Dept of Physics)

1999-00 Passivation and Oxidation of Group IV Semiconductors Studied by Scanning Probe Microscopy (CU99390)
✍ XU Jianbin ● KWOK Wai Man Raymund (Dept of Chemistry) ● Ian Howard WILSON ● Devine R.A.B.*

2000-01 Size Effects of SrBi2Ta2O9 (SBT) Ferroelectric Thin Films (CU00214)
✍ XU Jianbin ● Ian Howard WILSON ● WONG Sai Peng Joseph

2000-01 The Formation of Metal Nano-clusters in Dielectric Materials by Ion Gettering (CU00215)
✍ XU Jianbin

RESEARCH OUTPUTS AND PUBLICATIONS

<P011756> **HE Jian; WANG Xu and CHAN K.T.** "Tunable All-Optical Wavelength Cauerston and 2R Regeneration Based on Semiconductor - Figer Ring Laser". *Proceedings of 2001 IEEE/LEOS Annual Meeting Conference* vol.1. San Diego. CA. USA: IEEE Lasers & Electro-Optics Society, 2001.11.

<P011757> **CHAN Ka Wing; HUNG King Fai and ZHANG Yuan Ting.** "Noninvasive Blood Pressure Measurement for Telemedicine". Paper presented in the 23rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society. Istanbul, Turkey, 2001.10.25.

<P011764> **LAU C.M.; CHAM W.K.; TSUI H.T. and NGAN K.N.** "Facial Feature Extraction for Constructing 3D Human Face Model". *ICICS 2001* CD ROM. Singapore: IEEE & Nanyang Technological University, 2001.10.

<P011773> **LEE Chi-Wai; CHOY Chiu-Sing; BUTAS Jan and CHAN Cheong-Fat.** "A Pipelined Dataflow Small Micro-Coded Asynchronous Processor and its Application to DCT". *Proceedings of the IEEE International Symposium on Circuits and Systems 2001* vol.IV, pp.910-913. Sydney, Australia: IEEE, 2001.05.09.

<P011774> **LEUNG Lai-Kan; CHAN Cheong-Fat and CHOY Chiu-Sing, Oliver.** "A Giga-Hertz CMOS Digital Controlled Oscillator". *Abstracts of the 2001 IEEE International Symposium on Circuits and Systems* vol.4, pp.610-613. Sydney, Australia, 2001.05.

<P011807> **LEE K.L.; SHU C. and LIU H.F.** "10 Gsamplels Photoric Analog-To-Digital Converter Construsted Using Lo-Wavelength Litter-Suppressed Sampling Pulses from a Self-Seeded Laser Diode". *Abstracts of the Conference on Lasers and Electro-Optics CLEO 2001* ed. by OSA. vol.1, pp.67-68. USA: IEEE LEOS, OSA and APS, 2001.05.06.

<P011808> **CHOW K.K.; SHU C. and LIU H.F.** "All-Optical Control of Clock Division Using an Injection-Locked Fabry-Perot Laser Diode". *The 2001 Conference on Lasers and Electro-Optics (CLEO/QELS'01)* ed. by OSA. vol.1, pp.524-525. Maryland, USA.: APS, IEEE LEOS, OSA, 2001.05.06.

<P011941> **MAK W.K., Mark and TSANG H.K.** "Accurate Determination of Laplacian Pulse Width of Ultrashort Optical Pulses". *OECC/IOOC 2001 Conference Incorporating ACOFT 2001* pp.378-379. Sydney, Australia: OECC/IOOC/ACOFT Secretariat, 2001.07.04.

<P012209> **FAN Guoliang and CHAM Wai-Kuen.** "Postprocessing of Low Bit-Rate Wavelet-Based Image Coding Using Multiscale Edge Characterization". *IEEE Transactions on Circuits and Systems for Video Technology* vol.11 no.12, pp.1263-1272. USA: IEEE, 2001.12.

<P012754> **LEE Kar-Kin; CHAM Wai-Kuen; NGAN K.N. and LIU J.Z.** "DC Coefficient Restoration on Foreground/Background Video Coding". Paper presented in the 3rd International Conference on Information, Communications and Signal Processing, organized by School of Electrical and Electronic Engineering Nanyang Technological University, Singapore. Singapore, 2001.10.

<P013044> **PENG H.J.; WONG S.P. and ZHAO Shounan.** "Study Film-Edge Induced Stresses in Substrate by Infrared Photoelasticity". *Abstracts of 2001 ASME International Design Engineering Technical Conferences* p.684. Pennsylvania, USA: The American Society of Mechanical Engineers, 2001.09.09.

<P013050> **LEE Tong and LI Wen-Jing.** "Hopfield Neural Networks for Affine Invariant Matching". *IEEE Transactions on Neural Networks* vol.12, pp.1400-1410. IEEE, 2001.11.

<P013119> **FUNG Y. M.; CHEUNG W. Y.; WILSON I. H.; CHEN D. H.; XU J. B.; WONG S. P. and KWOK R. W. M.** "Electron Field Emission Characteristics of Textured Silicon Surface". *Journal of Vacuum Science and Technology B* vol.19 no.3, pp.884-887. Melville: American Institute of Physics, 2001.

<P016003> **CHAN Yiu Tong; LEE B H; INKOL R and YUAN Q.** "Direction Finding with a Four-Element Adcock-Butler Matrix Antenna Array". *IEEE Transactions on Aerospace and*

Electronic Systems vol.37 no.4, pp.1155-1162. New York, USA: Institute of Electrical and Electronic Engineers, 2001.10.

<P016086> **GAO Y. and WONG Sai Peng Joseph.** "Structural and Optical Properties of β-$FeSi_2$ Thin Layers Synthesised by Metal Vapour Vacuum ARC Ion Implantation". Paper presented in the 7th European Conference on Accelerators in Applied Research and Technology, origanzed by University of Surrey, UK Paper O02. Guildford, UK, 2001.08.21.

<P016095> **LAM H. S., LEE Tan and P.C. CHING.** "A Low Missing Rate Audio Search Technique for Cantonese Radio Broadcast Recording". *Proceedings of the 2nd IEEE Pacific Rim Conference On Multimedia* pp.546-549. Beijing, China: Springer - Verlag, 2001.10.24.

<P016273> **MacPhie Robert H and WU Ke Li.** "A Full-Wave Modal Analysis of Inhomogeneous Waveguide Discontinuities with Both Planar and Circular Cylindrical Boundaries". *IEEE Transactions on Microwave Theory and Techniques* vol.49 no.6, pp.1132-1136. 2001.06.

<P016303> **WANG Lianwei; FU K Y. Ricky; ZENG Xuchu; CHU K. Paul; CHEUNG Wing Yiu and WONG Sai Peng Joseph.** "Damage In Hydrogen Plasma Implanted Silicon". *Journal of Applied Physics* vol.90 no.4, pp.1735-1739. USA: American Institute of Physics, 2001.08.15.

<P016340> **CHOW K K; MAK Wing Keung; SHU Ching Tat C. and TSANG Hon Ki.** "Widely Tunable Wavelength Converter Using a Fiber Ring Laser with Semiconductor Optical Amplifier". *Proceedings of 2001 OECC/IOOC Optoelectronics and Communications Conference/Integrated Optics and Optical Fiber Communication* pp.90-91. Sydney, Australia: IEEE/Australian Photonics CRC, 2001.07.

<P016389> **BUTAS Jan; CHOY Chiu Sing Oliver; POVAZANEC Juraj and CHAN Cheong Fat.** "Asynchronous Cross-Pipelined Multiplier". *IEEE Journal of Solid-state Circuits* vol.36 no.8, pp.1272-1275. USA, 2001.08.

<P016580> **TSANG Hon Ki; MAK Wing Keung; SHU Ching Tat C.; CHOW K K and TONG Fuk Kay Franklin.** "All-Optical Wavelength Conversion Using Active Semiconductor Devices". *Proceedings of 2001 SPIE Conference on Active and Passive Optical Components for WDM Communication* pp.93-100. Denver, USA: SPIE, 2001.08.

<P016588> **YU Y H; SONG Z R; ZOU S C; WONG Sai Peng Joseph and WILSON Ian Howard.** "Preparation of SiC Thin Films by DC Magnetron Sputtering and Their Application in Microsensors". *Proceedings of 2001 6th International Conference On Solid-State And Integrated Circuit Technology (ICSICT-2001)* vol.2, pp.1432-1437. Shanghai, China: IEEE, 2001.10.22.

<P016719> **FAN Chun Wah and CHENG Kwok Keung Michael.** "Amplifier Linearization Using Simultaneous Harmonic and Baseband Injection". *IEEE Microwave And Wireless Components Letters* vol.11 no.10. USA: IEEE, 2001.10.

<P016851> **PUN Kong Pang, Jose FRANCA, AZEREDO-LEME C, CHAN Cheong Fat and CHOY Chiu Sing Oliver.** "Correction of Frequency-Dependent I/Q Mismatches in Quadrature Receivers". *Electronics Letters* vol.37 no.23, pp.1415-1417. UK, 2001.11.08.

<P016905> **CHEN K W; YU Y H; LEI Y M; CHENG L L; BALAKRISHNAN Sundaravel; LUO Enzhou; WONG Sai Peng Joseph; WILSON Ian Howard; CHEN L Z; REN C X and ZOU S C.** "Non-Rutherford Backscattering Studies of SiC/SIMOX Structures". *Applied Surface Science* vol.184, pp.178-182. Elsevier Science, 2001.12.

<P016927> **CHEN Dihu, WONG Sai Peng Joseph and LINDNER J K N.** "Effects of Beam Current Density on Ion Beam Synthesis of SiC". *Wide Band Gap Electronics (Materials Research Society Symp. Proc.)* pp.E9.1.1-E9.1.6. Warrendale, USA: Materials Research Society, 2001.

<P017006> **CHOW Kai Tik and LEE Tong.** "Image Approximation And Smoothing By Support Vector Regression". *Proceedings of the International Joint Conference On Neural Networks* pp.2427-2432. Washington, USA: IEEE, 2001.07.15.

<P017019> **WANG Hao; WONG Sai Peng Joseph; CHEUNG Wing Yiu; KE Ning; LAU W F; CHIAH M F and ZHANG X. X.** "Structural and Magnetic Properties of $Co_{65}C_{35}$ Nanocomposite Films Prepared by Pulsed Filtered Vacuum Arc Deposition". *Materials Science And Engineering C* vol.16, pp.147-151. Elsevier Science, 2001.10.

<P017035> **胡曉翎、張元亭.** ＜關節音技術及其在運動醫學中的應用＞. 《體育生物醫學基礎研究與進展》 秦嶺, 胡聲宇及 陳啟明編 pp.317-327. 中國: 人民體育出版社, 2001.

<P017071> **LHUILLIER M; QUAN L; SHUM H and TSUI Hung Tat.** "Relief Mosaics by Joint View Triangulation". *Proceedings of IEEE International Conference On Computer Vision And Pattern Recognition, CVPR 2001* pp.I-785-790. Hawaii, USA: IEEE, 2001.12.

<P017075> **HABERLEN M; CHEN Dihu; STRITZKER B; WONG Sai Peng Joseph and LINDNER J K N.** "FTIR and XTEM Investigations of the Formation of Crystalline and Amorphous SiC_x Phases in Silicon Upon High-Dose Carbon Implantation of Silicon". *Proceedings of the 19th International Conference On Atomic Collision In Solids (ICACS-19), Paper A42* p.103. Paris, France: Univ. Paris Sud. Orsay France, 2001.07.29.

<P017238> **WONG Sai Peng Joseph; PENG Haijing and ZHAO Shounan.** "Analytic Solution of Stress Distribution under a Thin Film EdgeiIn Substrates". *Applied Physics Letters* vol.79 no.11, pp.1628-1630. USA: American Institute of Physics, 2001.09.10.

<P017240> **DUO Xinzhong; LIU Weili; ZHANG Miao; WANG Lianwei; LIN Chenglu; OKUYAMA M.; NODA M.; CHEUNG Wing Yiu; WONG Sai Peng Joseph; CHU Paul K.; HU Peigang; WANG S. X. and WANG L. M**. "Evolution of Hydrogen and Helium Co-Implanted Single-Crystal Silicon during Annealing". *Journal of Applied Physics* vol.90 no.8, pp.3780-3786. USA: American Institute of Physics, 2001.10.15.

<P017360> **GAO Yun and WONG Sai Peng Joseph.** "Electrical Transport and Magnetoresistance Effect in Ion Beam Synthesized Nanocrystalline $TiSi_2$/Si System". *Proceedings of the 19th International Conference On Atomic Collision In Solids (ICACS-19), Paper A131* p.148. Paris, France: Univ. Paris Sud. Orsay France, 2001.07.29.

<P017378> **CHOW Chi Kin; TSUI Hung Tat and LEE Tong.** "Optimization On Unbounded Solution Space Using Dynamic Genetic Algorithms". *Proceedings of the International Joint Conference On Neural Networks* vol.4, pp.2349-2354. Washington, USA: IEEE, 2001.07.15.

<P017406> **WU Ke Li and WANG Hai Yin.** "A Rigorous Modal Analysis of H-Plane Waveguide T-Junction Loaded with A Partial-Height Post for Wide-Band Applications". *Proceedings of IEEE Transactions on Microwave Theory and Techniques* vol.49 no.5, pp.893-901. IEEE, 2001.05.

<P017440> **WEI Qing Li; WANG Hao; HU L; ZHOU G R; WU S; CHIAH M F; POON C Y and WONG Sai Peng Joseph.** "Monte Carlo Modeling of Magnetic Properties in Magnetic Granular

Films for High-Density Recording". *Proceedings Of The 6th ASIST The Sixth Asian Symposium On Information Storage Technology* pp.73-78. Shanghai, China: IEICE, Japan, 2001.11.07.

<P017456> **DENG Jiang Wen and TSUI Hung Tat.** "Mutually Weighted Hidden Markov Models for Recognition of American Sign Language (ASL)". *IEEE International Workshop On Cues In Communication (Inconjection With the CVPR'2001)* CD ROM. Hawaii, USA, 2001.12.

<P017476> **LIANG T K, TSANG Hon Ki, ROBERTS S W, BRADY D J, HARPIN A, DRAKE J and ASGHARI M.** "Measurement of Dispersion in A Silicon Waveguide at 1.5 μm". *CLEO Pacific Rim 2001* pp.722-723. Tokyo, Japan: Optical Society of America, 2001.07.

<P017534> **LEUNG Wing Yan; CHENG Kwok Keung Michael and WU Ke Li.** "Design and Implementation of LTCC Filters with Enhanced Stop-Band Characteristics for Bluetooth Applications". *Proceedings of Asia-Pacific Microwave Conference 2001* vol.3, pp.1008-1011. Taipei, Taiwan: IEEE, 2001.12.03.

<P017538> **CHIAH M F; WANG Hao; POON C Y; CHEUNG Wing Yiu; WONG Sai Peng Joseph; PAKHOMOV A B and WONG Catherine.** "Characterization of CoPt-C Nanocomposite Films Prepared by Pulsed Filtered Vacuum Arc Deposition". *Proceedings Of The 6th ASIST The Sixth Asian Symposium On Information Storage Technology* pp.67-71. Shanghai, China: IEICE, Japan, 2001.11.07.

<P017637> **WONG Sai Peng Joseph; ZHANG Xingwang; ZHANG F. and CHEUNG Wing Yiu.** "Electrical Transport Properties of Ion Beam Synthesized Nickel Silicide Layers by MEVVA Implantation". *Proceedings Of 2001 6th International Conference On Solid-State And Integrated Circuit Technology (ICSICT-2001)* vol.1, pp.486-490. Shanghai, China: IEEE, 2001.10.22.

<P017681> **WANG Xu; LEE Ka Lun; SHU Ching Tat C. and CHAN Kam Tai.** "Multiwavelength Self-Seeded Fabry-Perot Laser with Subharmonic Pulse-Gating for Two-Dimensional Fiber Optic-CDMA". *IEEE Photonics Technology Letters* vol.13 no.12, pp.1361-1363. USA: IEEE, 2001.12.

<P017706> **WONG Sai Peng Joseph; PENG Haijing and ZHAO Shounan.** "Thin-Film-Edge-Induced Stresses in Substrates". *Gate Stack And Silicide Issues In Silicon Processing II (Mat. Res. Soc. Symp.)* vol.670, pp.K7.5.1-K7.5.6. Warrendale, PA, USA: Materials Research Society, 2001.

<P017762> **XIAO Zhisong; XU Fei; ZHANG Tonghe; CHENG Guoan; GU Lanlan and WONG Sai Peng Joseph.** "Energy Transfer In Er Doped Silica Films Containing Si Nanocrystals Formed By MEVVA Ion Implantation". *Proceedings Of 2001 6th International Conference On Solid-State And Integrated Circuit Technology (ICSICT-2001)* vol.2, pp.1456-1459. Shanghai, China: IEEE, 2001.10.22.

<P017823> **LUO Enzhou; WONG S K; PAKHOMOV A B; XU Jianbin; WILSON Ian Howard and WONG C Y.** "Tunneling Current and Thickness Inhomogeneities of Ultrathin Aluminum Oxide Films in Magnetic Tunneling Junctions". *Journal of Applied Physics* vol.90 no.10, pp.5202-5207. Melville, USA: American Institute of Physics, 2001.11.15.

<P017854> **CHAN S W and SHU Ching Tat C.** "Compensated Dispersion-Tuning of Wavelength in a Fiber Ring Using a Semiconductor Optical Amplifier Nonlinear Loop Mirror". *2001 Conference on Lasers and Electron-Optics/Pacific Rim (CLEO/Pacific)* pp.I-270 - I-271. Chiba, Japan: IEEE/OSA, 2001.07.

<P017936> **CHENG Kwok Keung Michael.** "Oscillators". *RFIC And MMIC Design And Technology* ed. by I D Robertson and S. Lucyszyn Chapter 6, pp.251-279. UK: IEE, 2001.

<P018014> **LAW Ka Man; LEE Tan and LAU Wai.** "Cantonese Text-to-Speech Synthesis Using Sub-Syllable Units". *Proceedings of the 7th European Conference on Speech Communication and Technology* vol.2, pp.991 - 994. Aalborg, Denmark: International Speech Communication Association, 2001.09.03.

<P018031> **HU Xiaoling and ZHANG Yuanting.** "Effects of Refractoriness Variation on the Interpulse Interval Statistics at the Output of the Neuromuscular Junction". *Electromagnetics* vol.21, pp.531-543. USA, 2001.

<P018065> **胡曉翎、張元亭、秦 .** ＜肌音圖技術和肌肉疲勞＞. 《體育生物醫學基礎研究與進展》 秦嶺, 胡聲宇, 陳啟明編 pp.301-316. 中國: 人民體育出版社, 2001.

<P018168> **丁瑞欽、 王浩、 LAU W F、 張榮耀、 黃世平、 王寧娟 及 于英敏.** ＜InP/SiO_2 納米複合膜的微觀結構和光學性質＞. 《物理學報》 vol.50 no.8, pp.1574-1579. 中國: Chin. Phys. Soc., 2001.08.

<P018181> **Wen Jing LI and LEE Tong.** "Recognition and Visual Learning of Articulated Shape by Accumulative Hopfield Matching". *Proceedings of the International Joint Conference On Neural Networks* vol.3, pp.2153-2158. Washington, USA: IEEE, 2001.07.15.

<P018242> **LEE Kwok Wai and LEE Tong.** "Design Of Neural Networks For Multi-Value Regression". *Proceedings of the International Joint Conference On Neural Networks (IICNN 2001)* vol.1, pp.93-98. Washington, USA: IEEE, 2001.07.15.

<P018354> **CHEN Y J; DING J; SI L; CHEUNG Wing Yiu; WONG Sai Peng Joseph; WILSON Ian Howard and SUZUKI T.** "Magnetic Domain Structures and Magnetotransport Properties in Co-Ag Granular Thin Films". *Applied Physics A - Materials Science and Processing* vol.73, pp.103-106. Springer - Verlag, 2001.07.

<P018407> **JIANG Guang; TSUI Hung Tat; QUAN Long and LIU Shang Qian.** "Recovering the Geometry of Single Axis Motions by Conic Fitting". *IEEE International Conference On Computer Vision And Pattern Recognition 2001* pp.293-298. Hawaii, USA, 2001.12.

<P018450> **PUN Kong Pang; FRANCA Jose E and AZEREDO-LEME C.** "The Correction of Frequency-Dependent I/Q Mismatches in Quadrature Receivers by Adaptive Signal Separation". *Proceedings of 4th International Conference on ASIC 2001* pp.424-427. Shanghai, China: CIE, IEEE, IEE, 2001.10.

<P018615> **LO Wai Kit, P.C. CHING, LEE Tan and MENG Mei Ling Helen.** "Design, Compilation and Processing of CUCall: A Set Of Cantonese Spoken Language Corpora Collected Over Telephone Networks". *Proceedings of Research On Computational Linguistics Conference XIV* pp.193-212. Tainan, Taiwan: The Association For Computational Linguistics And Chinese Language Processing, 2001.08.16.

<P018660> **胡曉翎、張元亭.** ＜肌電圖原理及其在運動醫學中的應用＞. 《體育生物醫學基礎研究與進展》 秦嶺, 胡聲宇, 陳啟明編 頁 285-300. 中國: 人民體育出版社, 2001.

<P018746> **CHAN C. Y.; LAI K. H.; FUNG M. K.; WONG W. K.; BELLO I.; HUANG R. F.; LEE C. S.; LEE S. T. and WONG Sai Peng Joseph.** "Deposition and Properties of Tetrahedral

Amorphous Carbon Films Prepared on Magnetic Hard Disks". *J. Vac. Sci. Technol. A* vol.19, pp.1606-1610. USA: American Vacuum Society, 2001.07.

<P018790> **XU Jun; HUANG Xiao Hui; LI Wei; WANG Li; HUANG Xin Fan; CHEN Kun Ji; XU Jianbin and WILSON Ian Howard.** "Vacuum Electron Emission with Low Turn-On Electric Field from Hydrogenated Amorphous Carbon Thin Films". *Applied Physics Letters* vol.79 no.1, pp.141-143. USA: American Institute of Physics, 2001.07.02.

<P018798> **GUO H Y; WILSON Ian Howard; XU Jianbin; LUO Enzhou; CHEUNG Wing Yiu; KE Ning and SUNDARAVEL Balakrishnan.** "Aging Effect on the Ferroelectric Property of $YMnO_3$ Thin Film". *Ferroelectrics* vol.259, pp.181-185. USA, 2001.

<P018804> **CHOY Chiu Sing Oliver; BUTAS Jan; POVAZANEC Juraj and CHAN Cheong Fat.** "A New Control Circuit for Asynchronous Micropipelines". *IEEE Transactions on Computers* vol.50 no.9, pp.992-997. USA, 2001.09.

<P018897> **PENG Haijing; WONG Sai Peng Joseph and ZHAO Shounan.** "Infrared Photoelastic Study of Thin Film Edge Induced Stresses in Silicon Substrates". *Abstracts, Materials Research Society 2001 Fall Meeting, Paper L4.5* p.246. Boston, USA: Materials Research Society, 2001.11.26.

<P018934> **Wen Jing LI and LEE Tong.** "Hopfield Network For Affine Invariant Object Recognition". *Proceedings of the International Joint Conference on Neural Netoworks* 1, pp.588-593. Washington, USA: IEEE, 2001.07.15.

<P018946> **CHOI Wing Nin, WONG Yiu Wing, LEE Tan and P.C. CHING.** "Searching for the Missing Piece". *IEEE Automatic Speech Recognition and Understanding Workshop* Trento, Italy: IEEE, 2001.12.09.

<P018954> **PENG Haijing; WONG Sai Peng Joseph and ZHAO Shou Nan.** "Study of Thin Film-Edge Induced Stresses in Silicon Substrates by Infrared Photoelasticity". *Proceedings of DETC'01, ASME 2001 Design Engineering Technical Conferences And Computers Information In Engineering Conference* pp.1-6. Pittsburgh, USA: ASME, 2001.09.09.

<P018968> **KAM Patgi, NGAI Carina, LEE Tan and P.C. CHING.** "Speech-To-Speech Translation from Mandarin to Cantonese". *Proceedings of the 6th National Conference on Man-Machine Speech Comunication* pp.139-144. Shenzhen, China: Shenzhen University, 2001.11.20.

<P019011> **WANG Xu and CHAN Kam Tai.** "A New Source for Incoherent 2-Dimensional Coding in FO-CDMA". *Proceedings Of 27th European Conference On Optical Communication 2001 (ECOC'01)* pp.414-415. Amsterdam, The Netherlands: IEEE, 2001.10.

<P019086> **MO D; XU Jianbin; LIU Y and HU G D.** "Ellipsometric Study of Optical Properties of Oriented SBT Thin Films". *Ferroelectrics* vol.264, pp.243-248. 2001.

<P019109> **WANG Xu and CHAN Kam Tai.** "Limitation of the Free-Running Gain-Switched F-P Laser For 2-D Incoherent FO-CDMA Application". *OECC 2001/ IOOC 2001 Conference Incorporating ACOFT* pp.121-122. Sydney, Australia: IEEE, OSA, 2001.07.03.

<P019127> **DU Ying Gang; CHAN Kam Tai and SHI Xiangquan.** "Enhanced Echo Signal Power With Optimal Signal To Clutter Ratio In Polarimetric Radar". *3rd International Conference On*

Information, Communications & Signal Processing (ICICS 2001) CD Version. Singapore: Nanyang Technological University / Singapore, 2001.10.15.

<P019232> **WONG C S, TSANG Hon Ki, DAY I E, HARPIN A, DRAKE J and ASGHARI M.** "Two-Photon Absorption and Self-Phase Modulation in Silicon Waveguide at 1.5μm Wavelength". *CLEO Pacific Rim 2001* pp.592-593. USA: Optical Society of America, 2001.07.

<P019246> **LIN Pui Yu and CHENG Kwok Keung Michael.** "Analysis and Simulation of Adaptive Feedforward Power Amplifier for CDMA Communication Systems". *Proceedings of Asia-Pacific Microwave Conference 2001* vol.3, pp.988-991. Taipei, Taiwan: IEEE, 2001.12.03.

<P019398> **CHOI Yeung Bun and CHENG Kwok Keung Michael.** "Generalised Frequency-Domain Analysis of Microwave Class-E Power Amplifiers". *IEE Proceedings - Microwaves Antennas And Propagation* vol.148 no.6, pp.403-409. UK: IEE, 2001.12.

<P019470> **LI C P and WONG Sai Peng Joseph.** "Microstructures and Electrical Transport Properties of Percolation Layers of Nanocrystalline $CoSi_2$ Precipitates Embedded in Si Formed by Ion Beam Synthesis". *Proceeding of the 19th International Conference On Atomic Collision In Solids (ICACS-19), Paper A132* p.148. Paris, France: Univ. Paris Sud. Orsay France, 2001.07.29.

<P019690> **CHAN Yiu Tong; YUAN Q.; SO H. C. and INKOL R.** "Detection of Stochastic Signals in the Frequency Domain". *IEEE Transactions on Aerospace and Electronic Systems* vol.37 no.3, pp.978-988. New York, USA: Institute of Electrical and Electronic Engineers, 2001.07.

<P019829> **CHOW K K; SHU Ching Tat C.; MAK Wing Keung and TSANG Hon Ki.** "Widely Tunable Wavelength Converter Using a Double-Ring Fiber Laser Incorporating a Semiconductor Optical Amplifier". *IEEE Lasers And Electronics Society Annual Meeting 2001* pp.85-86. San Diego, USA: IEEE, 2001.11.

<P019941> **CHOY Chiu Sing Oliver; BUTAS Jan; POVAZANEC Juraj and CHAN Cheong Fat.** "A Fine-Grain Asynchronous Pipeline Reaching the Synchronous Speed". *Proceedings of 2001 4th International Conference on ASIC* pp.547-550. Shanghai, China: IEEE, 2001.10.23.

<P019992> **YAO Jun and ZHANG Yuanting.** "Bionic Wavelet Transform : A New Time-Frequency Method Based on An Auditory Model". *IEEE Transactions on Biomedical Engineering* vol.48 no.8, pp.856-865. USA, 2001.08.

<P026204> **GAO Ge, P.C. CHING and LEE Tan.** "A New Approach to Generating Pitch Cycle Waveform (PCW) for Waveform Interpolation Codec". *Microprocessors and Microsystems* vol.25 pp.421-426. The Netherlands: Elsevier Sciences B.V., 2002.02.

<P026343> **SO H C; MA W. K. and CHAN Yiu Tong.** "Detection of Random Signals Via Spectrum Matching". *IEEE Transactions on Aerospace and Electronic Systems* vol.38, pp.301-306. New York, USA: Institute of Electrical and Electronic Engineers, 2002.01.

<P026505> **WAI Yin Yee; CHOW Chi Kin and LEE Tong.** "Resolving Ambiguity in Depth Extraction for Motion Capture Using Genetic Algorithm". *2002 IEEE World Congress on Computational Intelligence, 2002 Congress on Evolutionary Computation* vol.2, pp.1804-1809. IEEE NNS, INNS, IEE, EPS, 2002.05.17.

<P026566> **PUN Kong Pang, CHOY Chiu Sing Oliver, CHAN Cheong Fat and Franca Jose E.** "A Quadrature If Mixer with High Image Rejection for Continuous-Time Complex ΣΔ Modultors". *2002 ISCAS* pp.IV221-224. Phoenix, USA: IEEE, 2002.05.26.

<P026591> **CHEN Kewei; YU Yuhui; MU Haichuan; LUO Enzhou; BALAKRISHNAN Sundaravel; WONG Sai Peng Joseph and WILSON Ian Howard.** "Preferentially Oriented And Amorphous Ti,TiN and Ti/TiN Diffusion Barrier for Cu Prepared by Ion Beam Assisted Deposition (IBAD)". *Surface and Coating Technology* vol.151-152, pp.434-439. Elsevier Science, 2002.03.

<P026606> **HE James Zhongqing; XU Jianbin; XU M. S.; XIE Zhong; WILSON Ian Howard; MA X. L.; LI Q.; WANG N.; HUNG L. S. and LEE C. S.** "Dispersion, Refinement, and Manipulation of Single Silicon Nanowires". *Applied Physics Letters* vol.80 no.10, pp.1812-1814. USA: American Institute of Physics, 2002.03.11.

<P026646> **SONG Z R; YU Y H; LI C L; ZOU S C; ZHANG F M; WANG X; SHEN D S; LUO Enzhou; SUNDARAVEL Balakrishnan; WONG Sai Peng Joseph and WILSON Ian Howard.** "Tetrahedral Amorphous-Carbon Thin Films for Silicon-On-Insulator Application". *Applied Physics Letters* vol.80 no.5, pp.743-745. USA: American Institute of Physics, 2002.02.04.

<P026825> **ZHANG Xingwang; WONG Sai Peng Joseph; CHEUNG Wing Yiu and ZHANG F.** "Electrical Transport Properties of $NiSi_2$ Layers Synthesized by Metal Vapor Vacuum-Arc Ion Implantation: Temperature Dependence and Two-Band Model". *Applied Physics Letters* vol.80 no.2, pp.249-251. USA: American Institute of Physics, 2002.01.14.

<P026844> **MA Wing Kin, DAVIDSON, Timothy N., WONG Kon Max, LUO Zhi Quan and P.C. CHING.** "Quasi-Maximum-Likelihood Multiuser Detection Using Semi-Definite Relaxation with Application to Synchronous CDMA". *IEEE Trans on Signal Processing* vol.50 no.4 pp.912-922. USA: IEEE, 2002.04.

<P026953> **XU Jun; HUANG Xiao Hui; LI Wei; WANG Li; CHEN Kun Ji; XU Jianbin and WILSON Ian Howard.** "Very Low Threshold Electron Field Emission from Amorphous Carbon Films with Hydrogen Dilution". *International Journal of Modern Physics B* vol.16 no.6&7, pp.988-992. Singapore: World Scientific Publishing Company, 2002.03.

<P027060> **LEE Tan, LO W. K., P.C. CHING and MENG Mei Ling Helen.** "Spoken Language Resources for Cantonese Speech Processing". *Speech Communication* vol.36 pp.327-342. The Netherlands: Elsevier Science B.V., 2002.02.

<P027079> **WU Jun; SHENG Weixing; CHAN Kwok Po; CHUNG Wing Kit; CHENG Kwok Keung Michael and WU Ke Li.** "Smart Antenna System Implementation Based On Digital Beam-Forming And Software Radio Technologies". *IEEE MTT-S International Microwave Symposium Digest* vol.1, pp.323-326. Seattle, Washington, USA: IEEE, 2002.06.

<P027123> **LU Le and TSUI Hung Tat.** "Algebraic Characteristic and Geometric Interpretation of Planar Motions and Their Applications to Camera Self-Calibration". *The Fifth Asian Conference On Computer Vision 2002* pp.362-367. Melbourne, Australia, 2002.01.23.

<P027306> **CHOW Chi Kin, TSUI Hung Tat and LEE Tong.** "Fast Free-Form Surface Registration By a New Genetic Algorithm". *The Fifth Asian Conference On Computer Vision 2002* pp.120-125. Melbourne, Australia, 2002.01.23.

<P027340> **丁瑞欽、 王浩、 于英敏、 王寧娟、 佘衛龍、 李潤華、 丘志仁、 羅莉、 蔡志崗、 張榮耀 及 黃世平.** 〈射頻磁控共濺射 GaAs/SiO2 納米顆粒鑲嵌薄膜的光學性質〉. 物理學報 (ACTA Physica Sinica) 第 51 卷 第 4 期, 頁 882-887. 中國: 中國物理學會, 2002.04.

<P027378> **MA Wing Kin, WONG Kon Max and P.C. CHING.** "On Computing Verdu's Upper Bound for a Class of Maximum-Likelihood Multiuser Detection and Sequence Detection Problems". *IEEE Transactions on Information Theory* vol.47 no.7, pp.3049-3053. USA: IEEE, 2001.11.

<P027452> **OUYANG Shan, BAO Zheng, LIAO Gui Sheng and P.C. CHING.** "Adaptive Minor Component Extraction with Modular Structure". *IEEE Trans on Signal Processing* vol.49 no.9 2127-2137. USA: IEEE, 2001.09.

<P027549> **WU Ke Li; YU Ming and SIVADAS Apu.** "A Novel Modal Analysis of a Circular-To-Rectangular Waveguide T-Junction and Its Application to Design of Circular Waveguide Dual-Mode Filters". *IEEE Transactions on Microwave Theory and Techniques* vol.50 no.2, pp.465-473. IEEE, 2002.02.

<P027691> **LEE K L and SHU Ching Tat C.** "Dispersion Managed SOA Fiber Ring Laser for a Switching-Wavelength Pulse Source". *Proceedings of 2002 Optical Fiber Communications Conference (OFC), Paper WR4* pp.313-314. Anaheim, USA: OSA/IEEE, 2002.03.

<P027697> **TSANG W M, WONG Sai Peng Joseph and LINDNER J K N.** "Field Enhancement Mechanisms and Electron Field Emission: Properties of Ion Beam Synthesized Sic/Si Heterostructures". *Abstracts, The 8th International Conference On Electronic Materials (IUMRS-ICEM 2002), Paper D-43* p.202. Xian, China: Chinese Materials Research Society, 2002.06.10.

<P028212> **DENG Jiang Wen and TSUI Hung Tat.** "A PCA/MDA Scheme for Hand Posture Recognition". *The 5th International Conference On Automatic Face And Gesture Recognition* pp.294-299. Washington, USA, 2002.05.20.

<P028224> **KWOK H L and XU Jianbin.** "A Model for Exciton Formation in Organic Electroluminescent Devices". *Solid-State Electronics* vol.46, pp.645-650. The Netherlands: Elsevier Science Ltd, 2002.04.

<P028245> **GRITSENKO V. A.; KWOK Wai Man Raymund; WONG Hei and XU Jianbin.** "Short-Range Order in Non-Stoichiometric Amorphous Silicon Oxynitride and Silicon-Rich Nitride". *Journal of Non-Crystalline Solids* vol.297, pp.96-101. The Netherlands, 2002.01.

<P02828> **SUNDARAVEL B, Ian Howard WILSON, LUO Enzhou, XU Jianbin, YEUNG H. W., LI Ho, YEUNG Chun Fai, SUN J.R. and WONG Hong Kuen.** "Resonant Rutherford Backscattering Spectrometry and Channeling Studies on the Effect of Annealing of $La_{0.67}Ca_{0.33}MnO_3$ Epilayers Grown on $SrTiO_3$(001) Substrates Using a Facing-Target Sputtering Technique". *Nuclear Instruments and Methods in Physics Research B* vol.188, pp.84-89. The Netherlands: Elsevier Science B.V., 2002.04.

<P028314> **GUO H Y; XU Jianbin; WILSON Ian Howard; XIE Zhong and LUO Enzhou.** "Study of Microscopic Piezoelectricity of $(Pb_{0.76}Ca_{0.24})TiO_3$ Thin Films". *Physics Letters A* vol.294, pp.217-221. The Netherlands: Elsevier Science BV, 2002.02.25.

<P028326> **LIU Yong; TSUI Hung Tat and WU Cheng Ke.** "A Practical Approach for 3D Building Modeling from Uncalibrated Video Sequences". *International Journal of Image And Graphics* 2002.05.

<P028451> **JIANG Guang; TSUI Hung Tat; QUAN Long and ZISSERMAN Andrew.** "Single Axis Geometry By Fitting Conics". *European Conference On Computer Vision 2002 (ECCV2002)* pp.537-550. Copennhagen, Denmark, 2002.05.

<P028466> **TSANG Hon Ki; WONG C S; LIANG T K; DAY I E; ROBERTS S W; HARPIN A; DRAKE J and ASGHARI M.** "Optical Dispersion, Two-Photon Absorption and Self-Phase Modulation in Silicon Waveguides at 1.5 μ m Wavelength". *Applied Physics Letters* vol.80 no.3, pp.416-418. USA: American Institute of Physics, 2002.01.21.

<P028512> **WANG Hong Wei; CHAN Cheong Fat and CHOY Chiu Sing Oliver.** "An 12-Bit 80MS/S 110MW Floating Analog-To-Digital Converter". *2002 ISCAS* pp.III137-140. Phoenix, USA: IEEE, 2002.05.26.

<P028523> **LEE Tan, LAU Wai, WONG Yiu Wing and P.C. CHING.** "Using Tone Information in Cantonese Continuous Speech Recognition" *ACM Transactions On Asian Language Information Processing* vol.1 no.1 pp.83-102. USA: ACM, 2002.03.

<P028569> **LINDNER J K N; TSANG W M; WONG Sai Peng Joseph; XU Jianbin and WILSON Ian Howard.** "XTEM Characterization of Tungsten Implanted SiC Thin Films on Silicon for Field Emission Devices". *Abstracts, Symposium K, Thin Film Materials For Large Area Electronics, E-MRS Spring Meeting 2002, Paper K/PII,68* p.K-29. Strasbourg, France: E-MRS, 2002.06.18.

<P028578> **XU Jun; HUANG Xiaohui; LI Wei; CHEN Kunji and XU Jianbin.** "Stable Field Emission with Low Threshold Field from Amorphous Carbon Films due to Layer-By-Layer Hydrogen Plasma Annealing". *Journal of Applied Physics* vol.91 no.8, pp.5434-5438. USA: American Institute of Physics, 2002.04.15.

<P028595> **CHOW K. K.; MAK Wing Keung; SHU Ching Tat C. and TSANG Hon Ki.** "Widely Tunable All-Optical Wavelength Converter Using a Fiber Ring Cavity Incorporating a Semiconductor Optical Amplifier". *Optics Communications* vol.203, pp.101-106. The Netherlands: Elsevier, 2002.03.01.

<P028599> **LI Chi Pui; WANG Ning; WONG Sai Peng Joseph; LEE Chun Sing and LEE Shuit Tong.** "Metal Silicide/Silicon Nanowires from Metal Vapor Vacuum Arc Implantation". *Advanced Materials* vol.14 no.3, pp.218-221. Weinheim, Germany: Wiley-VCH, 2002.02.05.

<P028620> **LI Wen Jing and LEE Tong.** "Invariant Feature Matching by Hopfield-Type Neural Network". *International Joint Conference On Neural Networks* vol.3, pp.2743-2748. Honolulu, Hawaii, USA: IEEE, 2002.05.17.

<P02876> **CHENG Wang Chi, CHAN Cheong Fat, CHOY Chiu Sing Oliver and PUN Kong Pang.** "A 1.2V 900 MHz CMOS Mixer". *ISCAS 2000 - IEEE International Symposium on Circuits and Systems* pp.365-368. Phoenix: IEEE/CAS, 2002.05.

<P028790> **CHEN Qinran, LIU Jianzhuang, CHAM Wai Kuen and TSUI Hung Tat.** "Correction of A 3D Object Reconstructed from a Single Image". *Proceedings of the Fifth Asian Conference On Computer Vision 2002* pp.694-699. Melbourne, Australia, 2002.01.23.

<P028993> **WANG Hao; WONG Sai Peng Joseph; CHIAH M F; POON Chi Yu; CHEUNG Wing Yiu and KE Ning.** "Magnetically Soft CoC Granular-Like Amorphous Thin Films with High Resistivity and High Saturation Flux Density". *Abstracts, Materials Research Society 2002 Spring Meeting, Paper E6.4* p.128. San Francisco, USA: Materials Research Society, 2002.04.01.

<P029076> **DENG Jiang Wen and TSUI Hung Tat.** "A Two-Step Approach Based on PaHMM For The Recognition of ASL". *The Fifth Asian Conference On Computer Vision 2002* pp.126-131. Melbourne, Australia, 2002.01.23.

<P029097> **FU K Y Ricky; CHU K Paul; CHEUNG Wing Yiu and WONG Sai Peng Joseph.** "Investigation of Substrate Damage Under Different Modes of Hydrogen Plasma Immersion Ion Implantation". *Abstracts, Materials Research Society 2002 Spring Meeting, Paper F8.7* p.140. San Francisco, USA: Materials Research Society, 2002.04.01.

<P029130> **PENG Haijing; WONG Sai Peng Joseph and ZHAO Shounan.** "Infrared Photoelastic Study of Thin-Film-Edge-Induced Stresses in Silicon Substrates". *Thin Films: Stresses And Mechanical Properties IX (Mat. Res. Soc. Symp. Proc. Vol. 695)* vol.695, pp.L4.5.1-L4.5.6. Warrendale, PA, USA: Materials Research Society, 2002.

<P029180> **CHOW Chi Kin and LEE Tong.** "Construction of Multi-Layer Feedforward Binary Neural Network by a Genetic Algorithm". *Proceedings of the International Joint Conference On Neural Networks* vol.3, pp.2562-2567. Honolulu, Hawaii, USA: IEEE, 2002.05.16.

<P029258> **DENG Jiang Wen and TSUI Hung Tat.** "A Fast Level Set Method for Segmentation of Low Contrast Noisy Biomedical Images". *Pattern Recognition Letters* vol.23, pp.161-169. Elsevier, 2002.01.

<P02928> **LI Wen Jing, LEE Tong and TSUI Hung Tat.** "Automatic Feature Matching Using Coplanar Projective Invariants for Object Recognition". *Proceedings of the 5th Asian Conference on Computer Vision (ACCV 2002)* pp.247-252. Melbourne, Australia: Hong Kong Government Printer, 2002.01.22.

<P029342> **WANG Hao and WONG Sai Peng Joseph.** "Preparation, Structure, and Properties of Magnetic Nanocomposite Films". *Magnetic Nanostructures* ed. by H. S. Nalwa pp.407-424. USA: American Scientific Publishers, 2002.05.

<P029361> **XU Mingsheng; XU Jianbin; WANG M and QUE D L.** "Optical and Xerographic Properties of Phthalocyanine Codeposited Composite Film and Ultrathin Multilayered Structure". *Journal of Applied Physics* vol.91 no.2, pp.748-752. USA: American Institute of Physics, 2002.01.15.

<P029370> **WANG Hao; WONG Sai Peng Joseph; LI W Q; CHIAH M F; POON C Y; CHEUNG Wing Yiu and KE Ning.** "Structural and Electrical Properties of Co_xC_{1-x} Nanogranular Films Prepared by Pulsed Filtered Vacuum Arc Deposition". *Thin Solid Films* vol.405, pp.304-309. Elsevier Science, 2002.02.

<P029385> **LINDNER J K N; CHUNG Pui Shan; WONG Sai Peng Joseph; LEE Wing Kee and CHAN Chiu Wah.** "Optical and Structural Properties of Hollow Ni, Cu and Ag Nanoclusters in SiO_2". *Abstracts, Symposium Q, Current Trends In Nanotechnologies : From Materials To Systems, E-MRS Spring Meeting 2002, Paper Q/PII.26* p.Q-29. Strasbourg, France: E-MRS, 2002.06.18.

<P029480> **TANG W W and SHU Ching Tat C.** "Dispersion-Tuned, Wavelength-Switched Short Pulses Generated from Optically Controlled Self-Seeded Laser Diode". *IEE Electronics Letters* vol.38 no.4, pp.193-194. UK: The Institute of Electrical and Electronics Engineers, 2002.02.14.

<P029607> **CHAN C P, P.C. CHING and LEE Tan.** "Noisy Speech Recognition Using De-Noised Multiresolution Analysis Acoustic Features". *Journal of the Acoustical Society of America* vol.110 no.5, pt.1 pp.2567-2574. USA: Acoustical Society of America, 2001.11.

<P029657> **OUYANG Shan and P.C. CHING.** "Fast Algorithm for Adaptive Estimation of Principal And Minor Components". *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing 2002* pp.I1073-1076. Orlando, Florida, USA: IEEE Signal Processing Society, 2002.05.12.

<P029678> **CHAN S W and SHU Ching Tat C.** "Harmonically Mode-Locked Fiber Laser with Optically Selectable Wavelength". *IEEE Photonics Technology Letters* vol.14 no.6, pp.771-773. USA: IEEE, 2002.06.

<P029683> **LEI C; TSUI Hung Tat and HU Z Y.** "On the Automatic Estimation of Fundamental Matrix". *The Fifth Asian Conference On Computer Vision 2002* pp.664-669. Melbourne, Australia, 2002.01.

<P029714> **CHAN Yiu Tong and REA T A.** "Trigonometric Bearings-Only Tracking for a Single Stationary Observer". *Proceedings of the Fifth International Conference on Fusion 2002* p.10. Orlando, Florida, USA: The International Society for Optical Engineering, 2002.04.

<P029720> **MA Wing Kin, DAVIDSON Timothy N., WONG Kon Max and P.C. CHING.** "Multiuser Detection for Asynchronous CDMA Using Block Coordinate Ascent and Semi-Definite Relaxation". *Proceedings of IEEE Int'l Conference on Acoustics, Speech and Signal Processing* pp.III 2309-2312. Orlando, Florida, USA: IEEE Signal Processing Society, 2002.05.12.

<P029738> **XIAO Zhisong, XU Fei, ZHANG Tonghe, CHENG Guoan and WONG Sai Peng Joseph.** "Effects of Silicon and Erbium Concentration on 1.54μM Luminescence from Silica-Based Thin Films formed by Mevva Ion Implantation". *Abstracts, The 8th International Conference On Electronic Materials (IUMRS-ICEM 2002), Paper D-17* p.188. Xian, China: Chinese Materials Research Society, 2002.06.10.

<P029791> **GUO H Y; XU Jianbin; XIE Zhong; LUO Enzhou; WILSON Ian Howard and ZHONG W L.** "Ferroelectric Relaxation of $(Pb_{0.76}Ca_{0.24})TiO_3$ Thin Film". *Solid State Communications* vol.121, pp.603-607. The Netherlands: Elsevier Science Ltd, 2002.03.

<P029883> **CHIAH M F; WONG Sai Peng Joseph; WANG Hao and CHEUNG Wing Yiu.** "Characterization of FePt-C and CoPt-C Nano-Composite Films Prepared by Pulsed Filtered Vacuum ARC Deposition". *Abstracts, Materials Research Society 2002 Spring Meeting, Paper E3.4* pp.123-124. San Francisco, USA: Materials Research Society, 2002.04.01.

<P029899> **HO Kin Pui; CHAN Cheong Fat; CHOY Chiu Sing Oliver and PUN Kong Pang.** "A CMOS Current Feedback Operational Amplifier with Active Current Mode Compensation". *2002 ISCAS* pp.I-709-712. Phoenix, USA: IEEE, 2002.05.26.

<P999511> **CHAN Chun Ping, WONG Yiu Wing, LEE Tan and P.C. CHING.** "Two-dimensional Multi-resolution Analysis of Speech Signals and Its Application to Speech

Recognition". *Proceedings of the 1999 IEEE International Conference on Acoustics, Speech, and Signal Processing* pp.405 - 408. Phoenix, USA: IEEE, 1999.03.15.

see also <P013007>, <P017309>, <P019861>, <P02507>, <P02547>, <P029088>

RESEARCH PROJECTS

Performance Supervision for Multiple Optical Amplifiers in WDM Transmission Systems

- ✍ CHAN Chun Kit
- ❑ 1 October 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

Due to the ever-growing demand in network bandwidth and the explosive growth in internet traffic, optical fiber networks have been widely deployed all over the world to offer ultrahigh transmission capacity. Wavelength division multiplexing (WDM) is a key technique to further unleash the hugh bandwidth in optical fibers. Apart from mere point-to-point transmission, the optical layer can also incorporate many networking functions such as routing, switching and performance monitoring to enhance the its robustness. In a WDM transmission system, multiple in-line erbium-doped fiber amplifiers (EDFAs) are the key system components to improve the transmission span and signal quality. Thus, any degradation or failure in these EDFAs will lead to tremendous and disastrous data loss. To ensure reliability of data delivery through such WDM transmission links, the working status of all the in-line EDFAs have to be monitored in a real time manner. Thus a simple but effective EDFA supervisory scheme is highly desirable to identify any degraded or failed ones and thus appropriate remedy can be made timely to restore the system transmission. In this project, we propose a simple yet effective performance supervisory scheme for multiple EDFAs in a WDM transmission system. The scheme is based of spectral analysis of the non-intrusively generated optical label at each EDFA.
(EE01761)

A Generic Optical Switch Fabric for Photonic Code-based Multi-protocol Label Switching (MPLS) Networks

- ✍ CHEN Lian Kuan ● TONG Fuk Kay Franklin
- ❑ 1 September 2001
- ❖ Research Grants Council (Earmarked Grants)

This project is to investigate a novel optical code/wavelength converter to be used in the emerging optical multi-protocol label switching (MPLS) networks that will provide efficient transportation of the surging Internet traffic. Dense wavelength-division multiplexing (DWDM) is being employed in optical transport networks and part of the access networks. Due to the limited resolution in wavelength selective devices, e.g. AWG, FBG, or FP filter, the number of channel is limited for a given optical bandwidth. Therefore, it is necessary to increase the number of channel in different dimension. In this project, we propose a novel code/wavelength converter that provides both code-conversion (for label swapping) and wavelength-conversion (for channel routing). The converter also facilitates label-swapping function for MPLS. In addition, the soft upgradability of code-division multiplexing enhances the scalability and flexibility of the label number for the future photonic MPLS networks.
(CS01172)

Design of Large-Scale Fibre Channel Fabric for Storage Area Network

- ✍ LEE Tong Tony ● CHAN Man Chi#
- ❑ 1 September 2001
- ❖ Research Grants Council (Earmarked Grants)

Fibre Channel based switching 'fabric' has widely been considered as an ideal candidate for interconnecting large amount of shared resources dispersed over a large area with high speed I/O capability. For achieving better delay-throughput performance, much work has been done on constructing a fabric from a number of small switches. In these implementations, routing between these switches is a challenging issue to be solved. Recently, the P.I. proposed a novel switch architecture known as Cross-path switch based on the path switching concept for constructing large scale switching systems. The Cross-path switch is capable of supporting multirate, multicast and multimedia traffic with QoS guarantee. In this project, we propose to develop a complete set of traffic control strategies for it in the path level, the call level and the frame level for Fibre Channel implementation. The goal of this project is to design an effective and practical traffic control scheme for Fibre Channel systems to achieve optimal

delay-throughput performance. Based on this control scheme, we will develop a model to study the performance of Fibre Channel based Cross-path switch. This can greatly simplify performance evaluation and network design, which enhances systematic deployment of large-scale Fabre Channel networks.
(CS01208)

Improving Disk Efficiency in Continuous-Media Servers with Soft-scheduling

- ✍ LEE Yiu Bun ● LUI Chi Shing John (Dept of Computer Science and Engineering)
- ❑ 1 December 2001
- ❖ Research Grants Council (Earmarked Grants)

Continuous-media such as audio and video have stringent timing requirements for correct decoding and presentation. Consequently, system designers have commonly resorted to dimensioning the system capacity according to worst-case scenarios. One notable example is the disk scheduler, where actual performance varies considerably depending on the request mixes. Most current continuous-media servers employ the SCAN scheduler or its variants with worst-case dimensioning techniques to guarantee performance, albeit at the expense of disk efficiency. This study investigates a soft-scheduling approach to disk-scheduler design. Specifically, soft-scheduling improves disk efficiency by: (a) relaxing hard performance guarantees to statistical performance guarantees to achieve disk capacity gains; (b) employing random-placement policy in place of sequential-placement policy to achieve better utilization in multi-zone disks; (c) a novel Dual-Round Scheduling algorithm that allows some request overflows in a service round to be absorbed by the previous round; (d) a novel Early-Admission Scheduler that enables the use of large media block without adversely increasing disk response time. In addition, procedures for detecting and recovering from round overflow to minimize data loss are also to be investigated. Early simulation results have shown that soft-scheduling can potentially achieve substantial gain in usable disk capacity over conventional hard-scheduling approaches. This research programme will thoroughly investigate various design alternatives by means of quantitative methods and experimentation.
(CS01209)

Study of a Peer-to-Peer Architecture for Building Scalable, Reliable, and Cost-Effective Video-on-Demand Services

- ✍ LEE Yiu Bun
- ❑ 1 June 2002
- ❖ CUHK Research Committee Funding (Direct Grants)

Video-on-demand (VoD) systems have traditionally been built around the client-server model, where a video server stores compressed video for delivery to clients connected by a network. With increasing demand for large-scale VoD systems, researchers have spent considerable effort in designing scalable, reliable, and cost-effective video servers. Nevertheless, a video server can only have finite capacity. As the system scales up, the server will need to be upgraded and this can become very expensive as the system scales beyond thousands of users. In this study, we investigate a radically different architecture where the bottleneck video server, is eliminated altogether. Specifically, this peer-to-peer, server-less architecture relies on the client machines for distributed data storage and delivery. A client initiating a new streaming session will first locate other client(s) where the requested stream is stored, and then request delivery of the stream directly from those clients instead of from a central server. This fully distributed architecture is inherently scalable as the storage and delivery capacity grows with the number of clients in the system. Additionally, we develop fault-tolerance algorithms for the system so that stream delivery can be maintained even if some of the clients fail.
(EE01594)

Progressive Image Mosaics and Morphing in Wavelet Domain

- ✍ Paul Ge BAO
- ❑ 31 December 2000
- ❖ Research Grants Council (Earmarked Grants)

Image-based rendering is based on the synthesis of a set of closely spaced panoramic images to form a multi-viewpoint virtual environment. Owing to the real-time performance and photorealistic requirements of the VR rendering of complex scenes,

it is crucial that the image synthesis techniques are of real-time efficiency and photorealism. We propose a wavelet domain image mosaics and morphing scheme based on visual perception-based modeling and compression of the wavelet coefficients, and multiresolution of the images in the wavelet space. The main objectives of the scheme are as follows.

(1) *Real-time performance*: Visual perception modeling and compression of the images in the wavelet domain will significantly reduce the complexity of the scene images. Consequently, the performance of image synthesis in the wavelet space will be significantly enhanced and the size of the system will be reduced. Using *Layered depth image* representation (LDI), all the layers (visible or occluded) of the scene may be modeled and compressed into a set of ordered wavelet matrices with different visual distortions for further reduction of the complexity. The layered wavelet depth image representation (LWDI) will also enable a dynamic warping of the visible and occluded surfaces of the scene in the wavelet domain with an ordering algorithm.

(2) *Progressiveness:* Owing to the multiresolution of the wavelet domain, the scene images can be synthesized in a coarse-to-fine manner: the baseband images will be synthesized first, followed by the detailed subbands level-by-level using the hierarchical correspondence measurement and interpolation until the degree of photorealism of the rendered images is satisfactory. In this system, the rendered scene will appear naturally from coarse to fine. The wavelet sub-images will be able to be further optimized by the encoding process. In real-time, the encoded sub-images will be decoded before undergoing through the synthesis process.

(3) *Photorealism*: Visual perception modeling and compression in the wavelet space will retain the visual quality of the images. The distortion of the photorealism of the scene captured by the reference images will be minimized in the process. The simplification of the complexity of the rendered scene image will allow the accommodation of more images to be taken from different viewpoints and sampled at different radiometric environments for a better photorealistic rendering system.

(EE00523)

Agents that Negotiate and Brokers

✍ SIM Kwang Mong

❑ 1 November 2001

❖ CUHK Research Committee Funding (Direct Grants)

The growing popularity of electronic trading among many modern businesses accentuates the needs for e-commerce support systems. Although there are extant e-commerce support systems that automate the process of negotiation, auction, and brokering, the goal of this research is to engineer an agent-based e-commerce support system that overcomes their limitations. Building on previous work by Sim (the P.I.) and his graduate students, this research adopts a *market-driven* approach for engineering agents that support multi-lateral negotiation. In this approach, agents respond to changes in market situations by autonomously selecting the appropriate strategy. Although market-driven agents react to market dynamics, they were not designed with the ability to adapt and enhance their strategies through learning. By augmenting market-driven agents with learning capability, this research hopes to engineer agents with more sophisticated problem solving abilities. While it is essential to automate the difficult and time-consuming process of negotiation, this research also recognizes the need to provide tools that will help users locate and match potential trading partners. Drawing upon some of Sim's previous contributions in market-driven agents and brokering agents published in IEEE transactions/journals, book chapters and agent-based e-commerce conferences, this research plans to design an agent-based system that can (1) match buyers and sellers along multiple criteria and (2) negotiate along multiple terms of transactions.

(EE01329)

Face Image and Sketch Recognition

✍ TANG Xiaoou ● GRIMSON W Eric L* ● LAM Kai Pui (Dept of Systems Engineering & Engin. Management)

❑ 31 December 2001

❖ Research Grants Council (Earmarked Grants)

Automatic retrieval of face images from police mug-shot databases is critically important for law enforcement agencies. It can help investigators to locate or narrow down potential suspects efficiently. However, in many cases, the photo image of a suspect is not available and the best substitute is often

a sketch drawing based on the recollection of an eyewitness. Despite the great need of such an automatic photo retrieval system using face sketches, little research can be found in this area, probably due to time and budget constrains in constructing a large face sketch database. In this project, we plan to use an interactive facial sketch composing system that we developed for the Hong Kong Police Department in an early project to build a large face sketch database. Then through a systematic study of face image and sketch information in a multilevel structure, we develop an efficient face recognition system capable of identifying both photos and sketches. We expect this research project will not only make theoretical contribution to face recognition research, but also bring significant impact on the practical law enforcement in Hong Kong.
(CS01190)

Investigation of Low-Cost Modulator for a Proposed DWDM Access Network

- ✍ TONG Fuk Kay Franklin ● CHAN Chun Kit Calvin* ● CHEN Lian Kuan
- ❑ 1 September 2001
- ❖ Research Grants Council (Earmarked Grants)

The proposed access network architecture is based on a double ring linking many add-drop nodes through DWDM. A central or exchange node will exchange the downstream data from and upstream data to the metropolitan network. To minimize the cost and for ease of control and management, we propose a centralized multiwavelength sources to be located in the exchange node. The downstream data will be re-used to carry the upstream data through a potentially low-cost optical modulator to transmit data. The same component will be used by all access nodes, and the difficult footprint and stocking problem of laser transmitter with specific wavelength for individual nodes will be eliminated. Comparing with existing $LiN6O_3$ based optical modulators our approach is of low performance but of relatively low intrinsic cost.
(CS01191)

Please refer to previous issues of this publication for more details of the following ongoing research at the department:

Edition	Title/Investigators
1999-00	Channel Tunable Mode-Locked Lasers for High Speed Optical Networks and Optical Signal Processing (CU99372) ✍ CHEN Lian Kuan ● TONG Fuk Kay Franklin ● HO Keang Po Ricky#
2000-01	System Limitations of Optical Netwroks due to Crosstalk (CU00225) ✍ CHEN Lian Kuan ● TONG Fuk Kay Franklin
1997-98	Integrated Communications Laboratory (EE97020) ✍ CHEUNG Kwok Wai ● LEE Kin Hong (Dept of Computer Science and Engineering) ● LEUNG Hong Chung (Dept of Electronic Engineering)# ● HO Keang Po Ricky# ● CHING Pak Chung (Dept of Electronic Engineering) ● CHAM Wai Kuen (Dept of Electronic Engineering) ● WEI Keh Wei Victor ● FONG Chi Bun (Centre for Innovation and Technology)# ● KO Kin Wa (Centre for Innovation and Technology)# ● CHAN Kwong Wing Raymond (Centre for Innovation and Technology)
1998-99	The Development of Mobile Computing and Connectivity Technologies (EE98052) ✍ CHEUNG Kwok Wai ● FONG Chi Bun (Centre for Innovation and Technology)# ● CHEUNG Lawrence* ● PANG Stephen*
2000-01	DINA Implementation (EE20027) ✍ CHEUNG Kwok Wai ● LUI Chung Yu (Centre for Innovation and Technology)# ● ZHOU Qun (Centre for Innovation and Technology)#
1997-98	The Principle of Multi-dimensional Switching and Its Applications in High-speed ATM Packet Switches (CU97570) ✍ LEE Tong Tony

1998-99 Traffic Control Strategies for Quality-of-Service Guarantees in Cross-Path ATM Packet Switches (CU98349)
✍ LEE Tong Tony ● TO Pak Tung Philip#

1999-00 Design and Analysis of Scheduling Algorithms in Input-Queued Switches Supporting IP-over-ATM (CU99398)
✍ LEE Tong Tony

1999-00 Scalable and Fault-Tolerant Video-on-Demand Systems – Design, Analysis, Prototyping, and Performance Evaluation (CU99095)
✍ LEE Yiu Bun

2000-01 Hong Kong IP Multicast Initiative (EE20005)
✍ LEE Yiu Bun ● CHEN Lian Kuan ● LUI Chi Shing John (Dept of Computer Science and Engineering)

2000-01 Study of a Unified Architecture for Video-on-Demand Services (EE20016)
✍ LEE Yiu Bun

2000-01 Telecommunication Network Research (EE95746)
✍ LI Shuo-yen Robert

1999-00 Adaptive Multimedia Communications (EE99017)
✍ LIEW Soung Chang

2000-01 Integrated Retransmission and Adaptation Scheme for Video Streaming over Legacy and Advanced Internet with QoS Guarantee (CU00229)
✍ LIEW Soung Chang ● LEE Yiu Bun

1999-00 MC/DS/CDMA as the Radio Technology for Wireless Multimedia Communication (CU99420)
✍ LOK Tat Ming ● WONG Wing Shing

2000-01 Adaptive Transmitter Design for Wideband Communication (EE20017)
✍ LOK Tat Ming

2000-01 Towards Agency and Ontology for Web-based Information Retrieval (EE20023)
✍ SIM Kwang Mong

1999-00 Global and Structural Pattern Recognition for Large-Set Databases (CU99378)
✍ TANG Xiaoou ● Grimson William Eric Leifur* ● LIU Jian Zhuang*

2000-01 Automatic Human Face Sketch Recognition (EE20018)
✍ TANG Xiaoou

1999-00 Design and Implementation of a Bi-directional Multiwavelength Ring Network (CU99369)
✍ TONG Fuk Kay Franklin ● HO Keang Po Ricky#

2000-01 Homodyne Crosstalk Reduction using FP Laser Diode (CU00228)
✍ TONG Fuk Kay Franklin ● HO Keang Po Ricky# ● TSANG Hon Ki (Dept of Electronic Engineering)

2000-01 Photonic Packaging Laboratory (EE00750)
✍ TONG Fuk Kay Franklin ● SHU Ching Tat C. (Dept of Electronic Engineering) ● TSANG Hon Ki (Dept of Electronic Engineering) ● CHEN Lian Kuan ● CHAN Chun Kit ● CHEUNG Kwok Wai ● WU Ke Li (Dept of Electronic Engineering) ● CHAN Kam Tai (Dept of Electronic Engineering) ● WONG Sai Peng Joseph (Dept of Electronic Engineering) ● LI Wen Jung (Dept of Auto. & Computer-Aided Engin.) ● WANG Michael Yu (Dept of Auto. & Computer-Aided Engin.) ● HO Keang Po Ricky#

1999-00 On the Performance Bounds of Turbo Codes (CU99424)
✍ WEI Keh Wei Victor

1999-00 Hong Kong Cyber Campus – Towards Networking all Schools in Hong Kong (ED99003)
✍ WONG Po Choi

2000-01 Power Control for Wireless Multimedia System in a Fading Environment (CU00222)
✍ WONG Wing Shing ● YAU Shing Toung Stephen* ● CAINES Peter Edwin*

2000-01 Fundamental Limits in Information Storage Systems (CU00165)
✍ YEUNG Wai Ho Raymond

1999-00 Efficient Multicast Routing for Multimedia Videoconferencing (CU99371)
✍ YUM Peter Tak Shing

2000-01 Architecture for IP Operating on WDM (CU00223)
✍ YUM Peter Tak Shing ● TONG Fuk Kay Franklin

RESEARCH OUTPUTS AND PUBLICATIONS

<P004265> **KWONG Cheuk-Fai; HO Keang-Po and CHEI Kwok-Hung.** "Trellis-Coded Quantization with Unequal Distortion". Paper presented in the 6th Asia-Pacific Conference on Communication 2000, organized by Korean Institute of Communication Science. Seoul, Korea, 2000.10.30.

<P004266> **HO Man-Shing; KWONG Cheuk-Fai; CHEI Kowk-Hung and HO Keang-Po.** "Channel Code Allocation for Unequal Error Protection to Embedded Image Coders". Paper presented in the 6th Asia-Pacific Conference on Communications (APCC 2000), organized by Korean Institute of Communication Science. Seoul, Korea, 2000.10.30.

<P011775> **YANG Yang; HO Chi-Fong; DING Xiao-Wei and YUM Tak-Shing.** "Analysis of Random Access Channel in UTRA-TDD Systems". *Abstracts of the 2001 International Conference on Third Generation Wireless and Beyond* vol.1, pp.831-836/6. San Francisco, USA: Delson Group Inc., 2001.05.30.

<P011776> **LEUNG Kin Kwong; SUNG Chi Wan; WONG Wing Shing and LOK Tat Ming.** "Convergence Theorem for a General Class of Power Control Algorithms". Paper presented in the International Conference on Communications, organized by IEEE. Helsinki, Finland, 2001.06.11.

<P011780> **LIU K. Joseph; WEI K. Victor; SIU C.; CHAN L. Roy and CHOI T.** "Multi-Application Smart Card with Elliptic Curve Cryptosystem Certificate". *IEEE Region 8 - Eurocon, 2001* Bratislava, Slovakia, 2001.07.07.

<P012184> **WEN Yong-gang; CHEN Lian-Kuan and TONG Frauk.** "Fundamental limitation and Potimization on Optical Code Comersion for WDM Daeket Switching Networks". Paper presented in the 2001 Optical Fiber Communication Conference, organized by IEEE/OSA. ed. by TIJEAIUA Saudra. California, 2001.03.17.

<P012187> **MAN Mo Chun and WEI Keh Wei Victor.** "A Taxonomy for Attacks on Mobile Agent". *Eurocon ' 2001 (International Conference on Trends in Communications)* pp.385-388. Bratislava, Slovakia: IEEE Region 8, 2001.07.07.

<P012662> **CHUNG Ling Chi; FU Chengpeng and LIEW Soung Chang.** "Improvements Achieved by Sack Employing TCP Veno Equilibrium-Oriented Mechanism Over Lossy Networks". *Abstracts of the IEEE Region 8 Eurocon' 2001 International Conference on Trends in Communications* pp.202-209. Bratislava, Slovakia: IEEE Region 8, 2001.07.06.

<P013071> **CHAN Kwun-Chung and CHEUNG Kwok-Wai.** "Performance Analysis on Distributed Interactive Server in a Large - Scale Fully Interactive Vod System (DINA)". Paper presented in the 15th International Conference on Information Networking (ICOIN - 15), organized by IEEE Computer Society Press. Beppu, Japan, 2001.01.31.

<P014840> **WEI Keh Wei Victor, WONG Ha Yin and LIU KAI SUI.** "Recoverable and Untraceable E-cash". *Paper presented in the IEEE Region 8 European Conference for Communication 2001,* organized by IEEE, 4 pgs. Bratislava, Slovakia, 2001.07.01.

<P016026> **SIM Kwang Mong and WONG Pui Tak.** "Web-based Information Retrieval Using Agent and Ontology". *In Proceedings of the International Conference on Web Intelligence (WI-2001)* The International Conference on Web Intelligence (WI-2001) pp. 384-388. Japan: The International Conference on Web Intelligence (WI-2001), 2001.10.

<P016039> **MA Kun and TANG Xiaoou.** "Translation-Invariant Face Feature Estimation Using Discrete Wavelet Transform". *Proceedings of the Second International Conference on Wavelet Analysis and Its Applications* pp.200-210. Hong Kong SAR: The Second International Conference on Wavelet Analysis and Its Applications, 2001.12.

<P016055> **YUM Peter Tak Shing and YANG Yang.** "Nonrearrangeable Compact Assignment of Orthogonal Variable-Spreading-Factor Codes for Multi-Rate Traffic". *Proceedings of IEEE 54th Vehicular Technology Conference* vol.2, pp.938-942. Atlantic City, USA: IEEE, 2001.10.07.

<P016096> **YEUNG K. H. and YUM Peter Tak Shing.** "Dynamic Multiple Parity (DMP) Disk Array for Serial Transaction Processing". *IEEE Transactions on Computers* vol.50 no.9, pp.949-959. IEEE, 2001.09.

<P016140> **CHANG Jen Chun, CHEN Rong Jaye and HWANG K. Frank. "**A Minimal-Automaton-Based Algorithm for the Reliability of Con(D, K, N) Systems". *Methodology and Computing in Applied Probability* vol.3 no.4 pp. 379-386. Netherlands: Kluwer Academic Publishers, 2001.12.

<P016530> **DING Cunsheng, SICA Francesco and Torleiv KLOVE.** "Two Classes of Ternary Codes and their Weight Distributions". *Discrete Applied Mathematics* vol.111, pp. 37-53. Discrete Applied Mathematics, 2001.07.

<P016577> **LIEW Soung Chang, CHUNG Ling Chi and FU Chengpeng.** "Performance Degradation of TCP Vegas in Asymmetric Networks and Its Remedies". *IEEE ICC 2001* ICC 2001 pp. 3229-3236. Helsinki, Finland: IEEE, 2001.06.11.

<P016737> **Mustapha AIT RAMI, MOORE John Barratt and ZHOU Xunyu.** "Indefinite Stochastic Linear Quadratic Control And Generalized Differential Riccati Equation" *SIAM J. Control*

Optim vol.40 no.4 pp.1296-1311. United States of America: Society for Industrial and Applied Mathematics, 2001.12.07.

<P016746> **CHAN Chun Kit; SHERMAN Karl L. and ZIRNGIBL Martin .** "A Fast 100-Channel Wavelength-Tunable Transmitter for Optical Packet Switching". *IEEE Photonics Technology Letters* vol.13 no.7, pp.729-731. USA: IEEE LEOS, 2001.07.

<P016929> **TANG Xiaoou and MA Kun.** "Discrete Wavelet Face Graph Matching". *Proceedings of the IEEE International Conference on Image Processing* vol.2, pp.217-220. Thessaloniki, Greece: IEEE, 2001.10.

<P017013> **CHEN Wende and Torleiv KLOVE.** "Weight Hierarchies of Binary Linear Codes of Dimension 4". *Discrete Mathematics* vol.238, pp. 27-34. Discrete Mathematics, 2001.07.01.

<P017017> **CHAN Lai Yin Simon; FUNG S. L.; WONG Sai Hung; CHAN Y. K.; TONG Fuk Kay Franklin; CHEN Lian Kuan and CHEUNG Sik Yuen Arthur.** "Demonstration of Multi-Wavelength Monitoring in WDM Systems Using Injection-Locked Fabry-Perot Laser Diode". *Technical Digest of IEEE CLEO/Pacific Rim '01* working paper no.ThB2-3. Chiba, Japan: IEEE CLEO/Pacific Rim '01, 2001.07.

<P017138> **YANG Qin; CHAN Man Chi and LEE Tong Tony.** "A Quasi-Static Routing Scheme for Cross-Connected Storage Area Network". *Proceedings of the joint meeting of the 5th World Multiconference on Systemics, Cybernetics and Informatics (SCI 2001) and the 7th International Conference on Information Systems Analysis and Synthesis (ISAS 2001)* Orlando, USA, 2001.07.22.

<P017301> **LIU Jianzhuang and LEE Yong Tsui.** "A Graph-Based Method for Face Identification from a Single 2D Line Drawing". *IEEE Transactions on Pattern Analysis and Machine Intelligence* vol.23 no.10, pp.1106-1119. USA: The IEEE Computer Society, USA, 2001.10.

<P017382> **To Pak Tung, Philip, LEE Tong Tony and CHAN Man Chi.** "Providing Per-session Performance Deterministic Quality of Service Guarantees for Cross-path Packet Switch". *EICE Trans. Commun.* E83-B 9. EICE Trans. Commun., 2001.

<P017483> **CHAN Kit; CHAN Chun Kit; TONG Fuk Kay Franklin and CHEN Lian Kuan.** "A Novel FFT-based EDFA Supervisory Scheme for WDM Transmission Systems". *Technical Digest of European Conference on Optical Communications* (ECOC 2001) Issue We. P.47. Amsterdam, The Netherlands: European Conference on Optical Communications 2001, 2001.09.

<P017660> **SIM Kwang Mong and CHUNG Yu Choi.** "Foundations of Market-Driven Agents: An Adaptation of Zeuthen's Bargaining Model". *In Proceedings of the Second International Conference on Intelligent Agent Techn* pp. 405-411. Japan: The Second International Conference on Intelligent Agent Technology (IAT 2001), 2001.10.

<P017783> **FU Fangwei; KLOVE Torleiv; LUO Yuan and WEI Keh Wei Victor.** "On the Svanstrom Bound for Ternary Constant Weight Codes". *IEEE Transactions on Information Theory* vol.47, pp.2061-2064. IEEE, 2001.07.01.

<P017945> **SIU Chun; CHAN Man Chi; LIEW Soung-Yue and LEE Tong Tony.** "On Performance Evaluation of the Deadline-ordered Burst-based Parallel Scheduling Strategy for QoS Guaranteed IP over ATM Packet Level Scheduling". *The Proceedings of the 2001 International Symposium on Performance Evaluation of Computer and Telecommunication Systems* pp.492-497. Florida,

USA: 2001 International Symposium on Performance Evaluation of Computer and Telecommunication, 2001.07.15.

<P017986> **THORNE Jeremy Stuart and MOORE John Barratt.** "Blind Adaptive Equalization of FIR and IIR Systems". *Proc of the 5th Intl Conference on Optimization Techniques & Applications* vol.3, pp.1527-1534. Hong Kong SAR: ICOTA 2001, Hong Kong, 2001.10.08.

<P018067> **FU Fangwei; WEI Keh Wei Victor and YEUNG Wai Ho Raymond.** "On the Minimum Average Distance of Binary Codes: Linear Programming Approach". *Discrete Applied Mathematics* vol.111 no.3, pp.263-281. Elsevier Science BV, 2001.08.

<P018113> **CHAN Kwun Chung and CHEUNG Kwok Wai.** "Video Proxy System for a Large-scale VOD System (DINA)". *The 5th World Multi-Conference on: Circuits Systems, Communications and Computers (CSCC2001)* pp.269-273. Crete, Greece: IEEE and WSES, 2001.07.

<P018144> **YANG Yang and YUM Peter Tak Shing.** "Throughput Analysis of RACH in UTRA-TDD on AWGN Channel". *Proceedimgs of IEEE 54th Vehicular Technology Conference* vol.2, pp.572-575. Atlantic City, USA: IEEE, 2001.10.07.

<P018190> **CHAN Ho Leung.** "A Combinatorial Approach to Information Inequalities". *Communications in Information and Systems* vol.1 no.3, pp.241-254. USA: Communications in Information and Systems, 2001.09.

<P018234> **FU Fangwei; KLOVE Torleiv and WEI Keh Wei Victor.** "On the Svanstron Bound For Ternary Constant-Weight Codes". *IEEE Transactions on Information Theory* vol.47, pp.2061-2064. IEEE, 2001.07.

<P018238> **LOK Tat Ming.** "Transmitter Adaptation For CDMA Systems Via Power Control And Code Diversity". *Proc. IEEE MILCOM 2001* pp. 1185-1189. Washington, D.C., USA: IEEE, 2001.10.28.

<P018271> **CHEUNG Sik Yuen; CHAN Lai Yin Simon; CHAN Chun Kit; TONG D. T. K. ; TONG Fuk Kay Franklin and CHEN Lian Kuan.** "Demonstration of an ONU for WDM Access Network with Downstream BPSK and Upstream Remodulated OOK Data Using Injection-Locked FP Laser". *Technical Digest of European Conference on Optical Communications* [Paper presented in the European Conference on Optical Communications (ECOC) 2001]. We. B. 3. 2. Amsterdam, The Netherlands, 2001.09.

<P018500> **KWOK Siu Yu and LI Shuo-yen Robert.** "Study on of Wide-sense Nonblocking Switching Networks from the Approach of Upper Ideals". *published in the book* ed. by Ding-Zhu Du and Hung Q. Ngo pp.101-116. Boston, USA: Kluwer Academic Publishers, 2001.06.

<P018547> **TONG Fuk Kay Franklin; CHAN Lai Yin Simon; CHAN Chun Kit and CHEN Lian Kuan.** "Applications of Injection Locked FP Laser in WDM Networks". *Technical Digest of Optoelectronics and Communications Conference and International Conference on Integrated Optics and Optical Fiber Communications* (OECC/IOOC 2001) vol.14A3, pp.302-305. Sydney, Australia, 2001.07.

<P018629> **SIM Kwang Mong and CHAU Chi Kin.** "Engineering Fuzzy Constraint Satisfaction Agents for Multi-User Timetable Scheduling". *In Proceedings of The Sixth International Computer Science Conference: Active Me* pp.244-254. Hong Kong SAR: The Sixth International Computer Science Conference: Active Media Technology, 2001.12.

<P018908> **GAO Xinbo and TANG Xiaoou.** "Unsupervised And Model-Free News Video Segmentation". *Proc. of IEEE Workshop on Content-Based Access of Image and Video Libraries 2001* IEEE Workshop on Content-Based Access of Image and Video Libraries 2001 pp. 58-64. Hawaii, USA: IEEE in association with CVPR 2001, 2001.12.

<P019008> **CHAN Kit; TONG Fuk Kay Franklin and CHEN Lian Kuan.** "Cross Gain Modulation Suppression in SOA Using Polarization Diversified Loop". *Technical Digest of IEEE CLEO/Pacific Rim 2001* (TuA1-4). Chiba, Japan: CLEO 2001, 2001.07.

<P019045> **LI Ngai and LIEW Soung Chang.** "Video Transmission in Explicit Rate Controlled Network". *2nd International Conference on Communications in Computing (CIC'2001)* 8 pgs. Las Vagas, USA, 2001.06.25.

<P019082> **SIM Kwang Mong and WONG Eric.** "Towards Market-driven Agents for Electronic Auction". *IEEE Transaction on Systems, Man and Cybernetics, Part A: Systems and Humans* vol.31 no.6, pp.474-484. IEEE, 2001.11.01.

<P019295> **CHUNG Ling Chi, FU Chengpeng and LIEW Soung Chang.** "Improvements Achieved by SACK Employing TCP Veno Equilibrium-Oriented Mechanism over Lossy Networks". *EUROCON 2001* pp. 202. Bratislava, Slovakia: EUROCON 2001, 2001.07.04.

<P019313> **FU Fangwei; KLOVE Torleiv; LUO Yuan and WEI Keh Wei Victor.** "On the Svanstrom Bound for Ternary Constant-Weight Codes". *IEEE Transactions on Information Theory* vol.47 no.5, pp.2061 -2064. USA: IEEE, 2001.07.

<P019364> **LI Shuo-yen Robert and LI Hui.** "Layout complexity of bit-permuting exchanges in multi-stage interconnection networks". *published in the book* edited by Ding-Zhu Du and Hung Q. Ngo pp.259-276. Boston, USA: Kluwer Academic Publishers, 2001.06.

<P019438> **WANG Yongmei; ZHANG Zhunping and GUO Baining.** "3D Image Interpolation Based on Directional Coherence". *Proceedings of IEEE Workshop on Mathematical Methods in Biomedical Image Analysis (MMBIA)* pp.195-202. Hawaii, USA: IEEE, 2001.12.

<P019463> **SIM Kwang Mong and SUN Weng Hong.** "A Comparative Study of Ant-Based Optimization for Dynamic Routing". *In Proceedings of The Sixth International Computer Science Conference: Active Me* pp. 153-164. Hong Kong SAR: Springer-Verlag Berlin Heidelberg 2001, 2001.12.

<P019641> **SUNG Chi Wan and WONG Wing Shing.** "Power Control and Rate Management for Wireless Multimedia CDMA Systems". *IEEE Transactions on Communications* vol.49 no.7, pp.1215-1226. IEEE, 2001.07.

<P019790> **KLOVE Torleiv.** "Relations between the Covering and Newton Radii of Binary Codes". *Discrete Mathematics* vol.238, pp. 81-88. 2001.07.01.

<P019815> **WANG Yongmei and ZHANG Hongjiang.** "Content-Based Image Orientation Detection with Support Vector Machines". *Proceedings of IEEE Workshop on Content-based Access of Image and Video Libraries* pp.17-23. Hawaii, USA: IEEE, 2001.12.

<P019898> **CHINLON Lin; KUNG-Li Deng and CHAN Chun Kit.** "Broadband Optical Access Networks". *Technical Digest of IEEE CLEO/Pacific Rim '01* TB4-1. Chiba, Japan: IEEE CLEO/Pacific Rim '01, 2001.07.

<P026200> **HUNG Wai; CHAN Kit; CHEN Lian Kuan; CHAN Chun Kit and TONG Fuk Kay Franklin.** "A Routing Loop Control Scheme in Optical Layer for Optical Packet Networks". *Technical Digest of Conference on Optical Fiber Communications* OFC 2002 working paper no.ThGG111, pp.770-771. Anaheim, USA: Conference on Optical Fiber Communications 2002, 2002.03.

<P02628> **LEUNG Wai Tak and LEE Yiu Bun.** "A Server-less Architecture for Building Scalable, Reliable, and Cost-Effective Video-on-Demand Systems". Paper presented in the Collaborative Computing in Higher Education: Peer-to-Peer and Beyond Workshop, organized by Internet2 Working Groups. 2002.01.30.

<P026413> **Li, Xia, WONG Wing Shing and ZHANG Jihong.** "Constrained State Estimation for Systems with Finite Communication Bandwidth". *Chinese Journal of Electronics* vol.11 no.1, pp.124-129. 2002.01.

<P026590> **LOK Tat Ming.** "Performance of DS/CDMA Systems with Intracell Code Handoff". Paper presented in ICT 2002, organized by BUPT, IEEE, IEE. pp. 33-37. Beijing, China, 2002.06.23.

<P026700> **LOK Tat Ming.** "A Time Division Duplex Multicarrier CDMA System". *Proc. ICT 2002* pp. 576-580. Beijing, China: Publishing House of Electronics Industry, 2002.06.23.

<P026916> **WEI Keh Wei Victor and SHUM Kwan.** "A Strong Proxy Signature Scheme with Proxy Signer Privacy Protection". Proceedings of IEEE Eleventh Inter'l Workshop on Enabling Technologys: Infrastructure for Collaborative Enterprises (WETICE-2002) Pittsburgh, USA: IEEE, 2002.06.10.

<P027036> **NG Wai Yin.** "A Partitioning Approach to Switching Packets With and Without In-Order Guarantee". *Conference on Stochastic Networks* Stanford, USA: Stanford University, 2002.06.25.

<P027046> **KWAN Ho Yuet and LOK Tat Ming.** "Simple Signature Sequence Adaptation Via Gain Control". *Proc. 3G Wireless 2002* pp. 620-624. San Francisco, USA, 2002.05.28.

<P027205> **LAM Tak Cheung and WEI Keh Wei Victor.** "A Mobile Agent Clone Detection System with Itinerary Privacy". Proceedings of IEEE Eleventh Inter'l Workshop on Enabling Technologys: Infrastructure for Collaborative Enterprises (WETICE-2002) Pittsburgh, USA: IEEE, 2002.06.10.

<P027651> **YEUNG Wai Ho Raymond.** "A First Course in Information Theory". Information Technology: Transmission, Processing, and Storage 434 pgs. Kluwer Academic/Plenum Publishers, 2002.03.

<P027736> **CHAN Kit; CHAN Chun Kit; TONG Fuk Kay Franklin; HUNG Wai and CHEN Lian Kuan.** "Suppression of Pattern Distortion in Semiconductor Optical Amplifier by Using Fiber Loop Mirror". *Proceedings of the CLEO Conference on Lasers and Electro-optics* p.609. Long Beach, USA, 2002.05.

<P027905> **CHAN Kit, CHAN Chun Kit, TONG Fuk Kay Franklin, CHEN Lian Kuan and HUNG Wai.** "Suppression of Pattern Distortion in Semiconductor Optical Amplifier by Using Fiber Loop Mirror". *IEEE Conference on Lasers and Electro-Optics (CLEO)* pp.609. Long Beach, California, USA: IEEE LEOS, 2002.05.

<P028020> **CHAN P.C. and WEI Keh Wei Victor.** "Preemptive Distributed Intrusion Detection using Mobile Agents". *Proc. IEEE Eleventh Inter'l Workshop on Enabling Technologys: Infrastructure for Collaborative Enterprises (WETICE-2002)* IEEE Eleventh Inter'l Workshop on Enabling

Technologys: Infrastructure for Collaborative Enterprises (WETICE-2002). Pittsburgh, USA: IEEE, 2002.06.10.

<P028091> **CHAN Kit; TONG Fuk Kay Franklin; CHAN Chun Kit; CHEN Lian Kuan and HUNG Wai.** "An All-Optical Packet Header Recognition Scheme for Self-Routing Packet Networks". *Technical Digest of Conference on Optical Fiber Communications* working paper no.WO4, pp.284-285. Anaheim, USA: Conference on Optical Fiber Communications 2002, 2002.03.

<P028095> **KWOK Paul, LEE MARIA and SIM Kwang Mong.** "Concept Acquisition Modeling for E-commerce Ontology". *Optimal Information Modeling Techniques* IRM Press pp. 30-40. PA, USA: IRM Press, 2002.03.01.

<P028114> **WEN Yonggang, Zhang Yu and CHEN Lian Kuan.** "On Architecture and Limitation of Optical Multiprotocol Label Switching (MPLS) Networks Using Optical-Orthogonal-Code (OOC)/Wavelength Label". *Optical Fiber Technology* vol.8 no.1, pp. 43-70. San Diego, USA: Academic Press, 2002.01.

<P028190> **CHAN Lai Yin Simon; CHAN Chun Kit; D. T. K. Tong; TONG Fuk Kay Franklin and CHEN Lian Kuan.** "Upstream Traffic Transmitter Using Injection-Locked Fabry-Perot Laser Diode as Modulator for WDM Access Networks". *Electronics Letters* vol.38 no.1, pp.43-45. USA: IEE, 2002.01.03.

<P028217> **LEUNG Wai Tak and LEE Yiu Bun.** "A Server-less Architecture for Building Scalable, Reliable, and Cost-Effective Video-on-demand Systems" *Internet2 Workshop on Collaborative Computing in Higher Education: Peer-to-Peer* 16 pgs. Arizona, USA: Internet2 Working Groups, 2002.01.30.

<P02841> **LAM T.C. and WEI K. Victor.** "A Mobile Agent Clone Detection System with Itinerary Privacy". *The IEEE Eleventh International Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises-(WETICE2002)* p.6. Pitsburgh, USA: Sumitra Reddy, West Virginia University, USA, 2002.06.11.

<P028792> **CHAN Wah Kit and WEI Keh Wei Victor.** "A Threshold Proxy Signcryption". Proceeding of the 2002 International Conference on Security and Management (SAM?English Citation End> Las Vegas, USA: The 2002 International Conference on Security and Management (SAM'02), 2002.06.25.

<P02880> **CHAN Wah Kit and WEI K. Vioctor.** "A Threshold Proxy Signcryption". <English Citation Start>Proceedings of the International Conference on Security and Management vol.1 no.1, p.249. Nevada, USA: CSREA, 2002.06.24.

<P028874> **NG Wai Yin.** "Explaining Small World Phenomena on Genealogical Trees". *Sitges XVIII Conference on Statistical Mechanics* Sitges, Spain, 2002.06.10.

<P02889> **CHAN P.C. and WEI K. Victor.** "Preemptive Distributed Intrusion Detection Using Mobile Agents". Paper presented in the IEEE Eleventh International Workshops on Enabling Technologies: Infrastructure for Collaboralive Enterprise (WETICE-2002), organized by Sunitra Reddy, West Virginia University, USA. 6 pgs. USA, 2002.06.11.

<P029001> **CHANG Hsun Wen, CHEN Rong Jaye and HWANG F.K.. "**The Structural Birnbaum Importance of Consecutive-k Systems". *Journal of Combinatorial Optimization* vol.6 no.2 pp. 183-197. Netherlands: Kluwer Academic Publishers, 2002.06.

<P029104> **LEE Yiu Bun and LUI Chi Shing John.** "Automatic Recovery from Disk Failure in Continuous-Media Servers" *IEEE Transactions on Parallel and Distributed Systems* vol.13 no.5, pp.499-515. USA: IEEE, 2002.05.

<P029176> **KWAN Ho Yuet and LOK Tat Ming.** "A Time Division Duplex System With Antenna Arrays For Both The Uplink And The Downlink". *Proc. 3G Wireless 2002* pp. 463-468. San Francisco, USA: Delson Group Inc., 2002.05.28.

<P029378> **CHIANG K. S., LOR K. P. and CHAN Chun Kit.** "Polarimetric Four-Wave Mixing in a Single-Mode Fiber". *IEEE Photonics Technology Letters* vol.13 no.8, pp.803-805. USA: IEEE LEOS, 2001.08.

<P029407> **TANG Xiaoou and LIN Feng.** "Video-Based Handwritten Character Recognition". *Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processi* pp. 3748-3751. Florida, USA: IEEE, 2002.05.

<P029454> **LEE Yiu Bun.** "On a Unified Architecture for Video-on-Demand Services". *IEEE Transactions on Multimedia* vol.4 no.1, pp.38-47. USA: IEEE, 2002.03.

<P029461> **LEE Tong Tony and LIEW Soung Yue.** "Parallel Routing Algorithms in Benes-Clos Networks". *IEEE Transactions on Communications* 7pgs. USA: IEEE Communications Society, 2002.

<P029599> **DING Cunsheng; FU Fangwei; KLOVE Torleiv and WEI Keh Wei Victor.** "Constructions of Permutation Arrays". *IEEE Transactions on Information Theory* vol.48 no.4, pp.977 -980. USA: IEEE, 2002.04.

<P029743> **ZHAO Feng and TANG Xiaoou.** "Preprocessing for Skeleton-Based Fingerprint Minutiae Extraction". *Proceedings of the International Conference on Imaging Science, Systems, and Technology* vol.2, pp. 742-745. Las Vegas, USA: CISST '02 International Conference on Imaging Science, Systems, and Technology, 2002.06.

<P029925> **CHAN Kit; CHAN Chun Kit; TONG Fuk Kay Franklin and CHEN Lian Kuan.** "Performance Supervision for Multiple Optical Amplifiers in WDM Transmission Systems Using Spectral Analysis". *IEEE Photonics Technology Letters* vol.14 no.5, pp.705-707. USA: IEEE LEOS, 2002.05.

see also <P004264>, <P016580>, <P018222>, <P019646>, <P028153>, <P028790>

RESEARCH PROJECTS

Scheduling with Negotiable Third-Party Machines

- ✍ CAI Xiaoqiang ● LEE Chung Yee*
- ❑ 1 December 2001
- ❖ Research Grants Council (Earmarked Grants)

We investigate a new class of scheduling problems, where we must outsource certain parts of the jobs we receive from our customers to a third party who possesses the machines needed to process these parts. The availability of the third-party machines is negotiable, depending on the price that we are willing to pay. Consequently, we have to (1) negotiate an agreement to secure the machine times we desire to have on the third-party machines, and (2) generate a schedule to process the jobs, so as to minimize the total cost, including the cost for the use of the third-party machines and the cost incurred if the due dates of the jobs cannot be met. In general, consideration of third-party machines in machine scheduling problems relaxes a common assumption made in traditional scheduling studies that one always possesses all the machines needed to process his jobs. The main objective of this project is to conduct an in-depth study to explore models and algorithms to solve this new branch of scheduling problems involving third-party machines.
(MP01166)

Incentives for Advance Ordering in a Supply Chain

- ✍ CHEN Youhua
- ❑ 1 October 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

This research tries to address the issues in designing incentives for advance ordering in a supply chain. In particular, we investigate what incentives the firms in the higher echelon of a supply chain can employ to induce the firms in the lower echelon to place advance orders and how each of these incentives affects on the ordering behavior of the firms in the lower echelon. The research is meant to fill a gap existing in the literature, to gain insights into the cost-benefit tradeoffs of all incentive schemes and to provide methodologies for justifying investment in certain areas of information technology.
(EE01684)

Optimization of Reservation Process on Two-Leg Flights with Cancellations and No-Shows

- ✍ FENG Youyi
- ❑ 1 October 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

The optimal booking control rules built in airlines reservation systems are presently based on the single-leg algorithms. Many flights, especially those between Asia and North America/Europe, however, have intermediate stops. This project aims at identifying the optimal booking control rules for two-leg flights with cancellations and no shows. Continuing on the recent development for the model of two-leg flights without cancellations and no-shows, we will in this project characterize the optimal booking control rules for the two-leg flight model with cancellations and no-shows. Furthermore, we also design algorithms that are easy to implement yet robust and near-optimal.
(EE01306)

Nonlinear Modeling Approaches for Quantifying NASDAQ Pre-market Indicator/Composite Index Relationship

- ✍ LAM Kai Pui
- ❑ 1 December 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

Non-stationary time series are commonly found in financial applications. Added to the complexity are the time-varying nature and non-linearity of accurate models for describing the dynamic behavior of these financial time series. This proposal seeks to extend the linear techniques of co-integration to handle time-varying, non-linear relationship between a time series ("news") and its causally affected time series. A particularly relevant case is the quantification of the close relationship between the NASDAQ pre-market indicator and the composite index of the same day. The predictability of daily return will be investigated based on a proposed "news" model for

dynamic changes. The effectiveness and robustness of neural network models for handling non-linearity is compared with linear least-square estimation and other econometrics techniques. The empirical relationship between N-day return and the buy-sell decision of some commonly trading rules will be determined.

In our previous work it has been observed that the estimation of the NASDAQ composite index could be substantially improved by incorporating the "news" effect of the NASDAQ-100. However it is arguable that deriving relationships among NASDAQ indexes are not practical as these indexes should be known at the same time. The recent availability of the NASDAQ-100 Pre-market indicator provides a good source of financial data, which can readily be used for predicting the composite index based on some robust nonlinear models.

(EE01925)

Hierarchical Information Extraction Learning Framework and Its Applications to Event Tracking and Filtering

- ✍ LAM Wai
- ❑ 1 December 2001
- ❖ Research Grants Council (Earmarked Grants)

Extracting semantic information with high precision from on-line information sources is very useful in a variety of applications. Many information sources are semi-structured textual documents with different formats such as HTML in Web, Usenet news, emails, medical records, equipment maintenance logs, XML documents, etc. These kinds of documents usually contain some ungrammatical short word fragments and free texts. Building hand-crafted extraction rules is costly and ineffective since a new set of rules needs to be constructed whenever there is a format change or a different source is handled. We propose a new and adaptive information extraction learning frame-work capable of discovering extraction models from training examples. Training examples are simply sample field item annotations given by the user.

(CS01187)

Logistics Support for Mobile Commerce

- ✍ LEUNG May Yee Janny ● CHENG Chun Hung
- ❑ 1 December 2001
- ❖ Research Grants Council (Earmarked Grants)

The popularity and accessibility of the Internet has spawned explosive growth in e-commerce. New WAP technologies and 3G communications networks will enable mobile devices (cellular phones, PDA, etc.) to access the Internet and/or other private databases. Many such mobile devices will also have GPS (global positioning) features, allowing its location to be pin-pointed. In the future, the mobile-commerce customer will expect to obtain *up-to-the-second* and *location-specific* information and to perform *on-line* transactions. To stay competitive, companies must re-think their supply-chain management to accommodate and exploit real-time mobile transactions in meeting increasingly exacting standards for customer service and supply/distribution performance.

The goal of this project is to develop a modular delivery-planning system that supports and exploits technologies for Mobile-commerce, and is adaptable to handle the traffic congestion and population density of Hong Kong. The target system will provide location-based information, on-line query/ordering and delivery-tracking for customers. It will also support delivery planning (order assignment and routing) and dynamic re-routing using time-based information. The system will be modular and will contain bilingual digital maps and traffic databases of Hong Kong.

The key research questions to be addressed in this project are:

(1) database design to accommodate and exploit dynamic updating and global-positioning,
(2) algorithmic development of routing and scheduling methods (optimal or heuristic) for dynamically-updated databases and changing routing/scheduling specifications,
(3) hardware feasibility investigation of mobile devices; and
(4) operational testing of the entire system using data from a delivery company in Hong Kong.

(MP01213)

Efficient Solution Schemes for Solving Multidimensional Nonlinear Knapsack Problems

- ✍ LI Duan
- ❑ 1 December 2001

❖ Research Grants Council (Earmarked Grants)

Multidimensional nonlinear knapsack problems are often encountered in real-world decision-making when one has to make efficient use of an entity which consumes multiple resources. Application areas include resource allocation, capital budgeting and redundancy optimization in reliability network. This kind of problems can be formulated as a nonlinear integer programming. The curse of dimensionality and nonlinearity make the problem a great challenge. Efficient solution schemes seem to be lacking for solving a general multidimensional nonlinear knapsack problem where nonconvexity, nonseparability, and/or high dimensionality are present. Advancement in multidimensional nonlinear knapsack problem will have a significant impact on the economic benefits in operations and management. Re-cent progress in nonlinear surrogate constraint methods and nonlinear Lagrangian theory provide a promising platform for development of efficient algorithms for certain classes of integer programming problems. The aim of this project is to further study some fundamental properties of nonlinear integer programming, and derive efficient solution methods for multidimensional nonlinear knapsack problems. The overall research goal will be achieved by carrying out the following three research tasks:

(1) to incorporate the nonlinear Lagrangian dual theory into multidimensional nonlinear knapsack problems,
(2) to develop convexification schemes and direct outer approximation methods for the continuous relaxation formulation of nonlinear knapsack problems,
(3) to investigate efficient numerical methods for nonlinear knapsack problems.

The research outcome from this proposed research should be applicable to a wide range of real-world optimization problems, and the derivation of certain efficient solution methods for nonlinear knapsack problems will advance the state-of-the-art in the above-mentioned academic challenge.
(MP01214)

Mandarin-English Information (MEI): Investigating Multi-Scale Query and Document Expansion for Translingual Spoken Document Retrieval

✍ MENG Mei Ling Helen ● KWOK Kui Lam* ● WANG Hsin Min*

❑ 1 November 2001

❖ Research Grants Council (Earmarked Grants)

Current Web-based search engines preponderantly search for textual information expressed in the query's language. As massive quantities of multimedia content become readily available in the growing global information infrastructures, there is strong motivation to develop *cross-lingual* and *cross-media* (CLCM) information retrieval technologies. CLCM retrieval enables the user to search for personally-relevant content in any language or medium. We have developed one of the first English-Chinese cross-language spoken document retrieval (CL-SDR) systems - the MEI (Mandarin-English Information) system. English newswire stories are used as queries to retrieve related Chinese radio news broadcasts from an audio collection. MEI integrates three key technologies: (1) speech recognition, for indexing the document collection; (2) machine translation, for crossing the query/collection language barrier; and (3) information retrieval, to search for relevant documents. English-Chinese CL-SDR is hampered by several prevailing problems, including: (i) *open vocabularies in translation and recognition*, (ii) *translation ambiguities*, (iii) *recognition errors*, (iv) *Chinese word tokenization ambiguity*, and (v) *Chinese homophones*.

We advocate a novel *multi-scale retrieval paradigm*, where both words and subwords (i.e. Chinese characters/syllables) are used for retrieval. Initial investigation indicates that the multi-scale approach typically outperforms the popular word-only approach. This project strives to further improve English-Chinese CL-SDR performance by investigating how *query expansion* and *document* expansion can be incorporated into our multi-scale paradigm. Our objective is to compensate for imprecise or incorrect translations, untranslatable terms and erroneous recognition through enrichment of the query / document with additional terms drawn from the same collection or other contemporaneous / side collection(s).
(CS01223)

Domain-Optimized Generation for Computer Speech Output with High Naturalness

- ✍ MENG Mei Ling Helen
- ❑ 1 November 2001
- ❖ CUHK Research Committee Funding (Direct Grants)

We propose an approach in developing a speech synthesis technique aimed at highly natural response generation in domain-specific spoken language applications. Our approach handles two Chinese dialects – Cantonese and Putonghua. The technique will be applied to specific application domains such as air travel, foreign exchange, stocks, etc. The Chinese syllable is selected to be our basic unit for concatenation. Each unit label includes a two-digit appendix to encode the distinctive features of the left and right coarticulatory context. Hence our approach is phonologically and linguistically motivated. Our approach attempts to maximize intelligibility and naturalness of the generated responses within the application domain. This is important for the usability of the human-computer interface. In order to illustrate the contribution of domain-based optimization, we will compare the quality of the synthesized outputs with a domain-independent synthesizer. In addition, we will investigate the portability of our approach across domains and across Chinese dialects, as well as the scalability of our approach from simple domains to complex domains.
(EE01810)

"The Author Once, Present Anywhere (AOPA)" Software Platform

- ✍ MENG Mei Ling Helen ● CHING Pak Chung (Dept of Electronic Engineering)
- ❑ 1 February 2002
- ❖ Funding from Other Sponsors ● Innovation and Technology Support Programme, ITF, Innovation & Technology Commission

We propose to develop the AOPA software platform that supports rapid development of "universally accessible" Chinese Web content for E-business service provision. The content is accessible by displayless voice browsers for telephones or for the elderly / visually impaired, mobile mini-browsers for Internet-ready phones and PDAs, and regular Web browsers for desktop PCs. AOPA enables Web content/service providers, ISPs, and ASPs to author and maintain a single content repository, which automatically adopts usability-optimized presentation styles to reach the client devices of diverse form factors. Web visitors using mobile handhelds or telephones will outnumber those using desktop PCs within three years. Universal accessibility enables information dissemination to a much wider audience. This is critical and beneficial to B2B/B2C E-commerce, M-commerce and voice-enabled E-commerce.
(EE01512)

Towards Cost-Effective E-business in the News Media & Publishing Industry Using NewsML

- ✍ WONG Kam Fai William ● YANG Christopher Chuen Chi ● LAM Wai ● CHEUNG David* ● LU Qin*
- ❑ 1 July 2001
- ❖ Funding from Other Sponsors ● Innovation and Technology Support Programme, ITF, Innovation & Technology Commission

XML (Extensible Markup Language) is a universal data format and an enabling technology for integrated electronic business solutions. Adopting XML appropriately can speed up the pace of e-commerce in Hong Kong and enhance Hong Kong's, mmercial competitiveness in the world. This applies to the news media and publishing (NMP) industry which involves processing and exchange of large amount of information. NewsML is the international XML standard defined for the NMP industry. The NewsML standard is designed for smoothening internal operations, e.g. data interchange, leading to better quality of services and higher efficieny. These, in turn, can open up many new e-commerce opportunities. Although the advantages of NewsML have been recognized internationally, the Hong Kong NMP industry has only recently started to investigate it. This can seriouly weaken the competitiveness of the Hong Kong NMP industry worldwide. worldwide. Thus, there is an urgency for them to exploit the potentials of NewsML and its associated technology. This lays down the goal of this project: establishment and promotion of a local NewsML standard and its supporting tools. Opions from XML experts in different sectors: higher education, news providers, news aggregators and technology providers will be solicited in defining the local NewsML standard.

(EE01966)

Concept-based Chinese/English Cross-lingual Information Retrieval

- ✍ YANG Christopher Chuen Chi
- ❑ 1 January 2002
- ❖ CUHK Research Committee Funding (Direct Grants)

The information available in languages other than English on the World Wide Web is increasing significantly. It is predicted that there will be only 60% increase in Internet users among English speakers but there will be 150% growth among non-English speakers for the next five years. By 2005, 57% of Internet users will be non-English speakers. The demand of searching across language boundaries will be growing exponentially. Although a few cross-lingual information retrieval works have been done, most of them are across several European languages, such as English, Spanish, German, French, and Italian. The difficulties of cross-lingual information retrieval between European and Asian languages are comparatively higher than those between European languages. These are due to several reasons: (1) machine translation techniques between European and Asian languages are rather less mature; (2) parallel/comparable corpus in European and Asian languages are comparatively rare; (3) the grammar of European and Asian languages are significantly different.

As English and Chinese are the most popular languages in the world, the desire on an efficient and effective Chinese-English cross-lingual information retrieval system is significant although there are still many research problems to be solved.

In this project, we propose to employ the concept space and fuzzy Baysian inference network techniques to develop a Chinese-English cross-lingual information retrieval system. Several problems will be investigated and the contributions are summarized as follows:

(1) Investigate the current Chinese indexing techniques and develop an efficient technique to retrieve significant Chinese term phrase, especially the unknown words that cannot be found in dictionary.

(2) Generate au automatic concept space using Hopfield network based on a parallel/comparable corpus.

(3) Develop an inference network, which utilize the automatic generated concept space, for cross-lingual information retrieval.

(EE01564)

Concurrent and Personalized Data Mining with a Large Number of Users

- ✍ YU Jeffrey Xu ● LU Hongjun*
- ❑ 1 October 2001
- ❖ Research Grants Council (Earmarked Grants)

Data mining is a powerful technology being widely adopted to help decision makers focus on the most important nontrivial/predictive information/patterns that can be extracted from large amounts of data they continuously accumulate in their daily business operations or obtain from datafeeds or WWW on the Internet. These hidden interesting patterns are highly expected to maximize a certain objective function in a decision domain. In real applications, even with the same data set and in the same institute, different users may have different objectives, and therefore attempt to mine/monitor patterns that are likely to affect the values of parameters of their objective functions. In this project, we will design and implement a concurrent and personalized data mining system for a large number of users. By personalization, we mean that a user can express their interests to mine/monitor pattern and pattern changes using constraints. By concurrent, we mean to compute such personalized data mining queries simultaneously. Our main objectives are to increase expressive power for users to express their interests, and to reduce total computational costs and shorten response time for mining/monitoring patterns or pattern changes in a dynamic environment in which data evolves through systematic addition of blocks of data.

(CS01229)

Primal-Dual Interior Point Approach to Multi-Stage Stochastic Programming

- ✍ ZHANG Shuzhong
- ❑ 1 October 2001
- ❖ Research Grants Council (Earmarked Grants)

This research project aims at developing new and high performance solution methods for multiple stage stochastic (convex) programming. We, as human being, too often are compelled to make decisions while the consequences of the decisions depend largely upon the unknown future. There is no other way for us, but to live with the uncertainty of this nature. However, we can learn to improve our ability to reduce of getting trapped into some undesirable situations by means of, e.g., quantitative techniques. Stochastic programming is exactly such a tool developed in the field of optimization to cope with the problem of decision-making under uncertainty. Among others, stochastic programming has found many applications in finance, such as asset-liability and bond-portfolio management. The conceptual model being extremely useful beyond any debate, many stochastic programming applications still remain computationally intractable because of their overwhelming dimensionality. Much research effort has been devoted to the numerical aspects of stochastic programming. The success, however, has been only moderate so far. In particular, only two-stage stochastic programming with a linear objective is studied extensively in the literature. In this project we propose to study a new decomposition approach for multiple-stage stochastic programming with a convex objective, based on the path-following interior point method combined with the homogeneous self-dual embedding technique. A pilot study has been conducted along this direction. Our preliminary numerical experiments show that this approach is very promising in many ways for solving generic multi-stage stochastic programming, including its superiority in terms of numerical efficiency, as well as the flexibility in testing and analyzing the model.
(MP01233)

Risk-Sensitive Control

- ✍ ZHOU Xunyu ● YAO David Da Wei
- ❑ 1 December 2001
- ❖ Research Grants Council (Earmarked Grants)

Traditional stochastic control deals with risk-neutral problems in the sense of minimizing the expected total cost over the decision horizon. Risk-sensitive control addresses a different class of objective functions that amplify the decision-maker's sensitivity to large cost values. Because of its importance and wide ranging applications, risk-sensitive control has in recent years attracted extensive research effort in the control community. Nevertheless, some fundamental problems remain open, and it is the objective of this proposal to study three such problems:
(1) risk-sensitive maximum principle,
(2) risk-sensitive linear-quadratic control, and
(3) connections between risk-sensitive control and the theory of large deviations.

We expect our proposed investigation to contribute new knowledge and new solution approaches to risk-sensitive control, and help enlarge the application domain of stochastic control, in particular to areas that are highly vulnerable to risks, such as insurance, financial services, and high-tech startups.
(MP01234)

Please refer to previous issues of this publication for more details of the following ongoing research at the department:

Edition	Title/Investigators
1999-00	Earliness/Tardiness Scheduling Subject to Known Due Dates and an Unknown Deadline (CU99418) ✍ CAI Xiaoqiang ● ZHOU Xian*
2000-01	On-line Scheduling of Multiprocessor Tasks with Partial Information (EE20019) ✍ CAI Xiaoqiang
1999-00	On the U-shaped Production Line Problem (EE99023) ✍ CHENG Chun Hung
1998-99	Knowledge Engineering for Crime Analysis and Management (CU98185) ✍ LAM Kai Pui ● BRAHAN J. W.* ● CHAN Hilton*
1999-00	Integrative Intelligence Techniques for Money Laundering Detection (CU99396) ✍ LAM Kai Pui
1999-00	Learning Classification Knowledge From High Dimensional Data and Its Application to Intelligent Text Filtering (CU99385)

✍ LAM Wai ● LING Charles X.* ● CHOI Philip L.S.*

1998-99 Polyhedral Combinatorial Methods for Planning Problems with Interaction Costs (EE98034)
✍ LEUNG May Yee Janny

1999-00 Gain-Sharing in Third-Party Logistics Alliances: Game-Theoretic Models and Empirical Investigations (CU99375)
✍ LEUNG May Yee Janny ● LAM Ko Kin*

1998-99 Successive Solution Scheme for Constrained Redundancy Optimization in Reliability Networks (CU98056)
✍ LI Duan

1999-00 Multiobjective Differential Dynamic Programming (CU99392)
✍ LI Duan ● LIAO Li Zhi*

2000-01 Transformation Methods for Global Optimization (EE20020)
✍ LI Duan

1999-00 An Inference Network Approach to Automated Reasoning (CU99397)
✍ LOW Boon Toh

1999-00 From Language to Information: A Hybrid Approach for Understanding Spoken Queries (EE99024)
✍ MENG Mei Ling Helen

2000-01 Parser Composition for Natural Language Processing (EE20007)
✍ MENG Mei Ling Helen

2000-01 Semi-Automatic Grammar Acquisition for Understanding Natural Language Queries (CU00177)
✍ MENG Mei Ling Helen ● CHING Pak Chung (Dept of Electronic Engineering) ● LAM Wai

1999-00 Extracting Temporal Information from Chinese Financial News (EE99025)
✍ WONG Kam Fai William ● LAM Wai ● LI Wenjie (Centre for Innovation and Technology)#

1999-00 OCF – Open Component Foundation (EE99001)
✍ WONG Kam Fai William ● CHEUNG Kwok Wai (Dept of Information Engineering) ● LYU Rung Tsong Michael (Dept of Computer Science and Engineering)

1999-00 Translingual Access of Chinese Text Using English (EE99041)
✍ WONG Kam Fai William ● LAM Wai ● Kwok K L*

2000-01 Extracting Temporal Information from Chinese Financial News (EE20021)
✍ WONG Kam Fai William ● LI Wenjie (Centre for Innovation and Technology)#

1999-00 Information Updates and Supply Chain Management with Application to Electronic Device and Equipment Industry (CU99417)
✍ YAN Houmin

1999-00 Supply Chain Structure and Information Dynamics (BS99004)
✍ YAN Houmin ● YAO David Da Wei ● CHEN Jian* ● LIU Lu*

1998-99 Color Image Retrieval and Visual Thesaurus (CU98034)
✍ YANG Christopher Chuen Chi ● LI Victor*

1999-00 Constraints Based Reasoning Approach for Tolerance Analysis and Tolerance Synthesis (CU99031)
✍ YANG Christopher Chuen Chi

1998-99 Strategic Research in Risk and Optimization (EE98040)
✍ YAO David Da Wei ● CAI Xiaoqiang ● CHENG Chun Hung ● HE Jia (Dept of Finance) ● LEUNG May Yee Janny ● LI Duan ● LIU Ming (Dept of Finance) ● YAN

Houmin ● YEN Jerome ● ZHOU Xunyu

1999-00 Performance Analysis and Optimization of Assemble-to-Order Systems (CU99376)
✍ YAO David Da Wei

2000-01 "Linear Quadratic Control via Semidefinite Programming, with Applications" (CU00175)
✍ YAO David Da Wei ● ZHANG Shuzhong ● ZHOU Xunyu

2000-01 Dynamic Aggregate View Selection and Maintenance for Large Financial Data Warehouses (CU00198)
✍ YU Jeffrey Xu ● LU Hongjun*

2000-01 Large Incomplete Datacube Computation (EE20024)
✍ YU Jeffrey Xu

1999-00 Sensitivity Analysis and High Performance Optimization Methods (EE99026)
✍ ZHANG Shuzhong

2000-01 Conic Optimization: Theory and Methods (CU00181)
✍ ZHANG Shuzhong

1998-99 Optimal Dividend Distributions and Risk Controls for Financial Companies (CU98054)
✍ ZHOU Xunyu

1999-00 Optimal Controls of Forward-Backward Stochastic Systems with Financial Applications (CU99435)
✍ ZHOU Xunyu

RESEARCH OUTPUTS AND PUBLICATIONS

<P004187> **JIN Honglan and WONG Kam-Fai.** "TREC-9 CLIR at CUHK, Disambiguation by Simikrity Valnes Between Adjacent Words". Paper presented in the NIST Special Publication 500-XXX: The Ninth Text Retrieval Conference (TREC-9), organized by National Institute of Standards and Technology,USA. Maryland, USA, 2000.11.13.

<P004264> **HUI Pui-Yu; TANG Xiao-On; MENG M. Helen; LAM Wai and GAO Xinbo.** "Automatic Story Segmentation for Spoken Document Retrieval". *The 10th IEEE International Conference on Fuzzy Systems* vol.3, p.4. The University of Melbourne, Australia: IEEE Neural Network Council, 2000.12.02.

<P011771> **HUI Kin; LAM Wai and MENG M. Helen.** "Automatic Event Generation from Multi-Lingual News Stories". *Proceedings of First ACM/IEEE-CS, Joint Conference on Digital Libraries* pp.23-24. USA: ACM, 2001.06.24.

<P016004> **CHEN Hanxiong ; YU Jeffrey Xu; KAZUTAKA Furuse and NOBUO Ohbo.** "Support IR Query Refinement by Partial Keyword Set". *The 2nd International Conference on Web Information Systems Engineering* pp.226-234. Kyoto: IEEE Computer Society, 2001.12.03.

<P016235> **YAO D. David; ZHANG Shuzhong and ZHOU Xunyu.** "Stochastic LQ Control via Semidefinite Programming". *SIAM Journal on Control and Optimization* vol.40, pp.801-823. 2001.

<P016239> **ZHANG Shuzhong.** "On a Profit Maximizing Location Model". *Annals of Operations Research* vol.103, pp.251-260. The Netherlands: Kluwer Academic Publishers, 2001.

<P016256> **MENG Mei Ling Helen; LO W. K.; CHEN Berlin and TANG Karen.** "Generating Phonetic Cognates to Handle Named Entities in English-Chinese Cross-Language Spoken Document Retrieval". *Proceedings of the Automatic Speech Recognition and Understanding Workshop (ASRU) 2001* Trento, Italy, 2001.12.

<P016316> **SUN X. L. and LI Duan.** "On the Relationship between the Integer and Continuous Solutions of Convex Programming". *Operations Research Letters* vol.29, pp.87-92. 2001.

<P016376> **Weifa Liang and YU Jeffrey Xu.** "Revisit on View Maintenance in Data Warehouses". *Advances in Web-Age Information Management* pp.203-211. Xian: Springer, 2001.07.09.

<P016473> **YANG X. M. ; LI Duan and WANG S. Y. .** "Near-subconvexlikeness in Vector Optimization with Set-valued Functions". *Journal of Optimization Theory and Applications* vol.110 no.2, pp.413-427. 2001.

<P016502> **WEI P.; YAN Y.H.; NI Y.X.; YEN Jerome and WU F.F. .** "A Decentralized Approach for Optimal Wholesale Cross-border Trade Planning Using Multi-agent Technology". *IEEE Transactions on Power Systems* vol.16 no.4, pp.833-838. 2001.11.

<P016558> **YANG Christopher Chuen Chi and Yip M. K.** "Visual Thesaurus for Color Image Retrieval Using Self-Organizing Map". *Proceedings of the 7th International Conference on Information Systems Analysis* Orlando, USA, 2001.07.

<P016581> **WONG Kam Fai William; LI Wenjie and Chunfa Yuan.** "A Model for Processing Temporal References in Chinese". Paper presented in the 10th Conference of the European Chapter - Temporal and Spatial Information Processing, organized by Association for Computational Linguistics Toulouse, France, 2001.07.07.

<P016759> **Chen H. and YAO D. David.** "Fundamentals of Queueing Networks: Performance, Asymptotics and Optimization". *Applications of Mathematics* vol.46. New York, USA: Springer - Verlag, 2001.

<P016763> **YAO D. David; ZHANG Shuzhong and ZHOU Xunyu.** "A Primal-Dual Semidefinite Programming Approach to Linear Quadratic Control". *IEEE Transactions on Automatic Control* vol.46, pp.1442-1447. 2001.

<P016780> **LAU Sau Mui; YEN Jerome and YU Jeffrey Xu.** "How XML Supports Financial Information Integration". *International Conference on Supply Chain Management and Information Systems in the Internt Age* Hong Kong: The Hong Kong Polytechnic University, 2001.12.17.

<P016833> **CHENG Chun Hung and MILTENBURG John .** "A Lagrangian Relaxation Algorithm for a Production Planning Problem Where Products Have Alternate Routings". *INFO* vol.39, pp.333-350. 2001.11.

<P016841> **LI Duan; SUN X. L.; BISWAL M. P. and GAO F. .** "Convexification, Concavification and Monotonization in Global Optimization". *Annals of Operations Research* vol.105, pp.213-226. 2001.

<P016896> **SONG J. S. and YAO David Da Wei.** "Supply Chain Structures: Coordination, Information, and Optimization". *International Series in Operations Research and Management Science* vol.42. Kluwer, 2001.12.

<P016978> **S. Krishna; N.N.A. Naikan; S. Sahu and YANG Christopher Chuen Chi.** "Application of TPM Activities in Indian Jute Industry for Productivity Improvement". *Proceedings of XII World Productivity Congress* Hong Kong SAR, 2001.10.

<P017118> **LAU Sau Mui and YEN Jerome.** "Adoption of On-line Trading in the Hong Kong Financial Market". *Journal of Electronic Commerce Research* vol.2 no.3. 2001.

<P017131> **WONG Kam Fai William; LOW Boon Toh and REN Yongjie.** "A Workflow Model for Chinese Business Processes". *International Journal of Computer Processing of Oriental Languages* vol.14 no.3, pp.233-258. Chinese Language Computer Society & World Scientific Publishing Company, 2001.09.

<P017153> **CAI Xiaoqiang; SHA Dan and WONG Chak Kuen.** "Time-varying Minimum Cost Flow Problems". *European Journal of Operational Research* Theory and Methodology vol.131, pp.352-374. Elsevier Science BV, 2001.

<P017206> **CAI Xiaoqiang; SUN Xiaoqiang and ZHOU Xian .** "Single-machine Stochastic Scheduling with Due Date Windows and Earliness-Tardiness Costs". *Proceedings of the 5th International Conference on Optimization: Techniques and Applications* pp.120-127. Hong Kong SAR, 2001.12.

<P017213> **NG C. K and LI Duan.** "A Sequential Constrianed Minimization Method for Constrained Global Optimization". *Proceedings of the 5th International Conference on Optimization: Techniques and Applications* vol.3, pp.990-997. Hong Kong SAR, 2001.12.

<P017309> **MENG Mei Ling Helen; WONG Yee Fong Julia; CHAN Cheong Chat; CHAN Shuk Fong; KEUNG Chi Kin; SIU Kai Chung; FUNG Tien Ying; TSUI Wai Ching; Ke CHEN; Lan WANG; Ting Yao WU; Xiaolong LI; LEE Tan; WONG Yiu Wing; CHING Pak Chung and Huisheng CHI.** "ISIS: A Trilingual Conversational System with Learning Capabilities and Combined Interaction and Delegation Dialogs" *Proceedings of the National Conference on Man-Machine Speech Communication* Shengzhen, China, 2001.11.

<P017320> **WONG Kam Fai William.** "Labor Shortfall in Hong Kong's IT Industry". *Communications of the ACM* vol.44 no.7. 2001.07.

<P017373> **CAI Xiaoqiang; SHA Dan and WONG Chak Kuen.** "Time-Varying Universal Maximum Flow Problems". *Mathematical and Computer Modeling* vol.33, pp.407-430. Elsevier Science Ltd, 2001.

<P017457> **LAM Kai Pui and NG Hoi Shing Raymond.** "Nonlinear News Modeling of NASDAQ Indices". *Proceedings of World Multiconference on Systemics* vol.10, pp.33-38. Orlando, Florida, USA: Cybernetics and Informatics, 2001.07.

<P017530> **LAU Sau Mui; LEE Yue Wefield and YEN Jerome.** "Cross Market Monitoring System: A Knowledge Management Approach". *International Conference on Supply Chain Management and Information Systems In The Internet Age, SCMIS 2001* 2001.12.

<P017603> **WONG Chin Chung and MENG Mei Ling Helen.** "Improvements on a Semi-Automatic Garmmar Induction Framework". *Proceedings of the Automatic Speech Recognitional Understanding Workshop (ASRU 2001)* Trento, Italy, 2001.12.

<P017616> **LUK Po Chui, Fuliang WENG and MENG Mei Ling Helen.** "Automatic Grammer Partitioning for Syntactic Parsing". *Proceedings of the Seventh International Workshop on Parsing Technologies (IWPT)* Beijing, China, 2001.10.

<P017672> **WONG Kam Fai William; SU Yat Fan; YANG Dongqing and TANG Shiwei .** "A New Conceptual Graph Generated Algorithm for Semi-structured Databases". *Proceedings of First Asia-Pacific Conference, WI2001* pp.267-271. Maebashi City, Japan: Springer, 2001.10.

<P017680> **LO W. K.; Patrick SCHONE and MENG Mei Ling Helen.** "Multi-Scale Retrieval in MEI: An English-Chinese Translingual Speech Retrieval System". *Proceedings of Eurospeech 2001* pp.1303-1306. Scandinaria, Denmark, 2001.09.

<P017685> **NG Suk Fung; LEUNG May Yee Janny; CAI Xiaoqiang and TRILOCHAN Sastry.** "Uncapacitated Multicommodity Network Design Problem with Zero Flow Cost". *Proceedings of the 5th International Conference on Optimization: Techniques and Applications* pp.1695-1699. Hong Kong SAR, 2001.12.

<P017701> **CHOI Tsan Ming; LI Duan and YAN Houmin.** "Newsvendor Problem with Mean-variance Objectives". *Proceedings of the 5th International Conference on Optimization: Techniques and Applications* vol.4, pp.1860-1867. Hong Kong SAR, 2001.12.

<P017721> **ZHANG Guochuan ; CAI Xiaoqiang and WONG C. K.** "Scheduling Two Groups of Jobs with Incomplete Information". *Proceedings of the 5th International Conference on Optimization: Techniques and Applications* pp.420-427. Hong Kong SAR, 2001.12.

<P017731> **SUN X. L.; K. McKinnon and LI Duan.** "A Convexification Method for a Class of Global Optimization Problems with Applications to Reliability Optimization". *Journal of Global Optimization* vol.21 no.2, pp.185-199. 2001.

<P017782> **MENG Xiaofeng ; WANG Shan and WONG Kam Fai William.** "Overview of A Chinese Natural Language Interface to Databases: NChiql". *International Journal of Computer Processing of Oriental Languages* vol.14 no.3, pp.213-232. USA: Chinese Language Computer Society & World Scientific Publishing Company, 2001.09.

<P017968> **Ng C. T. ; CAI Xiaoqiang and CHENG T. C. E. .** "Minimizing Completion Time Variance With Compressible Processing Times". *Proceedings of the 5th International Conference on Optimization: Techniques and Applications* pp.178-186. Hong Kong SAR, 2001.12.

<P017980> **WONG Kam Fai William; SONG Dawei ; BRUZA Peter and CHENG Chun Hung.** "Application of Aboutness to Functional Benchmarking in Information Retrieval". *ACM Transactions on Information Systems (TOIS)* vol.19 no.4, pp.337-370. New York, USA: ACM Press, 2001.10.

<P017993> **ZHANG Guochuan; CAI Xiaoqiang and WONG Chak Kuen.** "On-Line Algorithms for Minimizing Makespan on Batch Processing Machines". *Naval Research Logistics* vol.48, pp.241-258. John Wiley & Sons, Inc., 2001.

<P018007> **NG Hoi Shing Raymond and LAM Kai Pui.** "Stock Prediction Using NASDAQ-GEM Model". *Proceedings of World Multiconference on Systemics* vol.10, pp.39-44. Orlando, Florida, USA: Cybernetics and Informatics, 2001.07.

<P018023> **Ho, K.S., Leong, H.V. and LAM Wai.** "A Collaborative Word Processing System Using a CORBA-Based Workflow Framework". *Proceedings of the 3rd International Symposium on Distributed Objects & Applicat* pp.176-185. Rome, Italy, 2001.09.

<P018071> **YUEN S. M. and LAM Kai Pui.** "Microprocessor Systems". *Expert Systems* vol.2 pp.553-616. Academic Press, 2001.10.

<P018108> **LIU Hong-cheu and YU Jeffrey Xu.** "Safe Query Languages for Constraint Databases with Complex Values". *The 17th International Conference on Advanced Science and Technology* pp.121-126. Chicago, USA: Illinois Institute of Technology, 2001.10.06.

<P018222> **HUI Pui Yu; TANG Xiaoou; MENG Mei Ling Helen; LAM Wai and GAO Xinbo.** "Automatic Story Segmentation for Spoken Document Retrieval". *Proceedings of the IEEE International Fuzzy Systems Conference* pp.1319-1322. Melbourne, Australia, 2001.12.

<P018259> **MENG Mei Ling Helen.** "Intelligent Speech for Information Systems: Towards Biliterary and Trilingualism". Invited Tutorial, International Symposium on Chinese Spoken Language Processing (1 of 2 invited tutorials, hundreds of attendees) 2001.10.

<P018353> **HOLDER Allen G; STURM Jos F and ZHANG Shuzhong.** "Marginal and Parametric Analysis of the Central Optimal Solution". *INFOR* vol.39 no.4, p.394. 2001.11.

<P018374> **ETTL M.; FEIGIN G.; LIN G. and YAO D. David.** "A Supply Network Model with Base-Stock Control and Service Requirements". *Operations Research* vol.48, pp.216-232. 2001.

<P018417> **YANG Christopher Chuen Chi and A. Chung.** "Retrieving Chinese Web Financial News using User Profile and User Feedback,". Paper presented in The 3rd International Conference on Information, Communication, and Signal Processing, organized by IEEE Singapore, 2001.10.

<P018419> **XU Kui; WENG Fuliang ; MENG Mei Ling Helen and LUK Po Chui.** "Multi-Parser Architecture for Query Processing". *Proceedings of the Eurospeech 2001* Scandinaria, Denmark, 2001.09.

<P018447> **EBRU K. Bish; CHEN Youhua; LEONG Yin Thin; LIU Qizhang; BARRY L. Nelson; NG Jonathan Wing Cheong and DAVID Simchi-Levi.** "Dispatching Vehicles in a Mega Container Terminal". *Proceedings of the 5th Int'l Conference on Optimization: Techniques and Applications* pp.498-507. Hong Kong SAR: ICOTA, 2001.12.15.

<P018552> **Y. B. ZHAO and LI Duan.** "Existence and Limiting Behavior of A Non-interior-point Trajectory for Nonlinear Complementarity Problems Without Strict Feasibility Condition". *SIAM Journal on Control and Optimization* vol.40 no.3, pp.898-924. 2001.

<P018640> **LAM Wai and LAI Kwok-Yin.** "A Meta-Learning Approach for Text Categorization". *Proceedings of the International ACM SIGIR Conference on Research and Development in Information Retrieval* pp.303-309. New Orleans, USA: ACM Press, 2001.09.

<P018704> **LI Duan and SUN X. L. .** "Existence of a Saddle Point in Nonconvex Constrained Optimization". *Journal of Global Optimization* vol.21 no.1, pp.39-50. 2001.

<P018748> **ZHANG Guochuan; CAI Xiaoqiang; LEE C.-Y. and WONG Chak Kuen.** "Minimizing Makespan on a Single Batch Processing Machine with Nonidentical Job Sizes". *Naval Research Logistics* vol.48, pp.226-240. John Wiley & Sons, Inc., 2001.

<P018765> **FUNG Wai Ming; NG Hoi Shing Raymond and LAM Kai Pui.** "Digital FPGA Implementation for Bellman-Ford Computation". *Proc. SPIE* vol.4525, pp.76-87. Denver, Colorado, USA: ITCOM 2001, 2001.08.

<P018979> **WONG Chin Chung; MENG Mei Ling Helen and SIU Kai Chung.** "Learning Strategies in a Grammar Induction Framework". *Proceedings of the Natural Language Processing Pacific Rim Symposium* Tokyo, Japan, 2001.11.

<P019076> **CHENG Chun Hung; MADAN Manohar Shrinivasan; GUPTA Y.P. and SO S. .** "Solving the Capacitated Lot-sizing Problem with Backorder Consideration" *Journal of the Operational Research Society* vol.52, pp.952-959. 2001.08.

<P019121> **LAM Wai; KEUNG Chi Kin and CHARLES X. Ling.** "Learning via Prototype Generation and Filtering". *Instance Selection and Construction for Data Mining* ed. by H. Liu and H. Motoda pp.227-244. USA: Kluwer Academic Publishers, 2001.09.

<P019195> **TAHIR Choulli, TAKSAR Michael and ZHOU Xunyu.** "Excess-of-loss Reinsurance for a Company with Debt Liability and Constraints on Risk Reduction". *Quantitative Finance* vol.1, pp.573-596. Bristol, UK: Institute of Physics Publishing Ltd, 2001.11.

<P019206> **LAM Wai and HO Kei-Shiu.** "FIDS: An Intelligent Financial Web News Articles Digest System". *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans* vol.31 no.6, pp.753-762. USA: IEEE, 2001.11.

<P019437> **WANG Ning, GE Rui-fang, YUAN Chun-fa, WONG Kam Fai William and LI Wen-jie.** "Company Name Indentification In Chinese Financial Domain". *Journal of Chinese Information Processing* vol.16 no.2 pp.1-6. Beijing, China, 2001.11.20.

<P019452> **YANG Christopher Chuen Chi and J. Wong.** "Tolerance Synthesis by Constraint Propagation". *Proceedings of the 5th World Multiconference on Systematics, Cybernetics and Inf* Orlando, USA, 2001.07.

<P019573> **LIM Andrew Ee Beng and ZHOU Xunyu.** "Linear-quadratic Control of Backward Stochastic Differential Equations". *SIAM J. Control Optim.* vol.40 no.2, pp.450-474. USA: Society for Industrial and Applied Mathematics, 2001.07.19.

<P019585> **YUAN Chunfa; CHEN Gang ; WONG Kam Fai William and LI Wenjie.** "An Effective Method for Chinese Grammar Rule Learning". *International Journal of Computer Processing of Oriental Languages* vol.14 no.4, pp.361-374. USA: Chinese Language Computer Society & World Scientific Publishing Company, 2001.12.

<P019595> **SIU Kai Chung and MENG Mei Ling Helen.** "Semi-Automatic Grammar Induction for Bi-directional English-Chinese Machine Translation". *Proceedings of the Eurospeech 2001* Scandinaria, Denmark, 2001.09.

<P019646> **LAM Wai, GAO Xinbo, HUI Pui Yu, TANG Xiaoou and MENG Mei Ling Helen.** "Automatic Story Segmentation for Spoken Document Retrieval". *Proceedings of the IEEE International Fuzzy Systens Conference* pp. 1319-1322. Melbourne, Australia: IEEE, 2001.12.

<P019652> **YIN G.; ZHANG Qing; YAN Houmin and BOUKAS E. K.** "Random-Direction Optimization Alogrithms with Applications to Threshold Controls". *Journal of Optimization Theory and Applications* vol.110, pp.211-233. 2001.

<P019677> **LI Duan and X. L. SUN.** "Convexification and Existence of Saddle Point in a pth-power Reformulation for Nonconvex Constrained Optimization". *Nonlinear Analysis* vol.47, pp.5611-5622. 2001.

<P019861> **MENG Mei Ling Helen, CHAN Shuk Fong, WONG Yee Fong Julia, CHAN Cheong Chat, WONG Yiu Wing, FUNG Tien Ying, TSUI Wai Ching, CHEN Ke, WANG Lan, WU Ting Yao, LI Xiao Long, LEE Tan, CHOI Wing Nin, P.C. CHING and CHI Hui Sheng**. "ISIS: A Learning System with Combined Interaction and Delegation Dialogs". *Proceedings of the 7th European Conference On Speech Communication and Technology* pp.1551-1554. Aalborg, Denmark: International Speech Communication Association, 2001.09.03.

<P019921> **BROWN A O; ETTL M; LIN G; PETRAKIAN R and YAO David Da Wei.** "Inventory Allocation at a Semiconductor Company: Modeling and Optimization". *Supply Chain Structures: Coordination, Information, and Optimization* vol.42 no.chapter 9, pp.283-309. Kluwer, 2001.12.

<P019953> **CHOI Tsan Ming; LI Duan and YAN Houmin.** "Electronic Marketplace for Returned Products in the Publishing Industry: A Simulation Analysis". *Proceedings of the 1st International Conference on Electronic Business* pp.304-306. Hong Kong SAR, 2001.12.

<P019978> **WU Hanzhong and ZHOU Xunyu.** "Stochastic Frequency Characteristics". *SIAM J. Control Optim* vol.40 no.2, pp.557-576. USA: Society for Industrial and Applied Mathematics, 2001.07.25.

<P019986> **LI Wenjie; WONG Kam Fai William and YUAN Chunfa.** "Application and Difficulty of Natural Language Processing in Chinese Temporal Information Extraction". *Natural Language Processing Pacific Rim Symposium* pp.501-506. Tokyo, Japan, 2001.11.

<P026196> **YANG Christopher Chuen Chi and CHUNG Alan.** "A Personal Agent for Chinese Financial News on the Web". *Journal of the American Society for Information Science and Technology, Special Issue on Web Research* vol.53 no.2, pp.186-196. 2002.01.

<P026288> **YANG Christopher Chuen Chi; CHEN Hsinchun and HONG Kay.** "Internet Browsing: Visualizing Category Map by Fisheye and Fractal Views". *Proceedings of the IEEE International Conference on Information Technology: Coding and Computing* Las Vegas, USA, 2002.04.

<P026319> **YANG Christopher Chuen Chi and LI Kar Wing.** "Mining English/Chinese Parallel Documents from the World Wide Web". *Proceedings of the International World Wide Web Conference* Honolulu, Hawaii, USA, 2002.05.

<P026412> **CHENG Chun Hung; CHANG M. K. and CHEUNG Wai Man.** "The Use of the Internet in Hong Kong: Manufacturing vs. Service". *International Journal of Production Economics* vol.75, pp.33-45. 2002.01.

<P026418> **JIANG Haifeng; LU Hongjun; WANG Wei and YU Jeffrey Xu.** "Path Materialization Revisited: An Efficient Storage Model for XML Data". *Thirteenth Australasian Database Conference* pp.85-94. Melbourne, Australia: Australian Computer Society, 2002.01.

<P026611> **SHEN X. ; CHEN Hong; DAI J. G. and DAI W.** "The Finite Element Method for Computing the Stationary Distribution of an SRBM in a Hypercube with Applications to Finite Buffer Queueing Networks". *Queueing Systems, Theory and Applications* 2002.

<P026639> **Jiyuan An; Kazutaka Furuse; Hanxiong Chen; Masahiro Ishikawa; YU Jeffrey Xu and Nobuo Ohbo.** "Hyper Map: A Map Algorithm of High-Dimensional Space for Dimensionality Reduction and Clustering". *Data Engineering Workshop (DEWS'02)* Kurahiki, Japan: The Institute of Electronics, Information and Communication Engineers, Japan, 2002.03.04.

<P026910> **ZHAO Yunbin and LI Duan.** "Locating the Least 2-norm Solution of Linear Programs via A Path-following Method". *SIAM Journal on Optimization* vol.12 no.4, pp.893-912. 2002.

<P026939> **CHAN Shuk Fong and MENG Mei Ling Helen.** "Interdependencies among Dialog Acts, Task Goals and Discourse Inheritance in Mixed-Initiative Dialogs". *Proceedings of the Human Language Technology Conference* San Diego, USA, 2002.05.

<P027027> **LIM Ee Beng Andrew and ZHOU Xunyu.** "Mean-Variance Portfolio Selection with Random Parameters in a Complete Market". *Mathematics of Operations Research* vol.27 no.1, pp.101-120. USA: INFORMS, Linthicum, USA, 2002.02.

<P027041> **LI Duan; QIAN Fucai and FU P. L.** "Variance Minimization Approach for a Class of Dual Control Problems". *Proceedings of the 2002 American Control Conference* pp.3759-3764. Alaska, USA, 2002.03.

<P027106> **CHEN Hong and WAN Y. W.** "Capacity Competition of Make-to-order Firms". *Operations Research Letters* 2002.

<P027112> **CHEN Hong and M. Frank.** "Monopoly Pricing When Customer Queues". *IIE Transactions (Submitted)* 2002.

<P027147> **YANG Christopher Chuen Chi; KWOK S H and YIP Milo.** "Image Browsing for Infomediaries". *Proceedings of the Thirty-fifth Hawaii International Conference on System Sciences* Hawaii, USA, 2002.01.

<P027162> **YEN Jerome and YUEN Lok Tin.** "XML-based Financial Knowledge Management and Tag Generation". *Proceedings of Digital Library IT Opportunities and Challenges in the New Millennium* pp.717-736. Beijing, China: Beijing Library Press, 2002.

<P027164> **C. K. NG, L. Z. LAIO and LI Duan.** "A Globally Convergent and Efficient Method for Unconstrained Discrete-time Optimal Control". *Journal of Global Optimization* vol.23, pp.401-421. 2002.

<P027389> **LEUNG May Yee Janny and YU Alan .** "Quota Allocation by Linear Programming Using a Spreadsheet Solver ". *Asia-Pacific Journal of Operational Research* vol.19, pp.63-70. Singapore: Operational Research Society of Singapore, 2002.05.

<P027414> **GEORGE L. Vairaktarakis; CAI Xiaoqiang and CHUNG-Yee Lee.** "Workforce Planning in Synchronous Production Systems". *European Journal of Operational Research* vol.136, pp.551-572. Elsevier Science BV, 2002.

<P027470> **CHENg F.; ETTL M.; LIN G. and YAO David Da Wei.** "Inventory-Service Optimization in Configure-to-Order Systems". *Manufacturing and Service Operations Management* vol.4, pp.114-132. 2002.

<P027489> **JIANG Haifeng ; LU Hongjun ; WANG Wei and YU Jeffrey Xu.** "XParent: An Efficient RDBMS-Based XML Database System". Paper presented in the International Conference on Data Engineering, organized by IEEE Computer Society. San Jose, 2002.02.26.

<P027513> **LI Xan, ZHOU Xunyu and LIM Andrew Ee Beng.** "Dynamic Mean-Variance Portfolio Selection With No-Shorting Constraints". *SIAM J. Control Optim* vol.40 no.5, pp.1540-1555. USA: Society for Industrial and Applied Mathematics, 2002.01.18.

<P027719> **Lam S. S. and CAI Xiaoqiang.** "Single Machine Scheduling with Nonlinear Lateness Cost Functions and Fuzzy Due Dates". *Nonlinear Analysis: Real World Applications* vol.3, pp.307-316. Pergamon, 2002.

<P02775> **CHAN Ki; LOW Boon-Toh; LAM Wai and LAM Kai-Pui.** "Extracting Causation Knowledge from Natural Language Texts". *Proceedings of 6th Pacific-Asia Conference on Knowledge Discovery and Data Mining, PAKDD 2002* pp.555-560. Taipei, Taiwan: Springer-Verlag Berlin Heidelberg New York, 2002.05.08.

<P028335> **J. Miltenburg; CHENG Chun Hung and YAN Houmin.** "Analysis of Wafer Fabrication Facilities Using Four Variations of the Open Queueing Network Decomposition Model". *IIE Transactions* vol.34, pp.263-272. 2002.03.

<P028341> **WANG Wei; FENG Jianlin; LU Hongjun and YU Jeffrey Xu.** "Condensed Cube: An Effective Approach to Reducing Data Cube Size". *International Conference on Data Engineering* San Jose: IEEE Computer Society, 2002.02.26.

<P028638> **YANG Christopher Chuen Chi; CHEN Hsinchun and HONG Kay.** "Exploring the World Wide Web with Self-Organizing Map". *Proceedings of the International World Wide Web Conference* Honolulu, Hawaii, USA, 2002.05.

<P028644> **LAM Wai and SEGRE Alberto.** "A Distributed Learning Algorithm for Bayesian Inference Networks". *IEEE Transactions on Knowledge and Data Engineering* vol.14 no.1, pp.93-105. USA: IEEE, 2002.01.

<P028732> **LAM Kai Pui.** "Predictability of Intraday Stock Index". *Proc. IEEE Int. Joint Conf. Neural Networks (IJCNN)* vol.3, pp.2156-2161. Honolulu, Hawaii, USA: WCCI'02, 2002.05.

<P028750> **L. Z. LIAO and LI Duan.** "Adaptive Differential Dynamic Programming for Multiobjective Optimal Control". *Automatica* vol.38, pp.1003-1015. 2002.

<P028778> **MENG Mei Ling Helen and SIU Kai Chung.** "Semi-Automatic Acquisition of Semantic Structures for Understanding Domain-Specific Natural Language Queries". *IEEE Transactions on Knowledge and Data Engineering* vol.14 no.1, pp.172-181. 2002.01.

<P028968> **CHEN Hong and WAN Y. W.** "Price Competition of Make-to-Order Firms". *IIE Transactions (Submitted)* 2002.

<P029133> **LO Tin Hang and MENG Mei Ling Helen.** "WAP-Speech: Deriving Synergy between WAP and the Spoken Dialog Interface". *Proceedings of the 11th International World Wide Web Conference* Hawaii, USA, 2002.05.

<P029165> **SAGGION Horacio; RADEV Dragomir; TEUFEL Simone; LAM Wai and STRASSEL Stephanie.** "Developing Infrastructure for the Evaluation of Single and Multi-document

Summarization Systems in a Cross-lingual Environment". *Proceedings of the Third International Conference on Language Resources and Evaluation (LREC)* Las Palmas, Spain, 2002.05.

<P029217> **KWOK S H and YANG Christopher Chuen Chi.** "Watermarking in Online Media E-Business". *Proceedings of the IEEE International Conference on Information Technology: Coding and Computing* Las Vegas, USA, 2002.04.

<P029441> **CHEN Youhua; FENG Youyi and DAVID Simchi-Levi.** "Uniform Distribution of Inventory Positions in Two-echelon Periodic Review Systems with Batch-ordering Policies and Interdependent Demands". *European Journal of Operational Research* vol.140, pp.648-654. 2002.05.03.

<P029591> **LAM Kai Pui.** "Image Coding/Reconstruction and Matching Using a Parallel Distributed Hebbian Architecture". *Proc. IEEE Int. Joint Conf. Neural Networks (IJCNN)* pp.974-979. Honolulu, Hawaii, USA: WCCI'02, 2002.05.

<P029620> **FUNG Pui Cheong Gabriel; YU Jeffrey Xu and LAM Wai.** "News Sensitive Stock Trend Prediction". *6th Pacific-Asia Conference, Advances in Knowledge Discovery and Data Mining (PAKDD)* pp.481-493. Taipei: Springer, 2002.05.06.

<P029660> **Sethi, S.P.; YAN Houmin; Zhang, H. and ZHANG Qing.** "Optimal and Hierarchical Controls in Dynamic Stochastic Manufacturing Systems: A Review". *Manufacturing and Service Operations Management* vol.4 no.2, pp.133-170. 2002.

<P029706> **LEE Jon; LEUNG May Yee Janny and VRIES Sven de .** "Separating Type-I Odd-cycle Inequalities for a Binary Encoded Edge-coloring Formulation". *IBM Research Report* RC22303 (W0201-068). Yorktown Heighrs, New York, USA: IBM Research Division, 2002.01.10.

<P029731> **CHEN Hong; M. Frank and WU O.** "The JIT Inventory Revolution. What Actually Happened to the Inventories of American Companies between 1981-2000?". *Management Science (Submitted)* 2002.

<P029768> **CHANG Eric ; MENG Mei Ling Helen; LI Yuk Chi and FUNG Tien Ying.** "Efficient Web Search on Mobile Devices with Multi-Modal Input and Intelligent Text Summarization". *Proceedings of the Eleventh International World Wide Web Conference (WWW II)* Hawaii, USA, 2002.05.

see also <P016737>, <P018615>, <P027060>, <P02715>, <P027834>

RESEARCH PROJECTS

Please refer to previous issues of this publication for more details of the following ongoing research at the department:

Edition Title/Investigators

2000-01 Open Secure Time-stamping Platform for E-commerce and Protection of Intellectual Properties (EE20003)

✍ HU Stanislaus Yung Chi ● LEUNG Philip Kwong Hon ● LAM Shing Yung Anton ● WONG Siu To ● LEUNG Tak Cheong# ● LING Ka Hong