



The Chinese University of Hong Kong
Non-confidential Abstract of Technology Disclosure

Title:

ASSISTIVE TECHNOLOGY FOR ACTIVE PREVENTION OF ANKLE SPRAINS

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Patent Status:

US Patent Pending

Inventor(s):

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Active Protection for Athletes

Ankle sprains are a constant and painful threat to athletes at every sport and level. Thanks to new technology developed at The Chinese University of Hong Kong, it is now possible to prevent them, using the body's own protection mechanisms. Sensors built into the athlete's shoes can detect when a hazardous twisting movement is happening, and stimulate the leg muscles to contract rapidly, halting the twist before ligament damage can occur.

Ankles in Danger

Ankle injuries, and ligamentous sprains in particular, are extremely common. It is estimated that at least one million ankle injuries occur annually in the U.S. alone, 85% of them sprains. Sprains are particularly likely among athletes participating in sports such as soccer, volleyball and basketball, representing up to 45% of all injuries in certain sports. When ankle injuries occur, they are painful, debilitating, and slow to heal—occasionally requiring surgery. Further, they are likely to recur due to permanent weakening of the joint.

The basic cause of most ankle sprains is tearing of the lateral ligaments—that is, the fibrous tissue holding the bones together on the outer side of the ankle. This is typically caused by sudden rotation of the foot towards the inside. In normal swivelling of the foot, for instance when a person steps onto an outward-sloping surface, the peroneal muscles—those on the outer side of the lower leg—protect the ankle by pulling back on the side of the foot; but if the ankle twists violently, they may be unable to react quickly enough to avert injury.

CUHK's new protective technology works by detecting violent twisting of the ankle, using electronic motion sensors. When such an event occurs, an electrode rapidly stimulates the peroneal muscles of the lower leg, triggering them to contract and preventing damage to the ligaments.

First to the Line

Using electrodes to stimulate muscle contraction is a safe and proven technology, having seen numerous successful implementations in existing products. Training devices for muscle rehabilitation, massage devices, and walking aids for patients with nerve damage, all make use of this approach. However, there are no existing products that use emergency muscle stimulation to prevent ligament damage. This is a compelling opportunity to be the leader in a whole new sector of protective products.

Ready to Build

In order to implement this technology into a usable device, a number of components are required, including a twisting motion sensor, a data processor, electrodes to stimulate the peroneal muscles, and a power supply from small batteries. Researchers at The Chinese University of Hong Kong have developed these components and demonstrated that they protect the ankle effectively.

The complete device may be integrated into some form of athletic apparel such as a sprain-preventative sports shoe. The invention provides all details necessary for construction of a complete functional device.

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