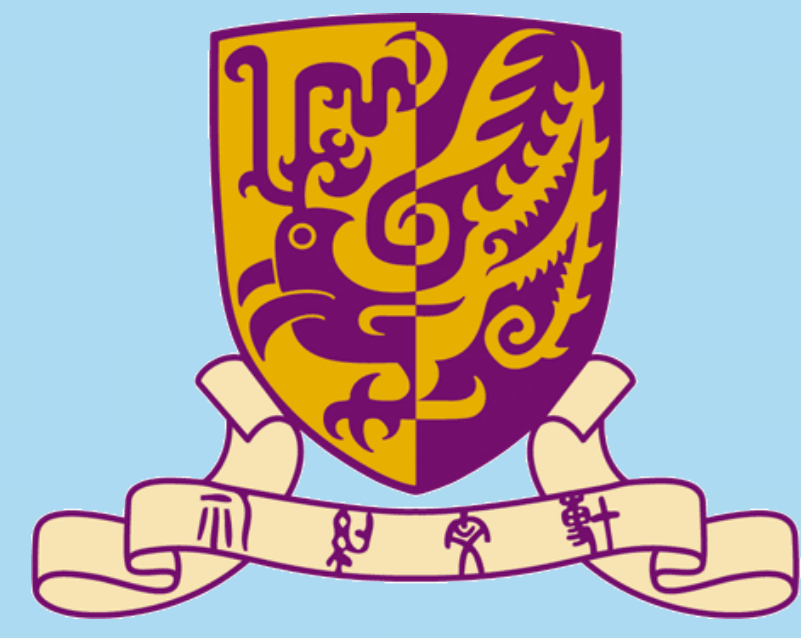


# VR Biomolecules for Learning Molecular Biology



生命科學學院

Pang-Chui Shaw, Queenie Lau,  
Biochemistry Programme, School of Life Sciences,  
Ray Lee, ITSC  
The Chinese University of Hong Kong



## Introduction

While the traditional classroom uses diagrams and models to represent the biomolecules, student engagement in learning molecular biology can be enhanced by application of virtual-reality technologies such that students can manipulate molecules, see the molecular structures in three-dimensional space interactively. This serves to increase their motivation and engagement of learning.

## Objectives

This project is to generate a collection of virtual molecules for Molecular Biology course aiming to help students understand and remember the three-dimensional structures and the molecular interactions between them for carrying out the function.

## What's inside?

1. Mobile app (**VR Biomolecules**) with 22 VR Biomolecules was developed. Users can manipulate biomolecules on mobile phone in 3-D using virtual reality headset.
2. Virtual biomolecules are divided into 7 categories: Purine and pyrimidine base, Nucleotide, Base pairing, Different forms of DNA, Transfer RNA, Ribosome and Other important molecules for molecular biology.
3. Information of the virtual molecules are centralized in e-learning website of the Biochemistry Programme. ([www.bch.cuhk.edu.hk/learnbiochem](http://www.bch.cuhk.edu.hk/learnbiochem))
4. For each biomolecule, **brief descriptions** are posted to website and **revision questions** are posted on Blackboard for related courses. Students can revise what they have learnt by doing the revision questions provided.

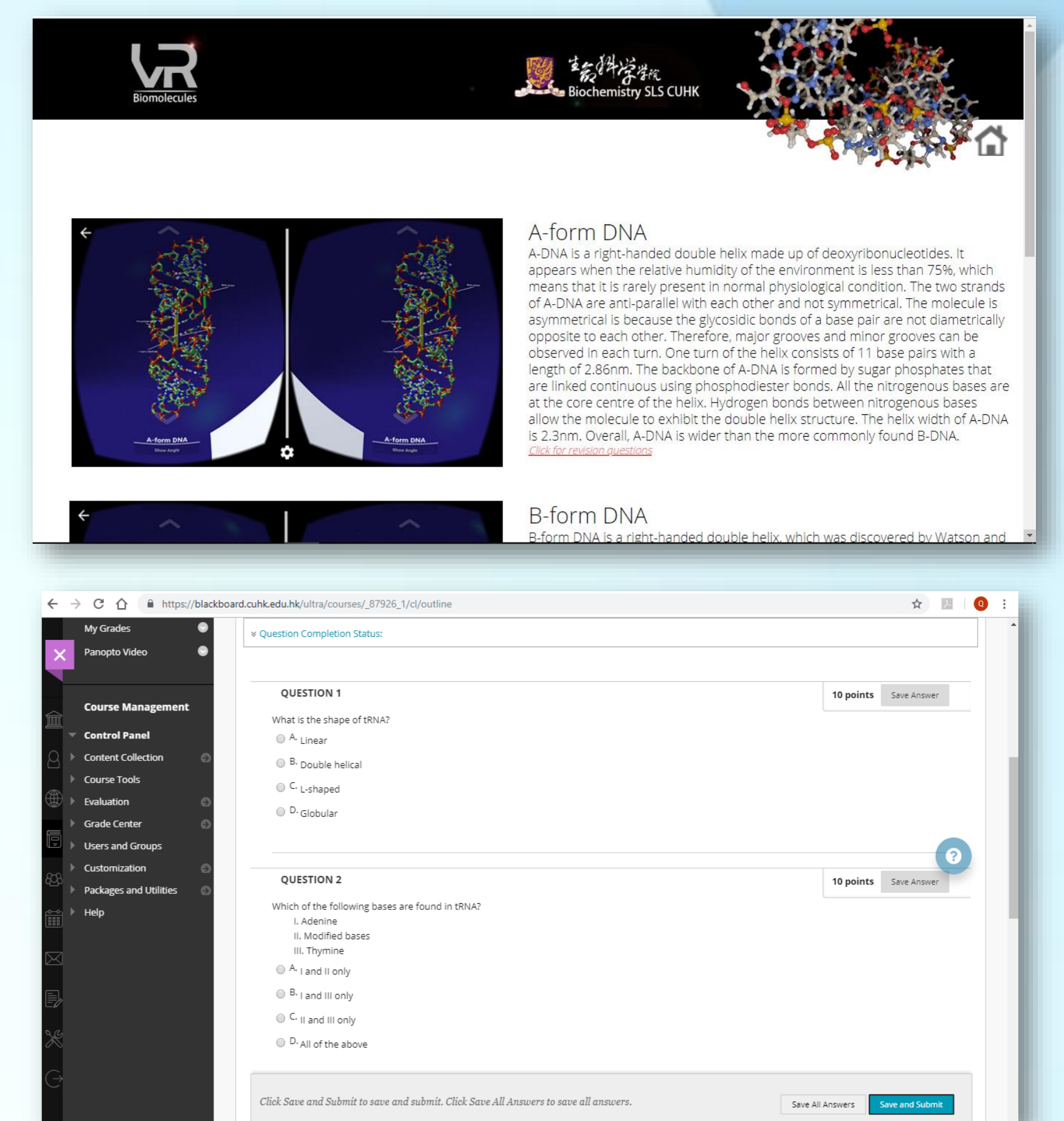
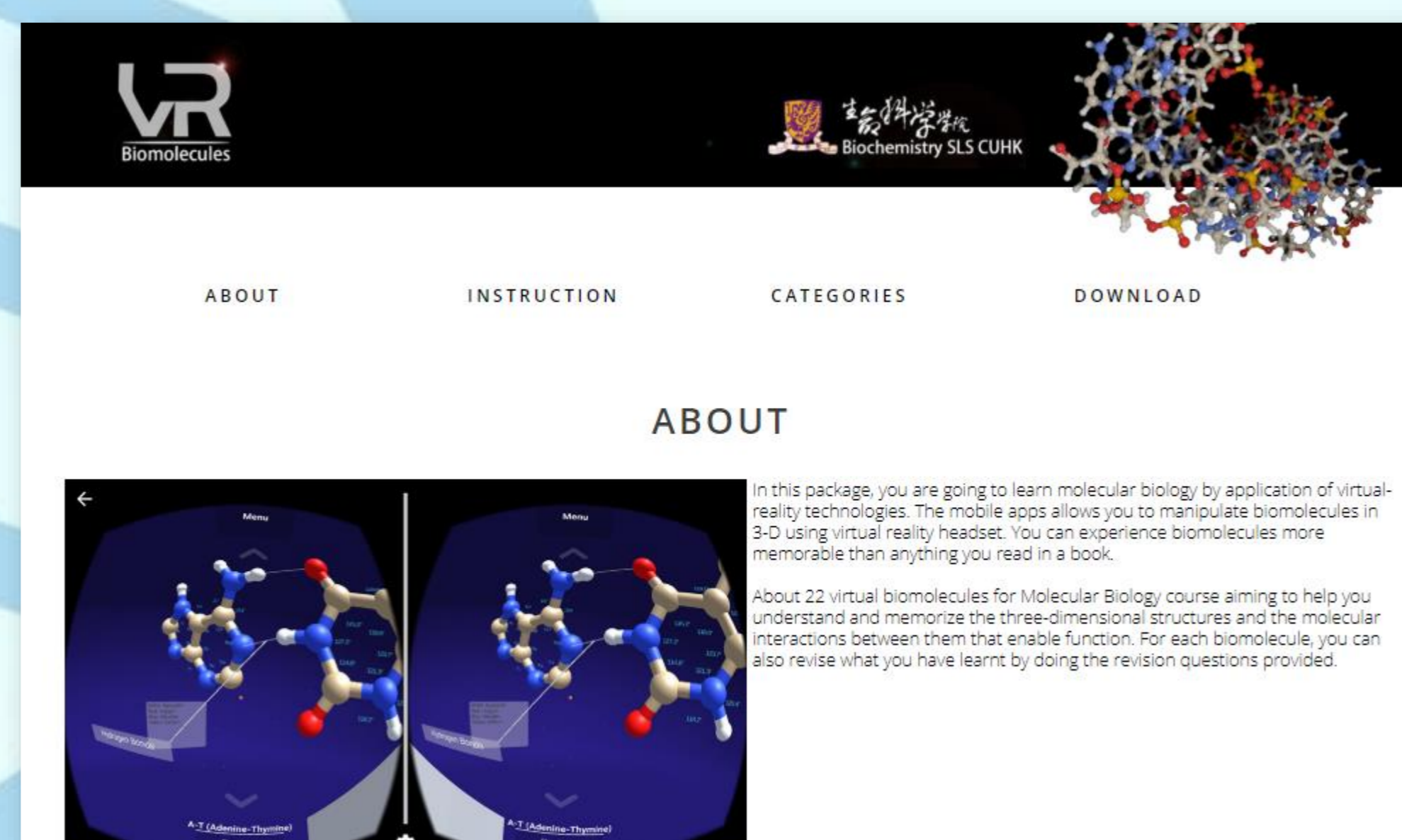


➤ **Download and Install**

For Android:

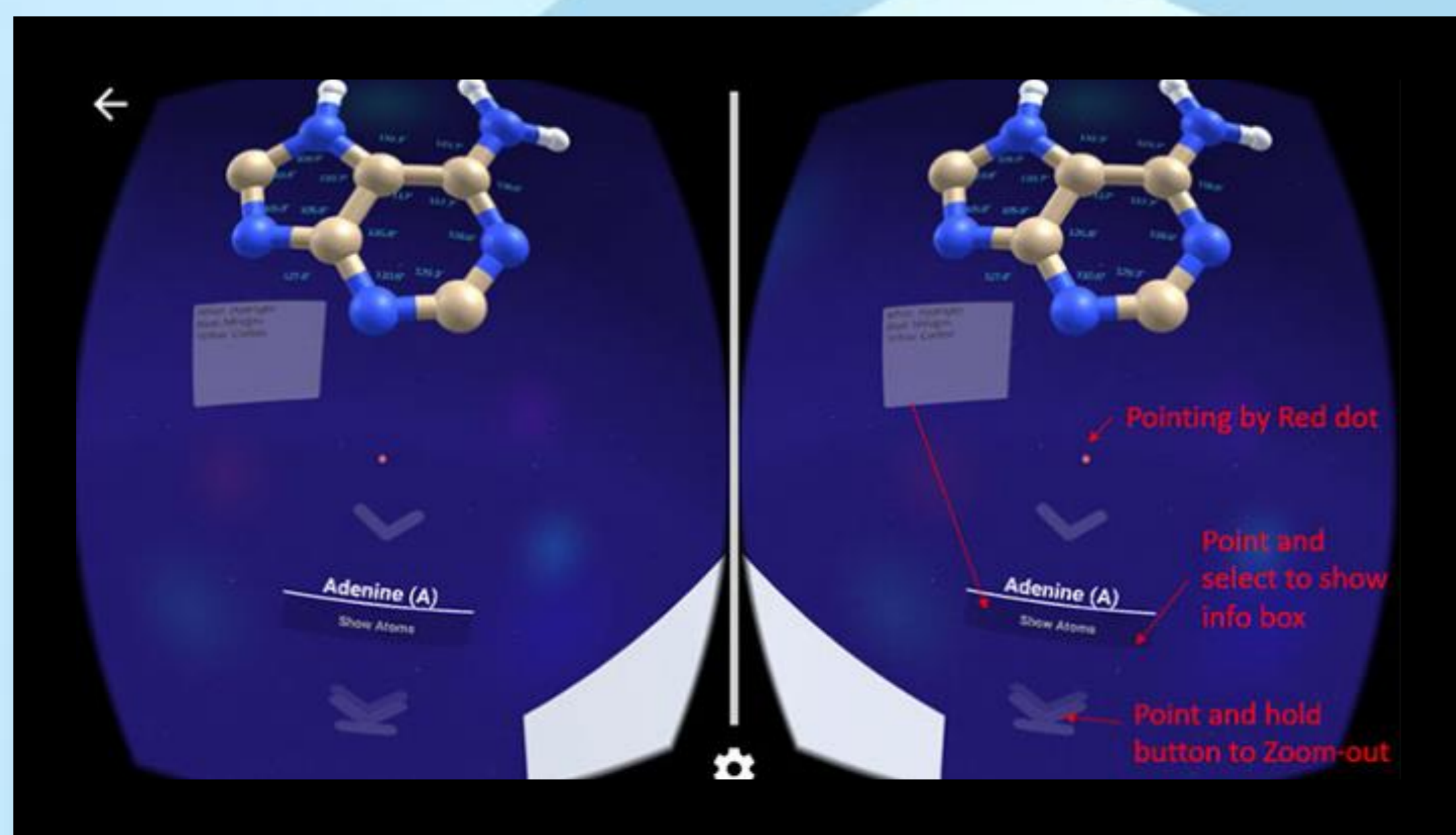


For iOS:



## How's the look and feel?

Virtual biomolecules are labelled for important atoms and dimensions. Use a control button on VR headset to interact with the apps.



## What is the feedback?

A focus group of 21 students studying Molecular Biology was formed in Feb 2018. **76% of them agreed** (52% agreed, 24% strongly agree) that the VR biomolecules increase their motivation and engagement of study. The result on other aspects as stated on below table also showed **positive feedback**.

Agreement with the following statements: (In %)	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Nil	Total
a. VR biomolecules increase my motivation and engagement of learning in my course study.	0%	0%	24%	52%	24%	0%	100%
b. VR biomolecules provide me a fast and flexible way to understand biomolecules.	0%	5%	10%	67%	19%	0%	100%
c. VR biomolecules are suitable for studying at home as pre-class preparation.	0%	0%	38%	33%	24%	5%	100%
d. VR biomolecules are suitable to become part of in-class activity.	0%	14%	14%	48%	24%	0%	100%
e. VR technology is suitable for e-learning modules.	0%	5%	5%	67%	24%	0%	100%
f. The effectiveness of learning biomolecules is enhanced with VR technology.	0%	0%	29%	52%	19%	0%	100%

## How to move forward?

In 2018/19, CUHK Students taking Molecular Biology course (BCHE3050) and Molecular Biology and Recombinant DNA Laboratory (BCHE3650) will be asked to use the app to supplement their studies.

## Acknowledgements

This work was supported by Courseware Development Grant Scheme (CDGS) (2016-17) (Ref: 4170525)