

# ACADEMIC SEMINAR

## ACM Distinguished Speaker Program

### *Disruptive AI Technologies for Molecular Biology and Medicine: DNA Motifs, CRISPR-Cas9 Off-Targets, and Cancer Screening from Blood*

In this talk, I will present my research group contributions in bioinformatics and health informatics in recent years. In particular, the unconventional and disruptive AI technologies are focused.

Firstly, the DNA binding of transcription factors is central to gene regulation and stem cell development. The DNA binding pattern (i.e. DNA motif) elucidation of transcription factors forms the basis for downstream research. Therefore, I will present our breakthroughs in elucidating DNA binding patterns from the protein-coding sequences of transcription factors using AI as well as our synthetic biology approach to synthesize a heterodimeric DNA motif from two monomeric DNA motifs. A DNA motif published on Nature has been rescued.

Secondly, CRISPR-Cas9 is the predominant tool for gene editing and raised substantial concerns on its clinical implications. To avoid any side effect, its off-target predictions are fundamentally essential. I will present our recent work in predicting CRISPR-Cas9 off-targets using deep learning, the latest AI technology.

Finally, I will present our very recent work in screening cancers from blood. I will demonstrate how our proposed AI approach (CancerAIDE) can outperform the existing approach (CancerSEEK) proposed in John Hopkins University. In particular, our approach can double the existing sensitivity from 38% to 77% for the earliest cancer detection (i.e., Stage I) at the 99% specificity level.



## Dr. Ka-Chun Wong

Assistant Professor, Department of Computer Science  
City University of Hong Kong

Ka-Chun finished his PhD degree in Department of Computer Science at University of Toronto (where deep learning AI was popularized in 2010s ) within 3.5 years (2012-13 departmental average: 6 years after master degree) by the end of 2014, after his RGC-funded

MPhil degree (his academic family tree). He serves as the associate editors of open-peer-review *BioData Mining* and *Computer Modeling in Engineering and Sciences*. He is also on the editorial boards of *Applied Soft Computing*, *Journal of Biomedical Informatics*, and *PeerJ Computer Science*.



Date: 17 June 2021 (Thursday)

Time: 15:30 - 17:00 (HK time)

Venue: Zoom meeting  Meeting ID: 985 0204 4736

link: <https://lingnan.zoom.us/j/98502044736?pwd=N21YSIVQd0FnK3BaSE0yMkRvdmZvQT09>

Language: English

\*\*\* All are Welcome \*\*\*