THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Department of Computing
電子計算學系

# COMP RESEARCH STUDENT SEMINAR

**Date : 18 January 2024 (Thu)**
**Time : 10:30 am - 11:30 am**
**Venue : FJ304 (Face-to-face)**

## CydiOS: A Model-based Testing Framework for iOS Apps

### Abstract

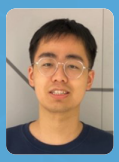
To make an app stand out in an increasingly competitive market, developers must ensure its quality to deliver a better user experience. UI testing is a popular technique for quality assurance, which can thoroughly test the app from the users' perspective. However, while considerable research has already studied UI testing on the Android platform, there is no research on iOS. This paper introduces CydiOS, a novel approach to performing model-based testing for iOS apps. CydiOS enhances the existing static analysis to build a more complete static model for the app under test. We propose an approach to retrieve runtime information to obtain real-time app context that can be mapped in the model. To improve the effectiveness of UI testing, we also introduce a potential-aware search algorithm to guide testing execution. We compare CydiOS with four representative algorithms (i.e., random, depth-first, stoat, and ape). We have evaluated CydiOS on 50 popular apps from App Store, and the results show that CydiOS outperforms other tools, achieving both higher code coverage and screen coverage. We open source CydiOS at https://github.com/SoftWare2022Testing/CydiOS, and a demo video can be found there.

**Mr Shuohan WU**
PhD student
Department of Computing

**About the Speaker**

Shuohan WU received his Bachelor's degree in Computer science from Zhejiang University of Technology in 2019, followed by a Master's degree from The Hong Kong Polytechnic University in 2021. He is currently pursuing his PhD in the Department of Computing at The Hong Kong Polytechnic University, under the supervision of Prof. Daniel Xiapu LUO. His research interest focuses on program analysis, software testing, and Web3 security.

## NeRF2: Neural Radio-Frequency Radiance Fields



**Mr Xiaopeng ZHAO**
PhD student
Department of Computing

**About the Speaker**

Xiaopeng ZHAO received a B.E. degree from the School of Management and Engineering at Nanjing University, China, in 2020. He is now a PhD student at the Department of Computing at The Hong Kong Polytechnic University. His research interests include AI-driven wireless technologies, including indoor localization, channel prediction, etc. He has received the best paper awards (runner-up) from ACM Mobicom and IEEE SECON.

### Abstract

Although Maxwell discovered the physical laws of electromagnetic waves 160 years ago, how to precisely model the propagation of an RF signal in an electrically large and complex environment remains a long-standing problem. The difficulty is in the complex interactions between the RF signal and the obstacles (e.g., reflection, diffraction, etc.). Inspired by the great success of using a neural network to describe the optical field in computer vision, we propose a neural radio-frequency radiance field, NeRF2, which represents a continuous volumetric scene function that makes sense of an RF signal's propagation. Particularly, after training with a few signal measurements, NeRF2 can tell how/what signal is received at any position when it knows the position of a transmitter. As a physical-layer neural network, NeRF2 can use the learned statistic model and the physical ray tracing model to generate a synthetic dataset that meets the training demands of application-layer artificial neural networks (ANNs). Thus, we can boost the performance of ANNs by the proposed turbo-learning, which mixes the true and synthetic datasets to intensify the training. Our experiment results show that turbo-learning can enhance performance with an approximate 50% increase. We also demonstrate the power of NeRF2 in the field of indoor localization and 5G MIMO.

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