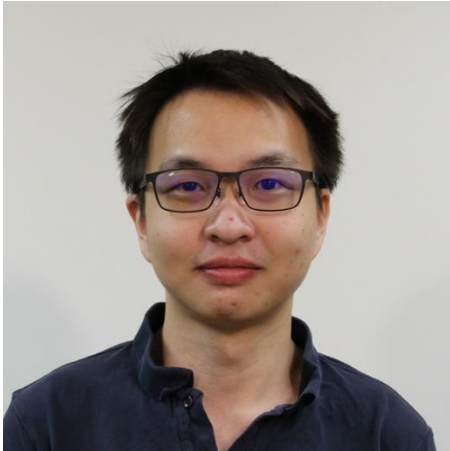




DISSERTATION DEFENSE



Hsun-Wei Cho

Enabling Direct Bluetooth-
WiFi Communications

Monday, April 29, 2024

10:00am – 12:00pm

3725 Beyster

Hybrid – [Zoom](#)

ABSTRACT: WiFi and Bluetooth are two of the most prominent wireless technologies. Since WiFi and Bluetooth employ different modulations and medium access mechanisms, they are incompatible, each requiring separate and different hardware components.

This thesis investigates this long-standing incompatibility and shows that direct communication between WiFi and Bluetooth chips is possible. It achieves direct waveform compatibility down to the physical-layer, which leads to the benefits of higher throughput, better interoperability and practicality. BlueFi is the first work that enables direct communication from real, widely-used WiFi chips to unmodified Bluetooth chips. BlueFi carefully crafts 802.11n packets on the transmitter side so that conventional Bluetooth receivers can accurately decode the waveform as legitimate Bluetooth (GFSK) packets. FLEW is the first to demonstrate bidirectional communication between WiFi and FSK chips. At its core, FLEW leverages the signal processing property of WiFi's DSSS modulation so that a carefully configured FSK demodulator can be also used as a WiFi demodulator. Unify focuses on high system integration and is a single-chip solution. Unify demonstrates such a bidirectional Bluetooth-WiFi communication on extremely popular FSK and BLE SoCs (System-on-a-Chip). DREW addresses the challenges of emulating WiFi operations on newer ultra-low-power (ULP) Bluetooth chips and doubles the downlink throughputs with its unique capability of QPSK demodulation. Finally, BBC applies the principle of Bluetooth-WiFi communication to other heterogeneous devices and enables direct communication between Bluetooth Classic and BLE devices.

CHAIR: Prof. Kang G. Shin