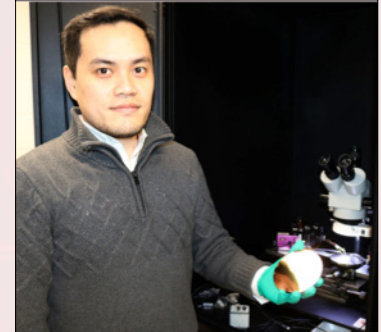


# Nebraska Center for Materials and Nanoscience

## 2019 Spring Seminar Series

## Pai-Yen Chen

### *Toward Batter-Free and Low-Noise Wireless Micro/Nano-Sensors*



Healthcare internet-of-things composed of wireless micro-/nano-sensors, with advantages like enhanced sensitivity and extreme miniaturization, could ever have an impact on the already-established (albeit imperfect) healthcare landscape. However, given by their small physical sizes, improving the detection limit of compact and fully-passive (battery-free) wireless sensors is often hindered by the poor signal-to-noise ratio (SNR) and the small effective aperture area for reception of radio waves (i.e., small backscattering cross-sections).

In the first part of my talk, I will give an overview of our recent progress in passive “harmonics sensors,” which are inspired from the concept of “harmonic radar” and can effectually suppress background clutters, echoes and cross-talks to achieve a good SNR in wireless measurements.

In the second part of my talk, I will present a novel all-graphene harmonic sensor that consists of a chemically-reconfigurable RF mixer built from graphene transistors and a transparent graphene RF antenna. This graphene-based wireless sensor could be compact, self-powered, transparent and flexible, thus paving the way towards potential uses in high-sensitivity smart contact lenses and body-centric monitoring systems.

Dr. Pai-Yen Chen is an Associate Professor in the Department of Electrical and Computer Engineering at the University of Illinois at Chicago. He received his Ph.D. degree from the University of Texas at Austin in 2013. He has been involved in multidisciplinary research on high-frequency electronics, applied electromagnetics, wireless micro/nano-sensors and integrated systems, plasmonics and nanophotonics. He has published tremendous amount of journal papers and conference papers, including Nature and Nature Electronics, and 9 US patents. He has received quite a few prestigious awards, including NSF CAREER Award, SPIE Rising Researcher Award, IEEE Sensors Council Early Career Award, IEEE Raj Mittra Travel Grant (RMTG) Award, ACES Early Career Award, Young Scientist Awards from URSI General Assembly and URSI Commission B: Electromagnetics, Air Force Research Laboratory Faculty Fellowship, National Argonne Laboratory Director’s Fellowship, Donald Harrington Fellowship, Taiwan Ministry of Education Study Abroad Award, United Microelectronics Corporation Scholarship, and quite a few student paper awards and travel grants from major IEEE conferences, including the USNC-URSI Ernest K. Smith Student Paper Award. He currently serves as Associate Editor of IEEE Sensors Journal, IEEE Journal of Radio Frequency Identification (IEEE JRFID), IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology (IEEE-JERM).



**March 27, 2019 | 4 p.m. | 136 Jorgensen Hall**

Refreshments in 1st floor vending area at 3:45

**Host: Christos Argyropoulos**

Department of Electrical & Computer Engineering

