NIT Electromagnetic Research Seminar 2025

Date/Time: **4th November (Tue), 2025 10:30 - 11:40**

Opening remarks 10:30-10:35
Talk session 10:35-11:35
Closing remarks 11:35-11:40

Place: **Building 4 Conference Room 2 (225)**

(Online: Join Microsoft Teams with team code 6jidz7j)

Electromagnetic Fingerprint-Based Hardware Security and Cryptography

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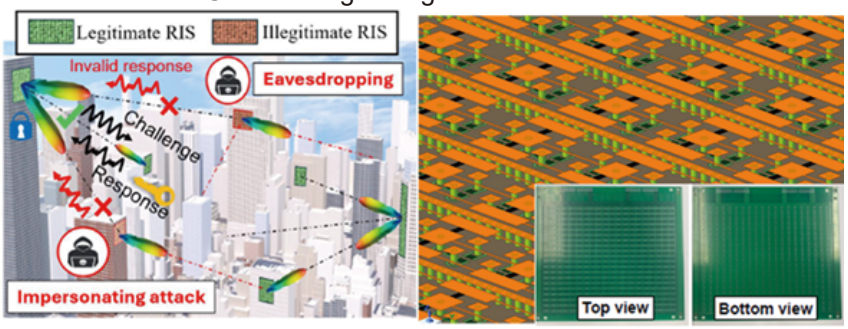
Summary:

With the rapid proliferation of interconnected electronic systems, such as the internet of things (IoTs) and machine-to-machine (M2M) networks, identification and authentication of devices exposing to various cyber threats have become critically important. This talk will introduce the concept of “electromagnetically unclonable functions (EMUF),” which exploits the unique and unclonable electromagnetic signatures of radio-frequency (RF) antennas and key components for identification and authentication of wireless devices, and even cryptographic random number generation. I will discuss how naturally-occurring manufacturing variations may give rise to distinct electromagnetic responses in temporal, spectral, and spatial domains, which can be captured, analyzed and classified (with the aid of AI) to form a unique fingerprint for each device. Special attention will be given to electromagnetic systems exhibiting exotic singularities, such as exceptional points (EPs), bound states in the continuum (BICs), and electromagnetically-induced transparency (EIT), for which high entropy and stochastic behaviors near these singular points can be leveraged to implement EMUFs as reliable hardware security primitives. I will present our recent findings on strong and reconfigurable EMUFs generated from RF antennas, oscillators, mixers, and intelligent reflecting surfaces, with experimental evidence. These EMUFs offer lightweight and low-cost solutions that are resistant to machine learning-based cloning, spoofing, and reverse engineering, thus unlocking new possibilities in hardware security, anti-counterfeiting, wireless access control, secure wireless communications, and post-quantum cryptography (PQC).



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※学外からの参加をご希望の方は下記までご連絡をお願い致します。