KD Kang: Security in Wireless Networks and Cyber Physical Systems

Our research is twofold: supporting security and privacy in 1) wireless networks and 2) cyber physical systems.

- Wireless networking is revolutionizing communication; however, it is introducing new challenges in terms of security and privacy. To address the problem, we are investigating new approaches to *lightweight, distributed* security and privacy solutions for key services such as routing, localization, and data collection. To support network-wide security, we are also exploring *compositional techniques* to support strong-enough, usable security for an application of interest by composing security modules without inadvertently introducing new security threats or vulnerabilities, while supporting the specified functionality with minimal interference or disruption.

- Many networked embedded systems, such as smart homes or smart electric grids, directly interact with physical systems. As these systems may directly affect the security and safety of individuals and the society, they are attractive targets for attack. We are investigating how to *leverage unique dynamics of physical syst*ems to detect deviations from normal behaviors—desirable or expected behaviors—of CPS such as smart homes or electric grids. We are also exploring how to model and simulate the physical as well as cyber system dynamics to *divert attacks to a CPS honeypot*, while protecting the real CPS and collecting attack patterns to enable further analysis.