Privacy Attacks on Internet of Things and Voice Over IP Based on Encrypted Network Traffic

Even with secured encryption, network traffic could still expose serious private information. In this talk, Dr. Zou will present two realistic privacy attack threats even when the network traffic is encrypted and secured. In the Internet of Things (IoT), an attacker could eavesdrop on Wi-Fi traffic to know what IoT devices exist in a home or business, including their working status and brands. In voice over IP, an attacker could infer a customer’s detailed actions when calling an automated phone service.

Dr. Zou received his Ph.D. from the University of Massachusetts at Amherst, and MS and BS degrees from the University of Science and Technology of China. He serves as the program coordinator for the MS in Digital Forensics program. His research interests are cybersecurity and computer networking. Dr. Zou has published more than 100 peer-reviewed research papers, has more than 7,000 Google Scholar citations and is a senior member of the Institute of Electrical and Electronics Engineers.
Laser-Assisted Nanoparticle Deposition and Doping of Semiconductors for Sensor Fabrication

Thermofluidic interactions between lasers and nanoparticle droplets form the foundation for creating novel device structures at low costs. Two advanced laser techniques, nanoparticle electrospray laser deposition and laser doping, will be discussed. While the former technique enables additive manufacturing of novel structures using nanoparticles, the latter paves the way for fabricating a new type of photodetector for detecting infrared radiation, including the midwave infrared (MWIR, 3-5 mm) spectral range. The laser-doped detectors operate under an optical principle in contrast to conventional electrical detectors. Various applications of MWIR photodetectors include pollution detection, industrial process monitoring, chemical forensics, chemical and biological warfare, and non-invasive medical diagnostics.

Dr. Kar received in Ph.D. in physics from the University of Illinois at Urbana-Champaign. He conducts research in the area of laser-matter interactions for advanced materials processing. He is a fellow of the National Academy of Inventors, a fellow of the Laser Institute of America and the co-author of “Theory and Application of Laser Chemical Vapor Deposition.”

Defect-Laden 2D Materials for Conversion of Synthetic Gas to Higher Alcohols: Insights from Theory and Experiments

There is an ongoing quest for cheap and abundant catalysts that would facilitate the hydrogenation of CO2, an abundant greenhouse gas in the Earth’s atmosphere, and CO, a poisonous exhaust, into fuels and chemicals traditionally derived from petroleum. The recent popularity of 2D materials has also turned attention to their feasibility as promising catalysts for a variety of reactions. Dr. Rahman will share results of collaborative computational and experimental examinations of the conversion of synthetic gas to methanol, ethanol and other value-added products on two 2D materials: molybdenum disulfide and hexagonal boron nitride. She will highlight the important role defects play, without which the basal planes of these materials would seem inert.

Dr. Rahman received her Ph.D. in physics from the University of Rochester. Her multidisciplinary research interests are computational design of functional nanomaterials through microscopic understanding of their physical and chemical properties based on first principles. She has led the effort in the physics department to transform undergraduate instruction through evidence-based, active learning strategies. Dr. Rahman is active with PhysTEC and the Bridge Program of the American Physical Society to help prepare physics majors for careers in teaching and to recruit graduate students from underrepresented minority group into physics. She works closely with experimental groups worldwide, who help make her research relevant.