Announcing the Final Examination of Mahmudur Khan for the degree of Doctor of Philosophy

Time & Location: April 27, 2018 at 9:00 AM in HEC 356
Title: Autonomous Discovery and Maintenance of Mobile Free-Space-Optical Links

Free-space-optical (FSO) communication has the potential to play a significant role in future generation wireless networks. It is advantageous in terms of improved spectrum utilization, higher data transfer rate, and lower probability of interception from unwanted sources. FSO communication can provide optical-level wireless communication speeds and can also help solve the wireless capacity problem experienced by the traditional RF-based technologies. Despite these advantages, communications using FSO transceivers require establishment and maintenance of line-of-sight (LOS). We consider autonomous mobile nodes (Unmanned Ground Vehicles or Unmanned Aerial Vehicles), each with one FSO transceiver mounted on a movable head capable of scanning in the horizontal and vertical planes. We propose novel schemes that deal with the problems of automatic discovery, establishment, and maintenance of LOS alignment between these nodes with mechanical steering of the directional FSO transceivers in 2-D and 3-D scenarios. We perform extensive simulations to show the effectiveness of the proposed methods for both neighbor discovery and LOS maintenance. We also present a prototype implementation of such mobile nodes with FSO transceivers. The potency of the neighbor discovery and LOS alignment protocols is evaluated by analyzing the results obtained from both simulations and experiments conducted using the prototype. The results show that, by using such mechanically steerable directional transceivers and the proposed methods, it is possible to establish optical wireless links within practical discovery times and maintain the links in a mobile setting with minimal disruption.

Major: Computer Engineering

Educational Career:
Bachelor's of Electrical and Electronic Engineering, BS, 2011, Bangladesh University of Engineering and Technology
Master's of Computer Science and Engineering, MS, 2015, University of Nevada, Reno

Committee in Charge:
Murat Yuksel, Chair, Electrical and Computer Engineering
Damla Turgut, Associate Professor, Computer Science
Yaser Fallah, Associate Professor, Electrical and Computer Engineering
Rickard Ewetz, Assistant Professor, Electrical and Computer Engineering
Boo Hyun Nam, Associate Professor, Civil, Environmental, and Construction Engineering

Approved for distribution by Murat Yuksel, Committee Chair, on April 11, 2018.

The public is welcome to attend.