FLORIDA ATLANTIC UNIVERSITY
COLLEGE OF ENGINEERING & COMPUTER SCIENCE

2018 Middle School Summer Engineering Technology Program

Building Smart Cities

This camp focuses on the exploration of sensing technologies and the Internet of Things (IoT) that are revolutionizing the management and delivery of services around the world. Through hands-on activities campers will learn about applying sensor hardware, computing tools, and analytical techniques in large-scale sensor network applications, such as smart gird and smart transportation systems. Campers will be enlightened, noticing interesting science and engineering applications encountered in their daily life that can make cities more livable, efficient, sustainable, and safer.

Offered: Week 2: June 18 – 22
Instructors: Yufei Tang, Ph.D., and Jinwoo Jang, Ph.D.

Schedule:

Day	Morning Session	Afternoon Session
Monday	Introduction to Smart Cities • Smart cities applications • Quick demonstration and hands-on experience with sensors on smart phones • Connection between sensors and human perspectives • Hands-on smartphone sensing activities	Vibration and Sound Sensing • Periodic function – pendulum experiment • Go outside to find periodic motions • Frequency and period • Resonance • Smart structure
Tuesday	Smart Grid • Smart power grid overview: electric grid structure, power generation, and sensor networks for the smart grid • Different sources and forms of energy and alternative energy (wind, hydro, and solar) • Demonstrate electric circuits with breadboards and their relationship with power grid	Hands-on with Wind Power Generation • Build a circuit powered by wind turbine
Wednesday	Vision Sensing – Image and Video • Resolution and frame rate • RGB mixing experiment with smartphone • Build images based on matrices • Play with campers' own portrait images (edge detection, face recognition, and image rotation)	GPS Positioning • Satellite communication • Map projection (punching out the globe cut-out) • Geographic coordinate system • Collect GPS data and visualize on Google maps
Thursday	The Internet of Vehicles • Demo: Vehicle sensor network (golf-cart) • Vehicle-to-Vehicle, Vehicle-to-Infrastructure, or Vehicle-to-Grid (V2X)	Hands-on with Electrical Vehicles • Build an electrical vehicle driven by solar panel
Friday	Building Your Own Smart City • Modeling and simulating a smart city using computer aided-design	I-SENSE Lab Tour • Pizza party • I-SENSE demonstration lab tour • Special lecture from an I-SENSE engineer