Low-Cost Networks for Environmental Monitoring

Short Course Organizer

Udaysankar Nair

AMS Committee on Measurements

Saturday, 22 January

Time	Topic	Instructor/Speaker
08:00-08:30 AM	Introduction/laptop-Raspberry Pi setup	U. Nair, University of Alabama, Huntsville
08:30-09:15 AM	Introduction to low-cost computing platforms and sensors	U. Nair, University of Alabama in Huntsville
09:15-10:15 AM	Meteorological and Soil Sensors	C. Phillips/U. Nair, University of Alabama in Huntsville
10:15-10:30 AM	Break	
10:30-12:00 PM	Meteorological and Soil Sensors	C. Phillips/U. Nair, University of Alabama in Huntsville
12:00-01:00 PM	Lunch Break	
01:00-2:30 PM	Solar power, communications and data-logging	N. Perlacky, University of Alabama in Huntsville
02:30-02:45 PM	Break	
02:45-4:15 PM	Air Quality Sensors, Survey of low-cost sensors and brainstorming	U. Nair, University of Alabama in Huntsville
4:15-4:20	Break	
04:20-05:00 PM	Low-cost trace gas pollution network	R. Cohen, University of Berkley, CA

Introduction to low-cost computing platforms and sensors

This lecture/hands-on session will introduce participants to microcontrollers, single-board computers, and general purpose input/output (GPIO) pins to interface with sensors. The different communication protocols used for interfacing with the sensors

will be illustrated using the Raspberry Pi. Analog to digital conversion and use of voltage divider circuits will be discussed.

Meteorological & Soil Sensors

Hands-on exercises for interfacing with temperature, pressure, humidity, wind, soil moisture, and soil temperature sensors with Raspberry Pi.

Solar Power, Communications and Data Logging

Designing solar power systems, wireless communications, and hands-on exercises for using Python client-server software for building low-cost environmental sensor networks.

Survey of low-cost sensors

A brief survey of commercial-off-the-shelf (COTS) sensors useful for environmental monitoring will be provided. This session will also include a brainstorming session on how COTS sensors could be utilized to build more complex environmental monitoring systems.

Low-cost trace gas pollution network

This guest lecture will present on the use of high-density, low-cost trace gas pollution sensors network for research. Specifically, this lecture will address novel methods used for overall calibration of the network.