



ARRL Education & Technology Program Teachers Institute on Wireless Technology Remote Sensing & Data Gathering (TI-2)

Instruction addresses the following learning units:

- The basic electronics of various sensors likely to be used in the classroom (temperature, pressure, humidity, ozone, GPS)
- The basic microcontroller techniques used to access and process the signals produced by the sensors
- The basic intra-sensor-package communications techniques used to connect the sensors of the packages to the controlling microcontroller
- The basics of the science of data linking radios that connect the sensor packages remotely to the users, including the use of APRS as a ham radio data link system for remote sensing
- The mathematics and math related technologies (graphing calculators and Excel spreadsheet programs) needed to manipulate the raw data collected into meaningful measurements
- Demonstrations of the various delivery and deployment methods for remote sensing including water and land based buoy system, high altitude balloon systems, satellite based system, and earth bound and planet-bound robot systems
- Discussions on the liabilities, dangers, and safety related to projects such as remote buoys and high altitude balloons



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Agenda 8:00 - 4:00 pm Daily

Monday:

How do remote sensors work? Understanding the science and electronics of a selection of sensors.

Tuesday:

Programming techniques to interface/manage selected sensors. APRS equipment set up and operations. Using amateur radio communications (APRS and packet) with sound card based software to transmit commands, track and receive data. Construction of the teachers' personal radio buoy system.

Wednesday:

Practical classroom applications for using remote sensors to do real science. Applications examined will include a sea buoy, Sea Perch robot, the Boe-Bot® land robot, and high altitude balloons.

Thursday:

Introduction to the Mars-Lander/Marine Amateur Radio Robotics Exploration Activity (MAREA)

As time permits, analyzing telemetry from amateur radio satellite experiments including the FUNcube Materials Science Experiment and other telemetry. Future satellite to classroom opportunities including satellite communication, wobble experiment, and Satellite Attitude Manipulation System (SAMS).