

Data logging basics and Campbell loggers

Tues, 13:30

Kevin Wang and Matthew Conley

- I. Introduction
 - A. Objective: to convert phenotypic traits to digital information
 - B. Phenotypic data collection
 1. Input
 2. Sensing
 3. Signal processing
 4. Data logging
 5. Data presentation
 6. Output
 - C. Data acquisition and logging units
 1. Dataloggers (i.e. CS CR3000)
 2. PC-based data-acquisition devices (i.e. National Instruments 6008 Data Acquisition (DAQ) board)
 3. Microcontrollers (i.e. Arduino Mega 2560)
 4. Programmable Logic Controller (i.e. MicroLogix 1000 PLC)
 5. Wireless “motes” (i.e. CrossBow MicaZ)
- II. Campbell Scientific Dataloggers
 - A. Stand-alone data acquisition system
 - B. Signal processing: analog/digital inputs
 - C. Control capability
 1. Analog/digital outputs
 2. Excitation outputs
 - D. Communication
 1. Serial ports
 2. CS I/O ports
 3. Radio
 - E. Storage
 1. Internal RAM
 2. Peripheral storage module
 - F. Programming: CRBasic Editor in LoggerNet
- III. Classic Campbell Scientific Dataloggers
 - A. CR206(x)
 1. The smallest and cheapest logger
 2. For use with a few remote sensors
 3. Radio or satellite communication options available
 - B. CR800 Series
 1. For use when a few measurement channels are needed
 2. No CF card memory expansion
 3. LCD display
 - C. CR1000:
 1. Most common CS logger and very versatile

2. A long development and usage history
 3. Operating system embedded
 4. File operation enabled
 - D. CR3000
 1. For use in multiple applications
- IV. Campbell Scientific CR3000 Micrologger
 - A. Power: 12V battery or solar options
 - B. Input ports: 28 single ended analog inputs, 4 pulse counters and digital I/O
 - C. Output ports: 5V and 12V excitation, switched voltage and current sensor excitation
 - D. Communication ports: RS232, COM, CS I/O
 - E. Storage: 4MB RAM with expandable CF card storage module
- V. Data logging on the Proximal Sensing Car Mark1 (PSCM1) phenotyper
 - A. Sensors integration: CR3000, GPS, 2 CropCircle sensors (GeoScout), 3 IRT sensors, and an ultrasonic sensor
 - B. PSCM1 in F105 field, Maricopa, AZ, 2014
- VI. Tips for CS datalogger users
 - A. Power expansion options, batteries, and chargers
 - B. Grounding and shielding
 - C. Selection of proper cabling
 - D. Keypad and LCD elements
 - E. Communication protocol options
 - F. Enclosures and insulation
 - G. Mitigation of dust, moisture, vibration and rodents