In-Cave Data Logger Project (DLP)
Sponsored by the
Central Connecticut Grotto

www.ctcavers.org
www.ctcavers.org/datalogger

This project is a work in progress, is frequently updated, and done entirely by unpaid volunteers. For more information, updates, and other documents, please contact info@ctcavers.org and put “CCG Data Logger” in the subject line. If you don’t get a reply within a week, please call 860-621-2080.

CCG DLP - Logger Hardware

Contents:
- Sensors
- Connection Overview
- Component Overview part 1
- Component Overview part 2
- Software Overview
Sensors

Human Presence
- Light (Human presence) Sensor
- Sound (Human presence) Sensor
- Motion (Human presence) Sensor

Bat Presence
- Bat Sonar Sensor

Ambient Conditions
- Water Level Sensor
- Temperature Sensor
- Humidity Sensor
- Wind (air flow) Sensor
Connection Overview

Reader / Programmer

Sensor cable can be un-plugged from logger at logger.

Sensor

Sensor

Sensor

Logger

External supplemental battery (optional)

Reader / Programmer cable can be un-plugged from logger at logger.

Connected to program the logger. Connected to retrieve data.

Reader / Programmer

Wireless Interface (Bluetooth, etc)

USB Interface or RS-232 Interface

Computer

PDA

KEY:
- Physical cable connection
- Non-contact connection

Non-contact connection
Component Overview part 1

Logger
- Microcontroller
- EEPROM for data collection
- Crystal/Oscillator
- Sensor functioning indicator LED
- Logging on/off indicator
- Sensitivity adjustment
- Battery

Microchip 16F690 Microcontroller
- 8 kb flash for programming
- 368x8 bytes RAM

Microchip 24LC1024
- 1024 i2C
- used for real time clock
- 32kHz crystal

Indicator that sensor is working and logging
Optional, may be needed to fine tune sensor, may need more than one for multi sensors
Internal battery, may also have connection for external battery

External supplemental battery (optional)

Sensor (on next page)

Reader/Programmer (on next page)
Component Overview part 2

Note on Sensor Processing:
The signal from some sensors may need to be processed before it reaches the microcontroller. Examples include amplification, filtering, and sample and hold (aka signal stretching).

The Sensor, Logger, and Reader/Programmer are separate units. The Sensor (or multiple sensors) is attached to the Logger, and these go into the cave. One Reader/Programmer can be used with many Loggers.
Software Overview

No programmable components

Sensor

Logger

User’s Computer

Logger Setup (below are examples, not a sequence)
- Initiate logging
- Set date
- Sensor selection, logging frequency and other parameters
- Clear existing data

Above is done by the user prior to placing the unit at a location

Below is done by the user after retrieving the logger

User’s Computer

Data Download
- Transfer data from logger to user’s computer

User’s Computer

Data Reading
- Microsoft Winform application in C#

Analysis and Reporting
- Microsoft Access and Microsoft Excel

End-User Application Development

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