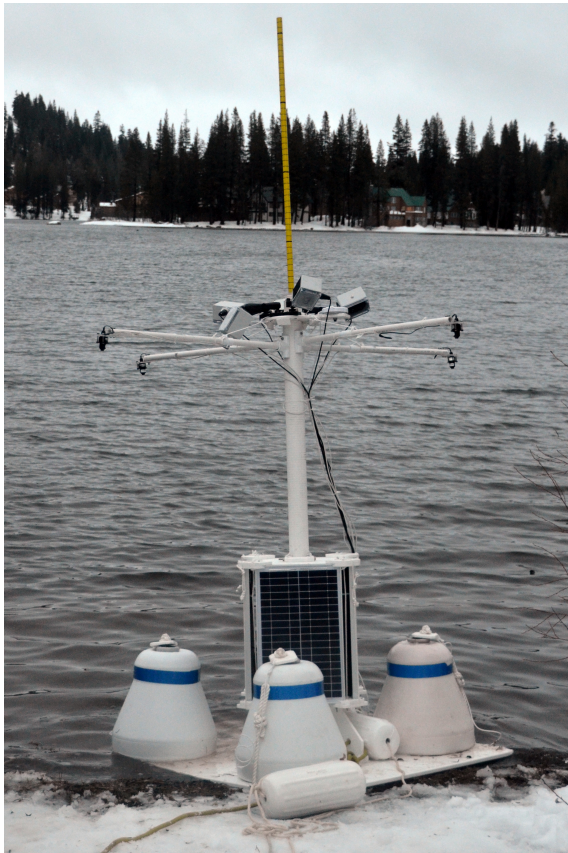


Buoy based multi-sensor, high resolution camera system



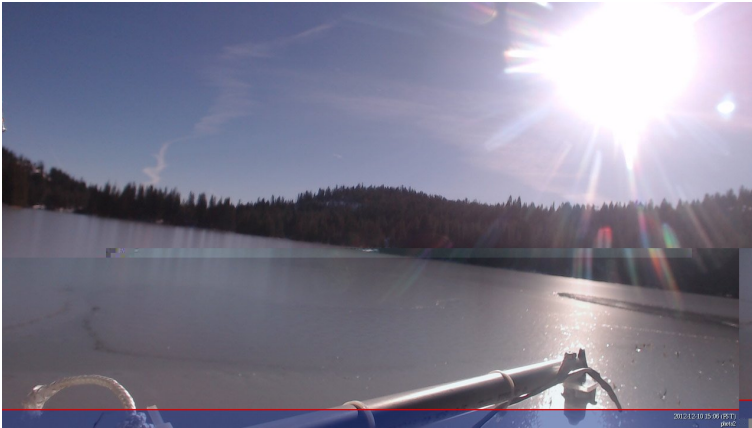
Satish Chetty
Beyond 66

Objective



- Study albedo properties of 3 types of material and 1 control area
- Small fresh water lake in the Sierras, near lake Tahoe, California
- Deploy just before the lake freezes and remove after melt
- 1-2 person deployment

What to measure/study



- Water temperature
- Atmospheric conditions (wind, temperature, incoming solar and UV radiation)
- Reflected radiation
- Pictures
- Tilt and compass

Hardware

- Buoys and platform
- Solar panels
- Wifi
- Tilt Sensor and Compass
- Solar Sensors
- Weather station
- Temperature Acquisition String
- Cameras
- Ultrasonic Sensor

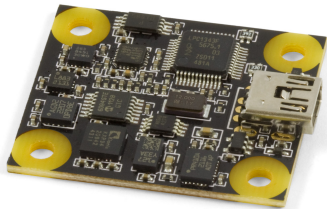
WiFi



- UA Wifi
 - -40° Celsius
 - Magnets
 - USB
 - Linux driver
- Amped AP and Antenna
 - Good output power
 - Change-able antenna
 - About a mile range
 - Local configuration



Accelerometer



- Phidget
- 3 -Axis Compass, Gyroscope, Accelerometer
- High Resolution accelerometer measurements at $< \pm 2g$
- Connects directly to a USB Port
- Low power 55mA
- -40° Celsius
- Linux Driver

Davis Solar Sensor



- 40° Celsius
- Simple A/D (0 to +3VDC); 1.67 mV per W/m²
- Spectral Response 400 to 1100 nm
- Resolution 1W/m²
- Range 0 to 1800 W/m²

Ultrasonic Sensor (snow fall measurement)

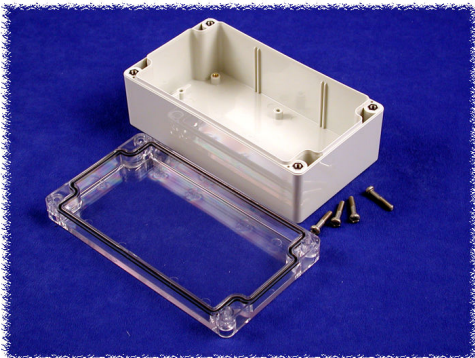


- Maxbotix
- Outdoor ready IP67
- -40° Celsius
- A/D conversion
- 1mm, 5/10 meter range
- Temperature sensor

Cameras



- Logitech c920
- 4 Cameras
- 1920 x 1080 pixels
- fswebcam to grab frames
- Hammond Enclosures
- Water proof USB connectors



Other Hardware



- Beaded Stream, TAC. Measures from -55°C to $+125^{\circ}\text{C}$ with $\pm 0.1^{\circ}\text{C}$ accuracy
- West Marine Taper Buoys (75lbs)
- Davis Weather Station
- Moxa USB hub
- Charge controller
- Lead Acid Batteries
- Camera mounts

Issues

- Linux drivers
- Frame grabbing at higher resolution with multiple cameras
- Water proofing and enclosure issues
- Cabling issues
- Physical deployment issues
- Magnets on the Wifi adapter
- Power
- No dark materials
- Snow issues

