Wireless IOT Water Height Sensor

Molinaroli College of Engineering and Computing
UNIVERSITY OF SOUTH CAROLINA

Nicholas Liger, Dr. Jasim Imran, Dr. Austin Downey
Department of Mechanical Engineering / Civil Engineering

UNIVERSITY OF South Carolina

Background

- SC DES needs low-cost sensors to deploy on high hazard dams across the state
- Commercially available sensors too expensive
- Previous development of water height sensor, but needed improvement

Hardware

- Arduino used as microcontroller
- Inexpensive ultrasonic sensors measure water height
- Data is backed up onto micro SD cards
- Custom PCB's for power regulation and ease of assembly
- Arduino attachments provide cellular and Wifi connectivity

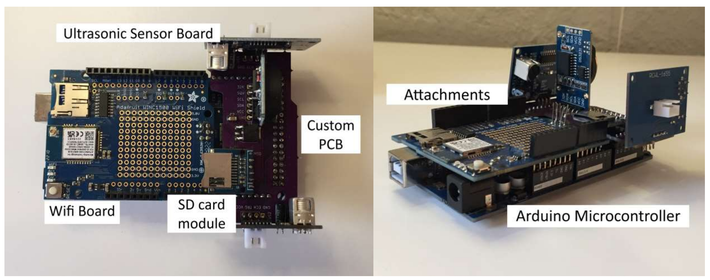

Figure 1: Arduino Hardware – Wifi Version

Conclusions

- Sensor shows promise as low-cost alternative
- Accuracy and longevity are adequate
- Connectivity issues in cellular board necessitates new hardware
- Wifi version needs field testing
- Better "plug and play" design for dam owners

Software

- Code for sensor runs off Arduino IDE and is open-source
- Adafruit IO provides low-cost, third-party data handling and storage
- Information from sensor put onto dashboard which can be accessed in real time by desktop or smart phone

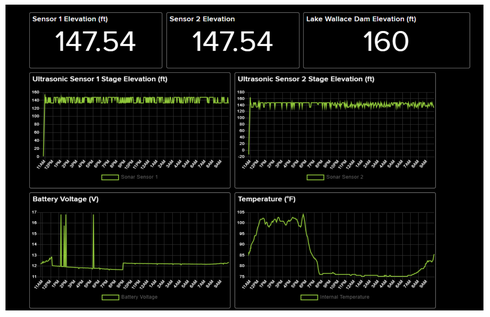

Figure 2: Adafruit IO dashboard

Package

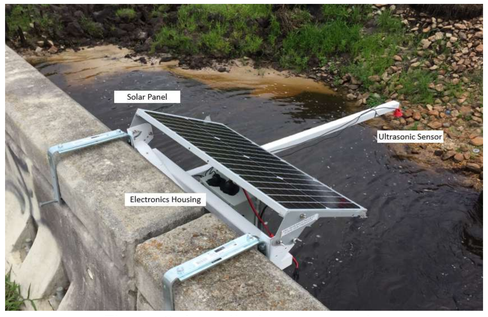

Figure 3: Installed sensor package

Deployment during Flood

Figure 4: Flooding at Lake Wallace

- Sensor package installed upstream of Lake Wallace Dam in Bennettsville, SC

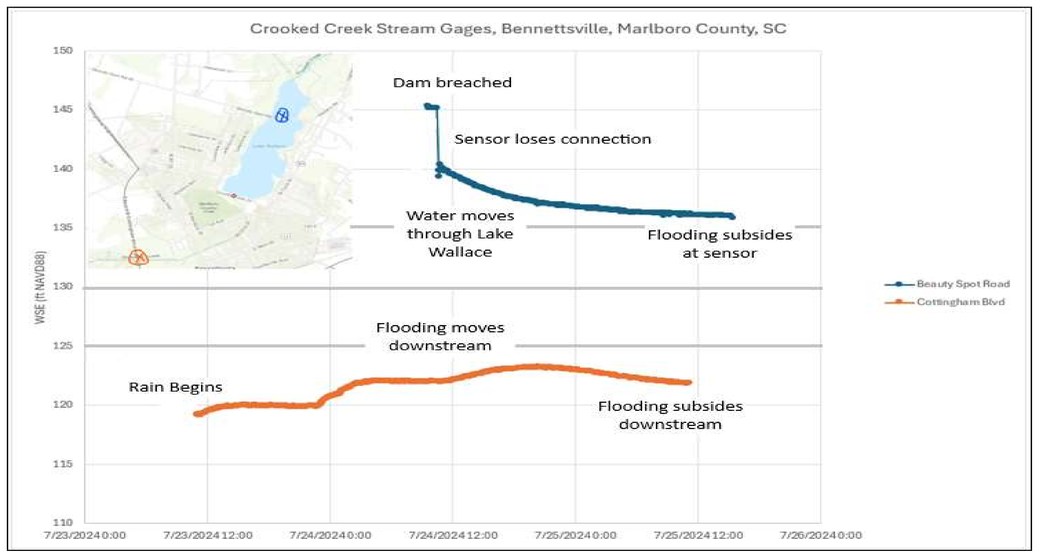

Figure 5: Readings from breach

- On the night of July 23rd-24th 2024, heavy rains cause dam upstream of sensor package to breach
- Sensor lost cellular connection for two hours during night due to cell network interference
- Flooding was captured initially, and water level subsiding after flooding was recorded
- Data was corroborated by USGS stream gauge downstream of Lake Wallace
- Water level readings were available in real time during flooding through Adafruit IO

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