

# **Thesis Abstract**

## **Mobile Waterway Monitor**

Buoyant and Dynamic Water Sensing

Kody Stribrny

*Directors:* Dr. Vrudhula and Dr. Wu

*School:* Computing, Informatics, and Decision Systems Engineering

*Timeline:* Fall 2016 – Spring 2017

The Mobile Waterway Monitor (MWM) seeks to monitor surface water in an unexplored way. Consisting of a small, buoyant node which floats with waterway current, the MWM will passively traverse a channel while recording data during transit. Sensor data is then offloaded in real-time to a hosting server which both stores data as well as allows for visualization through a hosted website. A Python program called the “dashboard” provides additional data visualization capabilities. The Mobile Waterway Monitor is completely unique in its construction, feature set, and approach to meaningful issues.

Born from several unique goals, the Mobile Waterway Monitor, satisfies several hardly achieved goals. Costing under \$300 to construct and utilizing open source code, the MMW is entirely more accessible to students, environmentalists, and makers around the world. No infrastructure is required to use the Waterway Monitor thanks to globally available GSM cellular communication. While costly, the downsides of potent cellular connection have been mitigated

by harvesting solar energy to mitigate battery consumption. Contained in a hearty polycarbonate case, the node can take on rocks, weeds, and small waterfalls with ease. The node completes all this without sacrificing measurement accuracy or floating depth which can limit devices from measuring smaller waterways. The small and mobile form factor paired up with a high degree of communication independence and passive energy production make the Mobile Waterway Monitor unlike anything currently in existence.

Operating style isn't the only thing separating the Mobile Waterway Monitor from other water sensing systems. The MWM server and other backend utilities take advantage of recent Internet of Things (IoT) advantages to provide easily configured, portable, and economical data management. Accessible through a website which provides graphing functions, all data is stored for 30 days and fully downloadable. Creating a self-hosted instance is a newly released feature which will only increase capabilities and removes many limitations. The Python dashboard utilizes the server stored data to provide a plethora of additional features. This glut of tools includes color coded maps, highly accurate and readable graphs, and both real-time and static data viewing. And there is still room for future expansion such as controllable movement, multi-node swarm behavior, and complete power independence.

Overall, the Mobile Waterway Monitor takes on a serious problem with societal impact in a novel way. The IoT inspired device combines a highly desirable feature set with accessibility, accuracy, and expandability without creating additional infrastructure needs. Environmental problems are numerous and without recording ecological trends can easily be brushed aside until reaching a critical point. Supervising important elements in nature, such as water resources, enable a smarter and cleaner future for currently stressed environments.