Project name: Flood Watch

Names of students: Natalie Mclaren, Dharius Robinson, Daniel Beauchamp

Supervised by: Daniel Knox

Project description

Our project revolves around The Internet of Things and how we could put it to use to help protect areas from the effects of flooding. Our main focus, throughout this project, is the collection of precise river level readings and how they are transferred through the network into storage. There are two main parts to ensuring this could be achieved; the first was to select a suitable device to measure the river levels. Due to its reliability and popularity amongst companies experimenting with river level monitoring, we chose to use an ultrasonic sensor. The second part was to use LoRaWan for data transfer. We signal mapped central Canterbury river areas to determine the strength of connections in potential mounting spots near the river.

Aside from the functionality found on our physical device, another crucial component in our project is a custom API which connects users and/or services to our data.

The idea is to be able to have multiple devices within the same area, or around different areas, providing fast information on the state of a river.

Results

Currently, our ultrasonic sensor is able to take precise readings within its maximum range of 5 metres. To confirm that the sensor produces the expected values, we ran tests which included moving it towards/away from the ground to produce a simulation of a river increasing/decreasing its levels. We have been able to configure network functionality by connecting our device to the LoRaWan gateways provided by the university. This has allowed our system to send readings and error codes should any functionality fail e.g. storage error whilst writing to the SD Card or sensor error when receiving an impossible reading (below zero). With the use of an engineering menu on our device, settings like the measurement period can be customised and information on battery power can be obtained.

Our API contains a range of endpoints to query everything from monthly device readings to grouped area readings and the number of errors within a given time range from the database. We have also provided a statistics endpoint which provides aggregated data and reading counts. We have chosen three databases to store various data in; InfluxDb for readings (due to its performance with time series data), MySQL for device and area information and Redis to cache the last reading for best performance. For testing purposes, we created some graphs within the API and fed them with the data queried from our databases. This confirmed just one of many potential usages of our API.