Michael Pattinson, Road Construction Program Leader, Logan City Council

The ‘Flooded Road Smart Warning System’ (FRSWS) is reliable, low cost and improves public safety, recycling e-waste and providing work opportunities to disadvantaged Queenslanders. It saves lives by reducing the risk of vehicles being driven into dangerous floodwaters and reduces the need for emergency services personnel to undertake dangerous swift water rescues and council staff to erect temporary warning signage under hazardous conditions. The system is powered by recycled batteries (solar recharged), and assembled using 3D printed brackets by people of disadvantaged backgrounds, a true Public Works project.

Back in January 2016 Council formed a multidisciplinary Project Team to develop a warning system to minimise the risk of driving into flooded roads. No limits were placed on members of the project team to encourage innovative solutions.

Following on from previous collaborations with Griffith University’s Industrial Affiliates Program, Council’s Maintenance Engineer worked with Dr. Peter Woodfield and engineering student Hayden Lewis, to realise the concept of a battery power circuit triggered by a float switch that activated flashing lanterns on the (W7-7-1B) Floodway sign, to provide advance warning to motorists.

The secondary component of the research was to provide a text message to Council’s On-Call officer. This prototype was completed in 12 weeks with two options, flashing lanterns (W7-7-1B) ‘Floodway’ sign and on black board above the (G9-21) ‘Road Subject To Flooding’ sign. The delivery of a text message to the On-Call officer was also completed over the 2G network. The system employed a Lead-Acid battery, trickle charged by a solar panel, controlled by an Arduino microcontroller.

The blackboard won Director approval to present to Council subject to any enhancements specified by the project team. The first enhancement was to upgrade...
to the 3G network, include email and if possible live mapping. The second enhancement was to review of the installation standards. These challenges were undertaken in collaboration with Dr Woodfield by engineering students, Albert Lee and Gaurav Goswami. Again, delivery occurred over 12 weeks, including a basic mapping option. The communication housing was redesigned by and 3D printed by Industrial Design student Rizal Evans. This design was judged as the best of three options (contractor, workshop and student).

The enhanced Flooded Roads Smart Warning system (FRSWS) was approved Council on 18 October 2016 with funding to follow subject to the flashing lanterns being replaced by the text ‘ROAD FLOODED’. Councillor Jon Raven advised that this was real innovation and that if any assistance was needed with 3D printing, Substation33, a Logan youth enterprise organisation should be contacted.

Council’s Maintenance Engineer worked with our former Lines & Signs Supervisor, Darryl Richards to develop the text using cut out templates and contacted Sustation33 regarding 3D printing. Contacting Sustation33 through Tony Sharp ably assist by Simon, Brad, Nathan and Crystal, has resulted in great improvement to the FRSWS and in the relationship with Council.

The initial improvement was fourfold increase in capacity by using Lithium-Ion batteries, recycled from dumped laptop computers after rigours testing, mounted in 3D printed brackets. This was followed by presenting the ‘ROAD FLOODED’ text using a combination LED matrix boards, then using printed circuit to minimising soldering joints and improving reliability. Substation33 also offered a radio-controlled option to eliminate the trenching between the float and the two warning signs. During this period student Jais Joseph researched the feasibility of replacing the ‘Arduino microcontroller’ with a ‘Raspberry Pi microprocessor’ for future enhancement such as managing video recording.

This project has directly supported the ongoing development of others, namely five students have completed their degrees and gained real live work experience.

While this development was being undertaken, the Project Team focused on a site location map using call-out data, swift-water rescue data, desktop flood modelling and of site prioritisation methodology and completed a data collection survey for 450 sites.

Logan City Council are installing FRSWS at a cost of $20,000 per site. To date the FRSWS has been installed at 36 sites, with another four planned by 30 June 2018. A ‘Provisional Patent’ has been lodged and a ‘Memorandum of Understanding’ between Logan City council and Substaion33 has been signed.

The Flooded Roads Smart Warning system has been supported by Logan City Council in 2017/18 with a budget of $250,000 and by the Queensland Government with a budget of $325,000. A 2018/19 Logan City Council budget of $250,000 is proposed.


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