

IOT: PAVING THE WAY AHEAD

WITH INTERNET OF THINGS SENSORS NOW BEING UTILISED ACROSS A BROAD RANGE OF HIGHWAY ASSETS, KARBONTECH'S **MARK ENTWISTLE** EXPLAINS HOW LOCAL AUTHORITIES CAN TAKE ADVANTAGE OF THE NEW TECHNOLOGY TO BOOST SAFETY AND EFFICIENCY

In an increasingly connected world, where Alexa creates your weekly shopping list and Google turns on your living room lights, it makes sense that IoT developments are being exploited elsewhere, including highways maintenance.

Local authorities are under continuing pressure to deliver more with less. Public perception of an efficient use of taxpayer money is essential, and councils are working hard to deliver this while improving the safety of the network for road users and residents. And here, sensors that use real-time information to inform and help create proactive maintenance

programmes play an essential role.

KarbonTech's work with IoT started by combining geospatial data with weather, drainage demand, topography, and historic maintenance records to better model the lifecycle of gully networks. Risk-scoring painted a comprehensive picture of the condition of such networks, thereby allowing proactive maintenance to be scheduled and ensuring visits to only those sites that required attention – a big saving in time and money. An efficient gully cleaning programme reduces highway flood events, improves safety, and maximises the potential of local authority budgets.

BETTER SAFE THAN SORRY

Following a fatality, where a driver got their vehicle stuck in standing water after a heavy rain event, KarbonTech developed a flood sensor that would trigger an electronic sign, warning road users of the risk to life during heavy rain.

Using live data, flood alerts and warnings are triggered at an agreed, pre-set level, illuminating the warning sign for road users and notifying the maintenance team. With such real time information, crews can monitor the road network, proactively close roads under threat, and visit areas requiring immediate attention.

HIGHWAYS

This system has the potential to reduce injuries and fatalities across the country.

SENSORS FOR EVERYTHING!

Sensors connected to smart software can be used right across the road network, examples of which include:

● Incident Response

Sensors on crash barriers and bridges signal collisions and strikes. Instant alerts are linked to maps for accuracy and are viewed on a centralised portal as well as providing email, text or call notifications.

● Winter Maintenance

Sensors for monitoring road temperatures give live updates across the network, allowing treatment operations to be optimised. Grit bin sensors enhance the winter maintenance plan, accurately measuring salt levels and linking to a map for visualisation as well as providing email, text or call notifications. Weather monitors also improve winter maintenance strategies.

● Environmental Monitoring

Sensors for air quality, rainfall, pressure, humidity and windspeed monitor pollution and weather, assist with decision making for maintenance programmes as well as winter maintenance plans. Air Quality Management Areas and urban areas use air quality data to adapt development planning and map out pollution issues for further improvements.

● Waste Services

Sensors within bins – commercial and public – record the fill-level in real time, allowing for optimised and efficient collection programmes.

● Footfall & Gate Monitoring

Sensors on gates record footfall data, and can trigger alerts when a gate is left open. All sensors allow for data collection and analysis to enhance the overview of the highway network and assist with planning.

● Grass cutting

Sensors to monitor the height of grass, when foliage is covering a blind spot or obstructing signage, again optimising cutting programmes and ensuring routes stay safe.

GETTING BEST VALUE FROM THE DATA

It's all well and good viewing and collecting this live data, but it's vital that it is used to its fullest potential. Although the data provides a comprehensive overview of



Real-time data on rainfall (lower left) captured from IoT sensors – in this case fitted to gullies to measure fill rates and silt levels (background image) – is delivered via the portal (lower right) to paint a picture of conditions across the entire drainage network

the highway network, local authorities tend to use a variety of sensor providers and portals to view this information in separate systems, meaning that it is not shared with other operational teams.

Using a central software solution improves collaboration, giving the same access to all, and allowing different service areas to take a joined-up approach to service delivery.

HOW DOES IT WORK?

A central solution collects and analyses data from all sensors on the network, risk-scoring connected highway assets and offering insights to improve proactive maintenance and forward planning. The software creates a single place to view, report and act on IoT sensor data, allowing teams to take a collaborative approach to programming works across the entire highway network. Each user has access to the same data, providing a broad and detailed view of every monitored highway asset, ensuring maximum efficiency in programming.

Andrew Brett, a local authority Principal Flood Risk Engineer says, "Installing sensors has allowed us to react quicker to our most vulnerable areas of the network. Historic rainfall and gully usage sensors give a clear view on demand and affect at each location. This information can be used to understand if the drainage in the vicinity has an adequate capacity for future weather events.

"With the collected data, it not only displays information to assist in whether the assets in location are adequate, but also allows data to be used in suitable capital bids for improvement, where needed".

WHAT'S NEXT?

KarbonTech is working on an ADEPT-funded project with Suffolk University and Suffolk Council to identify developments in the use of gully sensors. This includes investigating the correlation of rainfall events and water level at various points on the drainage route to predict future blockages, as well as monitoring the frequency that gullies fill to a prescribed level, to enhance the risk modelling tool.

The company is also bringing together data from a combination of open-source sensors so that local authorities can benefit from seeing over their boundary. Every gully captured with its Gully SMART sensors offers some form of IoT data free of charge so that a national picture can begin to be built.



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