Utility mapping for a 5G future

In a world 'first' for automated techniques, Ordnance Survey and MobilEye join forces to map Britain's street-level infrastructure in readiness for the launch of new services

In early May, Ordnance Survey and Intel's MobilEye subsidiary hosted an event at London's Olympic Park stadium to outline the results of a year-long trial of new data capture technology .... a move that supports the need of utility operators, highways agencies, local authorities and others for more efficient utility asset mapping as Britain moves towards a 5G infrastructure.

With the advent of connected and automated vehicles (CAVs), accurate information on the location and condition of static objects such as lamp standards, road signs and traffic lights will be essential. The project is but a prelude to mapping these and many other features such as manhole covers, drains, telco cabinets and road markings across the entire nation.

Dawn of a new era

The project saw test vehicles in London, Manchester and the North East, retrofitted with MobilEye's 8 Connect™ system camera unit, detect, process and upload dynamic data to the cloud before being cross-referenced with Ordnance Survey's existing datasets. Using automated object recognition and classification techniques – a world 'first' in terms of utility asset mapping – the exercise achieved a successful match in a high proportion of cases. Although just 11 vehicles were involved in the trials, the intention is to scale this up to several thousand over the next six months.

For Ordnance Survey interim CEO, Neil Ackroyd, the work marks the dawn of a new era in mapping. "Streets are one of the most unique geographies in that our pipes and cables run beneath them, our cars drive through them, people walk down them, and properties open onto them. As we contemplate developments such as a 5G infrastructure and intelligent mobility, more detailed, maintained utility mapping of our highways geography

Amnon Shashua (top left) explained how MobilEye's windscreen-mounted camera (inset centre) is used to detect, capture and classify street-level objects such as lampposts and traffic signals (top right). That data is aggregated and then merged with Ordnance Survey mapping (lower left) to provide real-time information to utility operators, highways authorities and a new generation of driver-assisted and autonomous vehicles (lower right)

will be critical to a safe, reliable and sustainable transport ecosystem."

He added, "The initial trials are already delivering a deeper and richer level of data capture, which we are confident will bring added value to our customers and become an important dataset for emerging markets, and a building block for Britain's infrastructure for many years."

MobilEye President and CEO, Professor Amnon Shashua, explained how front-facing windscreen cameras utilising the company's powerful EyeQ2® Image Processing Chip are used as intelligent agents. The AI-driven process captures HD imagery and condenses it into low bandwidth data packets for uploading to the cloud. "The beauty of this approach is that it works in real-time, on a continuous basis, and at negligible cost ... and you don't need to change anything. There is nothing like it anywhere else in the world."

Unleashing the power

While the locational element of the uploaded data is accurate to within five metres, being based on GPS positioning of the moving vehicle relative to features being captured, this is insufficient for many asset management purposes.

To achieve the required centimetre-level accuracy, Ordnance Survey applies geolocation algorithms to align the raw GPS data to its existing datasets. "It's when routes are driven multiple times to detect previously hidden, partly-obscured or temporary features such as traffic cones that we really begin to unleash the power of this mobile data collection and matching process," said Paul Cruddace, Ordnance Survey's Business Change and Innovation Manager.

He went on to suggest that future development will place more emphasis on feature attribution. "While populating our database with this geolocated data is great, it's also really useful to have additional information on the condition, history and ownership of assets such as street furniture and utility assets."

Customer involvement

In evolving what is intended as a commercial service, Ordnance Survey and MobilEye have been keen to involve and gather feedback from interested parties (see www.os.uk/riact). Arising from the early dialogue – and topping the list of customer requirements – will be the need for a service that notifies them of any change to the database. With £5.5 billion spent annually on streetworks across the UK and with a utilities, fibre and data network stretching 5.5 million km, those notifications will come thick and fast. The development of such a service is an additional strand of work currently underway said Cruddace.

Access to the database is also currently under discussion with customers, some of whom will need the continuous provision of raw data for processing within their own Geographic Information Systems. Others might prefer a subscription model that gives them access, as and when required. It points to a variety of business models and licensing arrangements to suit individual customer requirements.

One of those involved in the pilot project was Clive Surman-Wells, Operational Solutions Manager for Northumbrian Water. Having worked with Ordnance Survey and other utilities over the past three years to further the idea of an innovative underground assets map for the North East, it made perfect sense, he said, for the company to participate in this latest venture.

While many of the assets associated with the company's 55,000 km water supply and waste water networks are buried and out-of-sight, there are many clues on the surface as to their whereabouts in the shape of manhole covers, water meters, stopcocks, hydrants and stop valves. "By having an precise position fix on such features, the technology will make a step change in the way we plan and maintain our assets, avoid inadvertent 'strikes' against other utility pipes and cables, and improve our overall level of customer response," said Surman-Wells.

He noted that a further trial in a selected area of the North East will explore the limits of what the AI technology can offer. For example, can it tell the difference between a gas and water stop cock? Or between a manhole and fire hydrant? Both this trial, and another in London, will further work, funded by the government's Geospatial Commission, to create a nation-wide Underground Assets Register of pipes and cables.

Ordnance Survey and MobilEye took the opportunity to showcase the project to utility operators, highways agencies, fleet managers and other interested parties at London's Olympic Park Stadium