

Automated analysis using cloud-based web services



ThomasVogel/Getty Images

Edinburgh-based agency xDesign created a mobile app that uses data analysis and machine learning to monitor road defects. This led to spin-off company, Road Intelligence.

The Road Intelligence app uses an ordinary smartphone to collect accelerometer and gyroscopic data on every 'bump' a vehicle encounters. This road-defect data is profiled and fed into a machine-learning model based in the cloud. Proprietary algorithms analyse the data, grade defects for severity, and provide physical profiling.

About £3.6 billion is spent each year fixing UK roads, and local authorities pay over £30 million a year in compensation claims. Detecting road defects earlier would reduce both the cost of repairs and payouts.

How we helped

The app connects to a cloud-based system built by EPCC that integrates different Amazon Web Services, including a user-account system, data-checking, and data services.

Data is held securely and can be integrated with third-party services such as Google Maps, so allowing clients to view information in an accessible format. The system was tailored to xDesign's current requirements while allowing adaptation for future company growth.

The app can be deployed to multiple users across the road network, which means it can be analysed more frequently than is currently possible, allowing local authorities to be more proactive in fixing road defects through continuous data streaming.

How does it work?

- Using a smartphone in an ordinary dashboard mount, the app captures information about every road defect that is encountered.
- A single defect comprises over 250 points of data. These are sent to the cloud, allowing an infinite amount of power to process and make sense of the data.
- The app attempts to match the patterns of data sent from the vehicle against known patterns of defects and non defects (eg speed bumps) and grades accordingly.
- As multiple vehicles travel over multiple defects, the system improves automatically through the continuous stream of data, both for specific defects and overall.
- The entire road network is mapped, with data displayed visually in near realtime in the Road Intelligence web portal. The status of individual roads and information about defects is shown, as well as in-depth analysis of any defect.

A number of important collaboration partners were involved in building the application including EPCC, Construction Scotland Innovation Centre, and The University of Edinburgh Seismology Department.

EPCC: the UK's leading supercomputing centre

Our Accelerator service: supercomputing on demand

Cirrus is just one part of our Accelerator service, which delivers high-performance computing capability at a fraction of the cost of buying and operating in-house HPC services.

Accelerator can be used as a:

- Transformative HPC resource accelerating development and discovery lifecycles
- Flexible HPC resource smoothing out demand peaks
- Contingency over internal HPC infrastructure failure

Accelerator provides access to:

- ARCHER: our high-end compute system for large-scale simulation and modelling challenges
- Cirrus: a midrange, industry-standard Linux cluster. An ideal platform for applying commercial software tools



to solve a range of CFD and FEA simulation and modelling problems

- RDF: our large-scale data facility giving access to petabyte-scale data storage and archive facilities.

The World Class Data Infrastructure

The World Class Data Infrastructure (WCDI) will be a new facility managed by EPCC for the secure and trustworthy hosting and analysis of huge and varied datasets. Available to academia and industry, the WCDI will underpin the Data-Driven Innovation programme of the Edinburgh and South East Scotland City Region Deal.

We have been certified for the ISO 27001 Information Security standard for all the supercomputing and data services that we run, such as the NHS National Services

Scotland national Safe Haven. A Safe Haven is a secure environment in which data is linked and accessed, providing a high-powered computing service, secure analytic environment, secure file transfer protocol for receipt of data, and provision of analytic software.

With our unique combination of facilities and skills, we aim to be a leader in the secure hosting and management of datasets for academia and industry.

With the security of our exceptional expertise

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We can help you with:

- General HPC support
- Data management and analytics
- Computational modelling & simulation
- Training & consultancy
- Software development

To discuss our services for business, contact George Graham at EPCC:
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