Case study

REMOTE CONTROL SOUND MONITORING

Bringing *life* to technology.

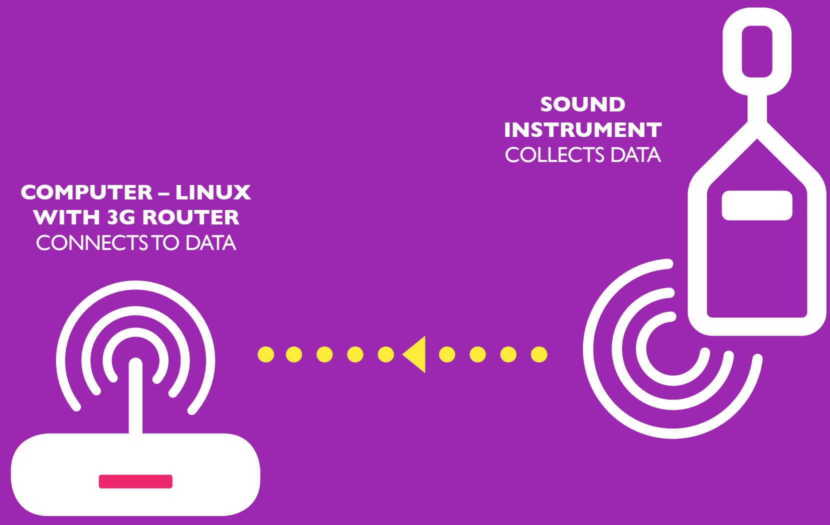
XOR systems

Noise levels on construction sites must keep within limits set by the council. ANV's market-leading sound measuring equipment has been successfully helping companies to do that, and be a good neighbour. But the technology needed evolving so the data could be gathered remotely.

The *Challenge*

The council sets noise limits and working hours on construction sites to protect the peace of the surrounding areas. While ANV's existing technology did a great job of monitoring noise pollution, it was labour-intensive and costly, as an engineer would have to visit each site to download the data.

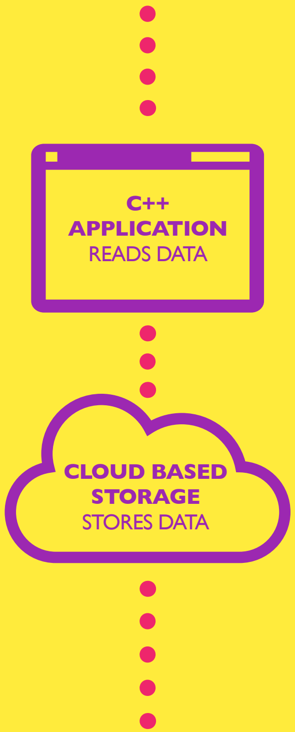
Not only that. The memory-card design also had limited recording time and was unable to monitor levels in real time or produce user-friendly, data-driven results. This is where Xor and the Internet of Things (IoT) came in.



The *Brief*

ANV asked us to create an embedded system and web-based platform that allowed data from a sound device to be accessed in real time, without having to visit it. They wanted it to show patterns via data and graphs, eliminate anomalies and allow access to results from any location online.

They were keen for the system to take snapshots of the data once a minute, and have the intelligence to disregard acceptable – and plot unacceptable – noise levels. The council could then penalise any breaches.



Our *Technology*

The Internet of Things (IoT) inspired us to tackle this brief. The IoT is the bringing together of items that are embedded with electronics, software or connectivity to form a network between objects. Think of an alarm clock connecting to the toaster, which is connected to the coffee machine and then to the car engine – it creates a system that is unparalleled in punctuality and cuts out the need for human interference.

We used this idea to create a computer system running Linux, with a 3G router to allow interconnectivity. Using cloud-based storage, which can be accessed anywhere; we developed a C++ application to allow the system to read data from the instrument before storing. This also coped with events, such as loss of signal.

Once the data is in the cloud, complex algorithms are used to process this data, which provide retainable information and detailed reports to send to ANV and its clients.

The *Result*

Now whenever noise on a construction site exceeds the council's limit, the device kicks in to record and store two minutes of audio on the server. It also sends a warning email to the council, noise consultants and people living nearby. ANV and its clients can then listen in remotely – no matter where the device is – to identify whether it's a real breach, or simply a siren or door slam. This is particularly useful as evidence in a courtroom.

ANV and its clients now have the tools to log into a bespoke website, manage their sound instruments, change recording intervals, weigh frequencies, and view current and historic data from the device. They also get a weekly report by email. Since hundreds of ANV's sound instruments are used all around the UK, this new technology has saved them money, time and hassle.

Comment

The approach here was to take a standard platform and then hang a number of different instruments on to that platform. The instruments work over a range of interfaces - RS232, RS485, Ethernet - and each has a unique communication channel. We have added other environmental parameters - dust, weather, vibration and frequency analysis of noise. The one platform is easily configurable for each instrument and also combinations of instruments, like Dust and Weather. Dust and Weather go well together because we want to know where the wind is coming from and how strong it is, when we detect high dust levels.

It gets more interesting! We need to combine instruments on one site, such that one can trigger another. For example, we have two vibration instruments, one on the edge of the construction site and one outside the site. This may, for example, be your house and you are concerned about subterranean vibrations damaging the foundations. If the vibration instrument on your house detects vibration, we need to know where it came from. If the instrument on the edge of the site detects vibration at an instant ahead of yours then we know where the vibration came from - it must have come from within the site.

With multiple noise instruments on the same site, we can track where a noise came from. Triangulation based on accurate timestamps identifies where the noise came from. The construction site people don't want to be penalised if the noise came from outside the site.

Jeff Graham, technical director