Detector Data Communication System (DDCS)
Loop Replacement Enabling Technology

JCT Paper

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An Effective Fix for Failed Loops, Feeders and Ducts

Context – The Problem

Many authorities still rely on inductive loops to provide basic traffic detection for their traffic control systems. When loops, feeders or ducts fail it can be time consuming and expensive to reinstate them. Until repairs are made the site will be performing below its optimum. The alternative to reinstating loops is to deploy a different detection technology of which there are numerous above ground solutions available from various manufacturers.

While above ground detection solutions can offer many benefits they do come with their own particular needs. Users need to be confident that these products can be installed and commissioned as simply as possible. They need to be confident that day to day operation and routine maintenance are straightforward, and that in the event of equipment failure, or in-service damage, that replacement does not bring its own set of complications.

The correct selection of the detector and the correct mounting location both go a long way towards mitigating these concerns. Specifically, there are benefits in placing the detector close to the required detection zones, giving less opportunity for anything to ‘get in the way’ or for small misalignments to cause issues with misplaced detection zones. However, moving the detector away from the signal poles brings a different problem, that of getting the detection data back to the signal controller.

This paper looks at the deployment of a solution that places a detector close to the loops being replaced, and returns the data to the controller effectively. It considers how the approach taken gives both technical and commercial benefits.

The Trial Site

Bath & North East Somerset (BANES) kindly offered a trial site where wireless linking of detection data back to the signal controller could be assessed.

The site, the junction of the Lower Bristol Rd and Windsor Bridge Roads is to the west of the Bath city centre on the main route to Bristol. The Windsor Bridge provides one of the crossing points of the river Avon, so the intersection is an important one in the network around the city. During periods of high demand the site is run under SCOOT control. The site was chosen as the two SCOOT loops on the west-bound Lower Bristol Rd. had failed.

The two-lane westbound Lower Bristol Road divides into and ahead and left turning lane and a right-turning lane, so distinct detection is required in both lanes.

Figure 2 shows the site and the location of the zones (yellow) and the controller (red).

Figure 1 Satellite View of the Trial Site (Image ©googlemaps) with the SCOOT zone location arrowed yellow, controller location arrowed red.

A street lighting column was located a few meters to the west of the failed loops so this provided a suitable location for mounting a detector. BANES had selected an AGD 650 vision-based product that offered 2 distinct output zones, each of which could be configured for size, location, direction of travel of traffic and other characteristics, conveying a better level of functionality than the pre-existing loops offered.

The column is ~90 m from the controller cabinet, on the opposite side of the Lower Bristol Rd and is occluded from the cabinet by building structures.

The Equipment

The Coeval Detector Data Communication System (DDCS) was used to provide the wireless link back to the controller.

This solution is comprised of a road-side pole mounted unit for powering the detector and relaying the data, and a cabinet mounted card to accept the wireless messages and unpack them for offering to the controller's detection inputs.

Recognising the issues normally encountered at the roadside, the pole mounted unit requires only that 230Vac is provided to it. The roadside unit contains (if so ordered) a suitable power supply to run between two and four one or two zone detectors i.e. up to eight zones can be returned from one pole top location from up to four detectors.

Power is provided and the detection/zone outputs received from each detector by means of a standard TOPAS (Buccaneer) connector on the unit housing. The unit also supports an external antenna.

Figure 2 The installed Link and Detector

At the controller cabinet an antenna, a dedicated router and 3U Eurocard unit receive and unpack the detection data before offering it to the controller's dedicated IO.

[Noting that the use case is the replacement of inductive loops, there is a strong possibility that these have been connected via an intelligent backplane so the additional IO may not be available. The solution includes an optional accessory card designed to plug into a loop slot but which can accept the above ground detector outputs, thereby maximising the use of any intelligent backplane that may be present. This extended capability was not included at the trial site.]

<u>The Installation & Commissioning</u>

The entire system was installed and commissioned in the course of a morning. The cabinet card was installed first, so that once the remote equipment was active it could be monitored by SCOOT, allowing detector alignment and zone positioning be altered as necessary to achieve the optimum performance. Once the cabinet equipment was confirmed as working the remote equipment was installed. A power connection, (a "Christmas decoration" IEC60309 Commando socket) was quickly fitted to the lamp column. (Permissions for this had been sought as part of the trial preparation.)

The detector and the pole mounted unit were located onto a daughter pole which was fitted offset from the lamp column.

The detector was oriented to give the right field of view and the wireless link unit turned to face the controller.

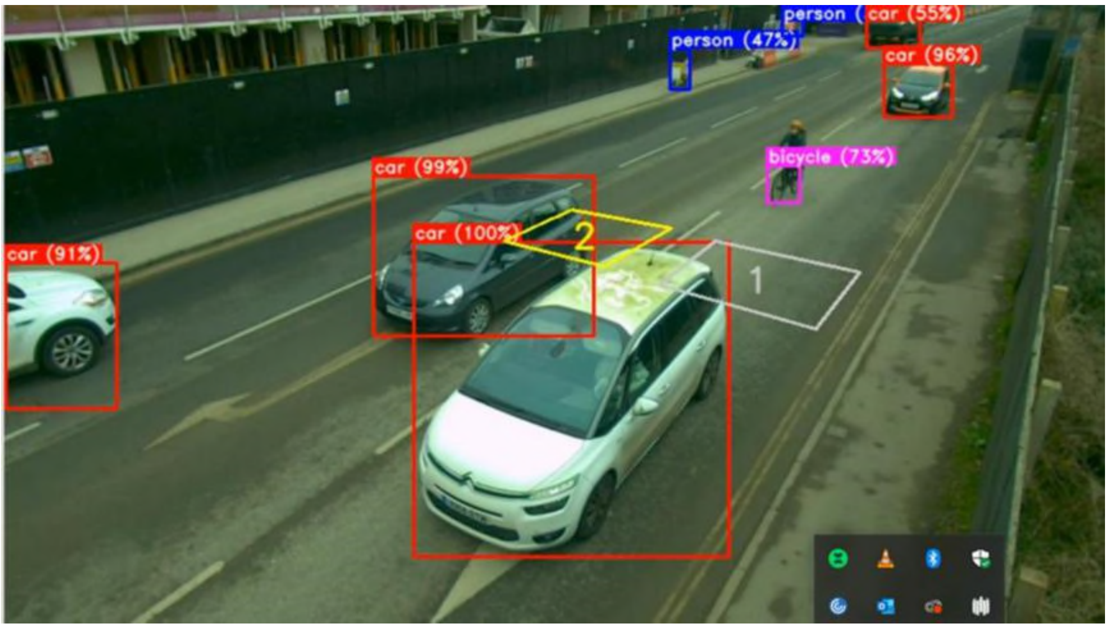

Figure 3 An image from the detector configuration showing the zones (1 & 2) and vehicles causing a detection in zone 2

Even before the detection zones were set up the BANES engineer reported that SCOOT had identified the detectors as present. Once the zones were set and verified then SCOOT data was confirmed as flowing, showing that detection data was reaching the cabinet and being passed to the controller and thence to the UTC system.

<u>Assessment</u>

In the absence of working loops there was no opportunity to run “before and after” trials, however, at the pragmatic level, the absence of loops meant that having vehicle data was necessarily a significant benefit over the previous position.

Periodic check-ins with BANES over the following days and weeks have indicated, continuing performance at an acceptable level. Performance was assessed by checking the data received by the detectors over a period of several months, to ensure the measured traffic flows fell within expected values and to check that there were no intermittent failures in data transmission. The UTC systems’ ASTRID database showed good traffic flow levels and no intermittent failures when checked, indicating reliable performance.

Figure 4 Typical 15 minute count data from N01241A (Lower Bristol Rd.

A typical period of data is shown in , and it can be seen that the data follows the expected daily flow cycle with no breaks or gaps.

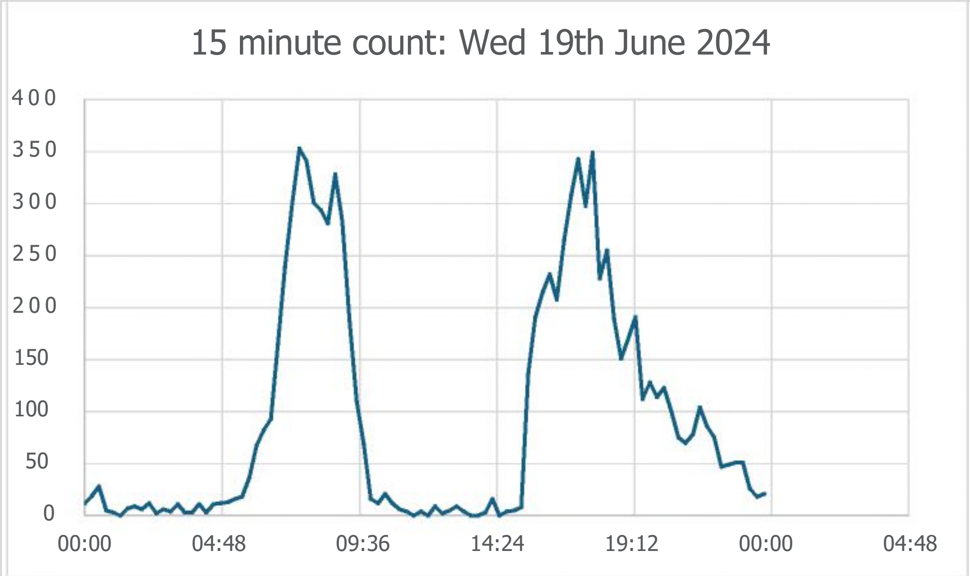

Figure 5 Abnormal 15 minute count data from N01241A (Lower Bristol Rd.

The flow profile of caused some concern until the information of was discovered.

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Lower Bristol Road in Bath closed following multi-vehicle collision

WEDNESDAY 19TH JUNE 2024 BATH ECHO NEWS TEAM COMMUNITY, CRIME

The A36 Lower Bristol Road in Bath is expected to remain closed for most of the rest of the day following a serious multi-vehicle collision earlier this morning, Wednesday 19th June.

Figure 6 Evidence of an Incident 19th June a.m. Content © Bath Echo

These performance data are backed up by qualitative assessment of the performance of the junction since the installation of the equipment, with, at best no reports of issues attributable to the equipment.