CT TECHNOLOGY
TRAFFIC CONTROL SYSTEMS AND SOLUTIONS

CASE STUDY

BRISTOL CITY COUNCIL

The Challenge

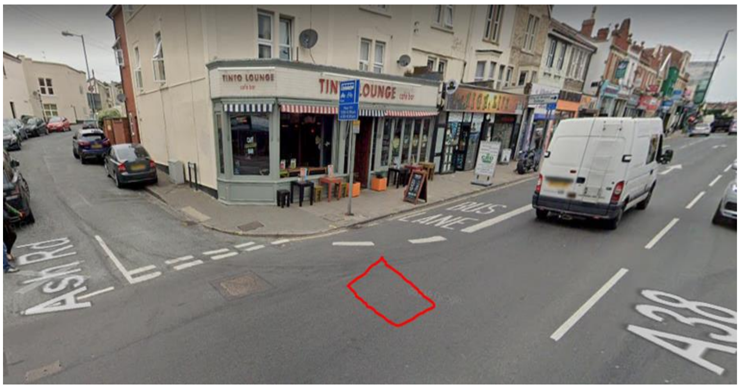
The Gloucester Road area in Bristol is a very busy and constrained part of the city's network. As a result, the traffic signals in the area are controlled via SCOOT to maximise their efficiency.

A few months ago, one of the SCOOT inductive loop detectors failed at the Gloucester Road and Ashley Down Road junction.

There were no viable alternatives available that could be used in place of the failed detector, and it was determined that the detector needed to be replaced.

The detector was on the outbound approach, adjacent to a side road, as shown to the right. The positioning of the detector was optimal for SCOOT operation and could not be easily repositioned, but the location meant that re-cutting the loop detector would involve expensive traffic management, including three-way temporary traffic signals.

This issue made a traditional detector repair too expensive to be viable, given Bristol City Council's (BCC) budgetary constraints. BCC explored the alternative options available. It was decided to trial the Iteris VersiCam video detection system, which could be installed onto a nearby traffic signal head and powered using six (6) spare cores available within the head. The detector would then be used as a Filter detector for the outbound movement.



The Installation

The installation was carried out as follows:

• The VersiCam was installed onto the signal head on the entry to the junction. It was powered from six (6) spare cores available in the signal head and was mounted onto an extension bracket that was fitted to the signal head.

• The VersiCam was angled to the preferred detector position, which was around 10m in front of the traffic signal pole, in front of the stop-line.

• The VersiCam's detection zone was then set so that the zone only detected traffic in lane 1. This element of the configuration included watching the replies into the UTC system, to ensure that the detection zone was the correct size in direction of travel (around 2m), so that the UTC system received the correct amount of LPU's per vehicle.

This is illustrated below:

```
Link Occupancy Monitor N08161B          Down Node J08161 2084 A38 Glos Rd/ Ashley Down Rd

Region              RGA    Split              PERM    Cycle                ON
Offset               ON    Implement            ON    Sat. Occ.             9
Q Clear Max Q       255    Journey Time          2    Start Stg      N08161/1
Start Lag            -1    End Stage      N08161/2    End Lag               0
Detector N08161B1 Outstation X08160     2084 A38 Glos Rd/ Ashley Down Rd

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• The VersiCam was wired into the controller in the usual way as an above ground SCOOT detector.

• The existing controller's SCOOT detector input was re-used in order to send the data back to UTC. The UTC system was set up to receive this input for the associated link.

Once the installation was complete, the SCOOT link was validated and then the camera was left operating for a few weeks so that data could be collected from the site for analysis.

The Findings

SCOOT detectors work as a simple presence detector for a section of carriageway 2m in the direction of travel. The sensor is polled 4 times a second, every second and a simple binary string is sent back to the UTC system for each detector, which displays vehicle presence / absence on the detector. The presence / absence input is then converted to link profile units by the SCOOT model, using a linear discounted occupancy method. Within the SCOOT model, 17 LPU's is usually 1 vehicle. It is preferable that the model receives the correct amount of link profile units per vehicle, as this makes many of the SCOOT validation screens easier to read.

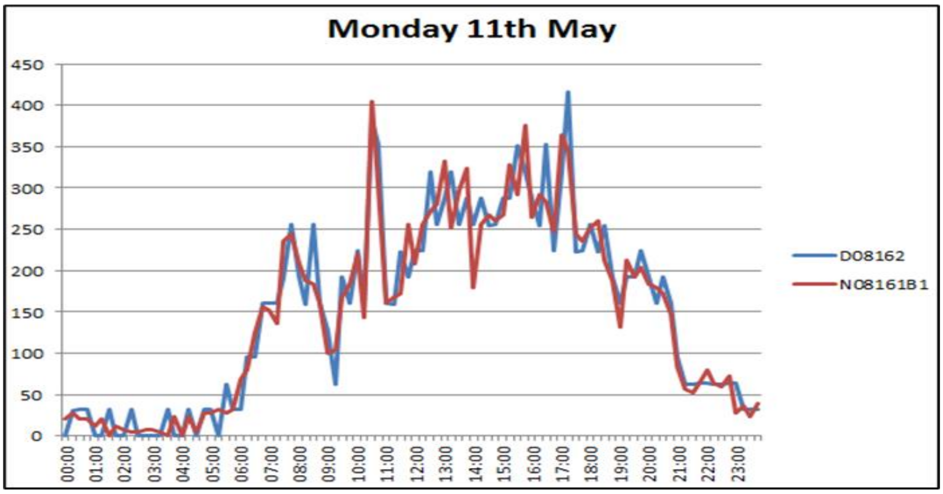
The Iteris VersiCam worked as required, for the section of carriageway that we had specified. We observed that the detector did not 'hang on' after the vehicle had cleared the detection zone and the zone was the correct size.

The detection zone was manually configured to be the correct size for SCOOT. To do this did involve viewing the link monitor and the traffic passing the detector in real time. The zone was then manually amended, until it looked correct to the SCOOT engineer on the link monitor.

The detector was set up as both a SCOOT detector and count site in the UTC system. The sensor accurately detected the presence or absence of a vehicle and did this without missing smaller vehicles, motorcyclists and cyclists.

The graph to the right shows a comparison of the SCOOT detector data and the count site data generated.

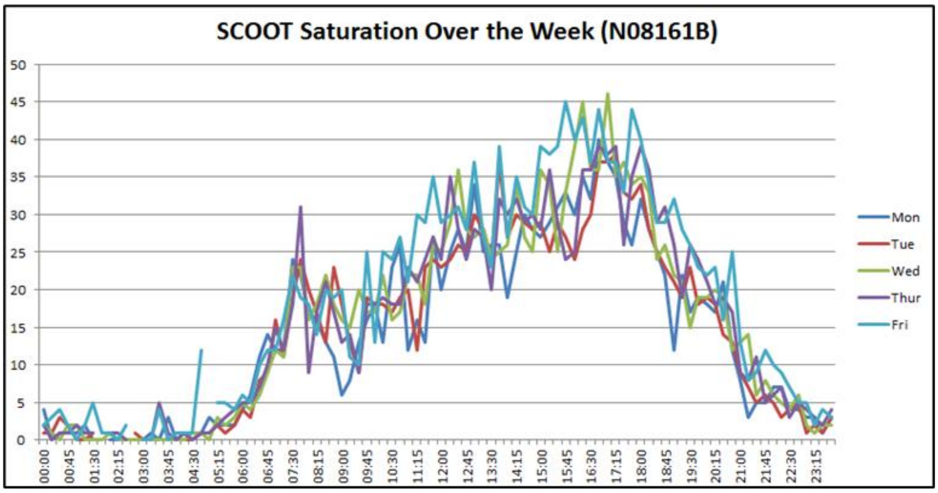
The graph shows that the SCOOT detector is providing an accurate count, as the SCOOT model is taking the 1/4 second detector presence values and converting them into LPU's. To check the performance of the above ground detector, we have graphed the count data against the LPU value, which has been converted back into vehicles / hr, by dividing the value by 17. The results demonstrate that the detection zone and therefore the input into UTC is correct as the SCOOT models' LPU conversion matches closely with the count values from the sensor.



The validation of the SCOOT link was carried out in the same way it would be for a link using an inductive loop. The parameters entered were unaffected by the detector type, with the Saturation Occupancy (STOC / SATO) value being within the expected range for a single lane junction approach.

The performance of the SCOOT link was then checked, and it was apparent from the data that the link was modelling as expected. The graph below shows the SCOOT Saturation data derived from the detector. It is consistent throughout the week, which supports that the sensor provides a consistent and reliable performance.

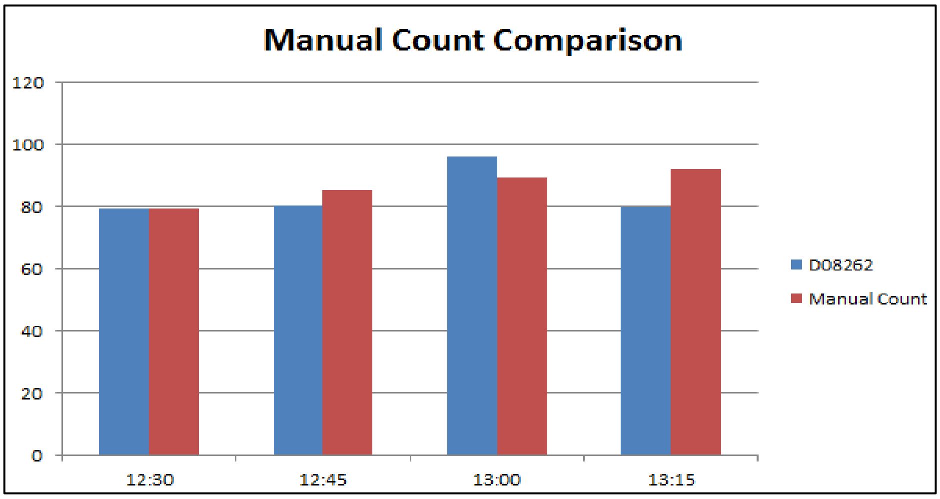
The data shows similar consistency / reliability at night as in the day. This is also reflected in the slightly higher saturation on the Friday evening, which accurately reflects the actual traffic conditions on Friday evenings.



A manual traffic count was also compared against the count site using the VersiCam as an unclassified count site. The totals are shown below, and graph of the manual count is shown on the right.

The total traffic counted during the 1-hour period

SENSOR	MANUAL
335	345



This shows that the manual counts, and the SCOOT detector's automated counts were very close. The differences can be explained as follows:

• There were a lot of vehicles that had poor lane discipline and were using lane 2, rather than lane 1. It is possible that not all of these vehicles were detected, as the sensor was for lane 1 (ahead) traffic only.

• The count site replies to UTC in blocks of 8. So a reply would only be sent back to UTC after 8 vehicles have been counted. This may explain the discrepancy between the 13:00-13:15 and 13:15-13:30 time periods.

Night and Bad Weather Performance

After five months, the team at Bristol City Council carried out a manual count in wet and twilight/dusky conditions. It was found that the VersiCam™ performance results were excellent and had not changed since its initial installation. No faults or glitches were found.

Conclusion

The conclusions from the trial are that the Iteris VersiCam can be used as a SCOOT detector. The sensor is easy to deploy where there is a traffic signal pole in the appropriate location. The detector has some power / cabling requirements, as it can be powered from spare cores available within the traffic signal head. Where there are no spare cores, running in a new cable would often be cheaper than the traffic management associated with a loop detector re-cut.

Provided the sensor is installed appropriately and the detection zone is carefully configured, it works effectively as a SCOOT detector.

Further analysis of the sensor's performance would be beneficial, however. This will include:

• **Long term performance:** These checks will be repeated in 12 months, to check the age of the sensor has minimal impact.

• **Long term maintenance cost:** The working life of the sensor will be examined, along with any costs associated with maintaining it, as BCC need to demonstrate that the sensor offers a whole life cost saving.

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