

SMARTMICRO™ TRUGRD STREAM RADAR/CAMERA WITH NOVUS AGGREGATOR IN TRAFFIC APPLICATIONS

Overview:

Smart Video & Sensing Ltd helps Portsmouth City Council & Highways England capture traffic data and identify potential queuing traffic near the end of the M275 motorway in Hampshire, UK by deploying the smartmicro™ TRUGRD STREAM intelligent traffic radar with built-in CCTV.



Two TRUGRD STREAM radars were connected to the NOVUS PREMIUM data aggregator from Smart Video & Sensing Ltd to capture vehicle data and allow remote viewing of the CCTV and collected data over a 3G/4G network. By early identification of queueing traffic, signs can be set to alert drivers that there is a queue ahead. Meanwhile collected data such as classification, speed, count, gap and headway can be used for future traffic planning.

Background:

The M275 is a 2-mile (3.2 km) long, dual three-lane motorway in Hampshire, Southern England. It is the principal road route for entering and leaving Portsmouth. It continues as the A3 into Portsmouth, and meets the M27 at its northern terminus.

The M275 is one of few motorways in England which is not the responsibility of Highways England. It is managed by Portsmouth City Council from the point where the slip roads to the M27 end. The M275 was not built with a full hard shoulder. For its entire length, a narrow verge is maintained, although there is space available for a full width shoulder. Instead, drivers are warned on entry from the A3 and M27 of the lack of hard shoulder, with signs saying "no hard shoulder for 2 miles".

At its southern terminus, access direct from the ferry port onto the northbound entry slip road is an addition to this high-standard motorway. It introduces a traffic light junction under motorway restrictions.





Collaborative Partnering:

Smart Video & Sensing Ltd engaged with Portsmouth City Council and Highways England do discuss the position of the radars and the data collection requirements. Paul Darlow and Martin Wylie from Portsmouth City Council commented on the versatility and sensitivity of the TRUGRD STREAM coupled with the quality of display from the 2MP camera even in low light night time illumination. The distance covered by the radars was impressive with objects covered out at 250+ metres. Pedestrians and cyclists were being detected on a sunken walkway/cycleway adjacent to the southbound carriageway. Commenting on the TRUGRD STREAM, Paul Darlow Traffic Network Manager at Portsmouth City Council said “ The combination of a great CCTV image allowing us to monitor traffic movements plus the data collected by the radar makes this product a truly effective addition to our ITS estate. One product, two technologies.”

“THIS GIVES US SOME ADDITIONAL IDEAS IN OTHER AREAS OF THE CITY WHERE WE CAN INSTALL THE RADAR GIVING US THE CCTV AND DATA COLLECTION CAPABILITIES “ SAID MARTIN WYLIE OF PORTSMOUTH CITY COUNCIL

Products:

The idea traffic detector should be able to ‘see’ all traffic and share the data with traffic management planners and even interface to connected vehicle over vehicle to infrastructure links (I2V). Precise information will be passed from the radar to the vehicle informing the position of every object and obstacle in the vicinity.

It’s common to find products like radar, lidar, CCTV on our transport networks. All of these technologies have their advantages and disadvantages. Using a hybrid product like the smartmicro™ TRUGRD STREAM combining different technologies has major advantages. Radar detectors provide reliable detection under all weather conditions and can accurately detect speed and distance which CCTV cannot. Radar and camera combination provides an effective traffic detection solution – which is what is provided in the TRUGRD STREAM combined radar/camera from smartmicro™

Challenge:

The challenge faced by Smart Video & Sensing Ltd was to be able to install the radars on a gantry over the M275 without working over a live lane of traffic and without requiring a road closure whilst still capturing traffic in all 6 traffic lanes up to 200m from the radar detector. We were very fortunate since the gantry was in joint ownership between Highways England and Portsmouth city Council which made dealing with access issues easier through the Council. To overcome the issue of working over a live lane, SVS designed a bracket to mount the radar from the gantry over the verge of the motorway at the edge of Lane 1 but clear of the live lane.

Additionally, no direct communications were available at site, so the Novus unit was programmed for 3G/4G operation. The intention was to install an extension to the Portsmouth City Council 'mesh' system at that point soon and remove the requirement for the 3G/4G connection.



NOVUS PREMIUM DATA AGGREGATOR



Fig 1: Showing TRUGRD STREAM radar installation on a pole extender above gantry walkway with the NOVUS unit installed below. The radar is installed at an overall height of 9.7m from carriageway.

Both radars were commissioned. One radar was directed northbound and the other directed southbound capturing the traffic data in each direction.

The northbound radar was also monitoring the bus lane from the local park-and-ride scheme which was due to re-open after a COVID shutdown on 19th July 2021. CCTV coverage was good even in reduced light conditions (motorway lighting at night).

Data Collection:

Data collection and aggregation is done by the NOVUS PREMIUM from Smart Video & Sensing Ltd. The NOVUS product can interface to up to 4 smartmicro™ radars and can store the data locally to a hard drive or removable flash drive and can communicate via an IP link or over a 3G/4G network via modem. A local copy of the traffic management configuration software is held locally on NOVUS to allow reconfiguration and remote access to the radar(s) installed on site.



Fig 2: CCTV image M275 southbound from built-in camera in the radar with the object detection and classification and other data shown on the right.
 *Note the cycleway and walkway to the right of the image where the radar was also picking up pedestrian traffic and cycles.

The raw data leaving the radar is in a pseudo-hexadecimal format provided by smartmicro™ (via RS485 or port based via ethernet) and a video stream (via ethernet) to the NOVUS PREMIUM data aggregator developed by Smart Video & Sensing Ltd. Software in the NOVUS has been specially written within a Windows™ environment to interpret the hexadecimal output from the smartmicro™ radars to identify the data headers for relay outputs, per vehicle counting and other statistical data. The information drawn from the data aggregation and statistical analysis can then be used to provide the information about the data captured by the radar in other formats. Data is stored at the NOVUS on a removable data device or a hard drive to ensure that nothing is lost in the event of any communications breakdown and can be uploaded at any time in a .csv format, .xml format or passed to the Smart Video & Sensing Ltd cloud server or to a third party software application via an API or JSON file.

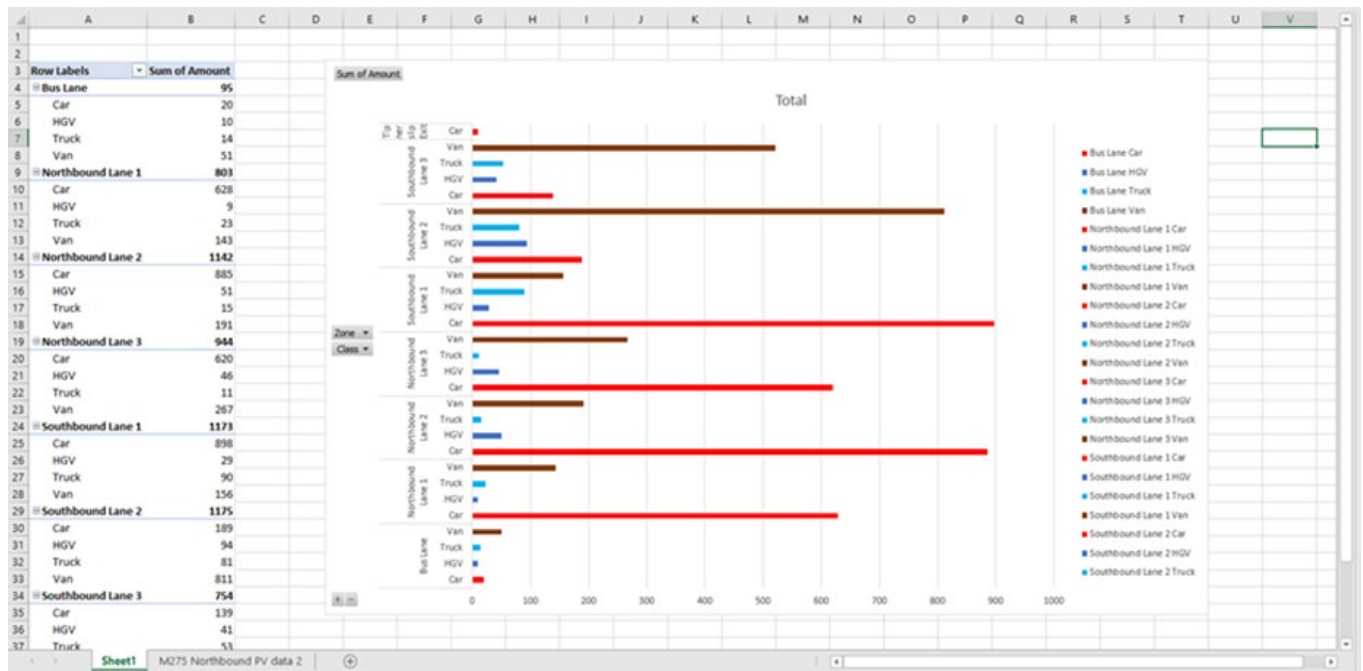


Fig 5: Presentation of data using pivot tables

The preceding tables give a good illustration of how data may be presented from the .csv file using pivot tables to convert the data into easy to ready graphical representations.

Expansion of the System:

Following the success of the installations on the M275 and prior to the end of the test period Portsmouth City Council placed orders for an additional four TRUGRD STREAM radar/camera units with NOVUS PREMIUM to be installed at strategic locations around the slip roads of the M275 where there are regular build ups of traffic which sometimes queues back to the motorway creating potential safety concerns.

“Following the impressive performance of smartmicro™ TRUGRD STREAM coupled with the Smart Video & Sensing NOVUS PREMIUM over the past 5 months, Portsmouth City Council will look to roll out more of these combinations at other strategic routes around our main traffic corridors” commented Paul Darlow.