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Zero-setback detection

Easily mountable on existing roadside poles and fully programmable to support a variety of applications – in any weather condition – the RTMS radar sensor is making some serious waves in the field of traffic detection

Urban traffic control is a relatively undeveloped area of advanced traffic management, in which ITS disciplines have shown they can yield high benefits at low cost – i.e. relief of congestion through better management of traffic in the existing grid. Yet urban traffic has all the ingredients for successful ITS deployments. For instance, there is a high concentration of vehicles; cities being the ultimate destination of the majority of traffic. The widening of roads to increase capacity is not an option, and improved signal coordination is clearly an achievable congestion reduction method.

URBAN CHALLENGES

One difficulty in the deployment of ITS in the urban environment is the complexity and cost associated with the deployment of detection systems and sensors to support such systems. Clearly, to perform near-optimal signal control requires accurate real-time data – and lots of it. Until recently, though, this meant a difficult choice among several alternatives.

Stop-bar loop detectors are difficult and expensive to maintain as a result of frequent failure and the need to stop traffic during maintenance. They also provide only part of the data required for effective signal timing control. Video detection at the stop-bar, meanwhile, alleviates such maintenance headaches, but is still unable to provide the most essential information – the length of the queue at each approach. Advance or system detectors – commonly called 'midblock' detectors – can complete the picture and provide the necessary data for full and even adaptive control. However, they have been associated until recently with high cost, resulting from installation constraints and communications requirements.

New developments now allow the addition of midblock detectors to urban traffic control systems at a fraction of both the deployment and maintenance costs. There are a number of advantages to be gleaned from the placement of midblock detectors. As well as measuring the actual queue length in real time, they measure link speed, while providing positive indication of a long queue, long before gridlock forms. That said, there are a few limitations. For instance, expensive communications and power lines may be required far from the intersection. In addition, it may require special poles for deployment, which further complicates the installation.

Older loop detector technology for traffic detection is both expensive and impractical for midblock detection and hence used sparingly.

MICROWAVE RADAR

However, a new innovation is now available for accurately and reliably monitoring midblock traffic at a fraction of the cost of in-road loops. It combines a multilane microwave radar detector with a wireless

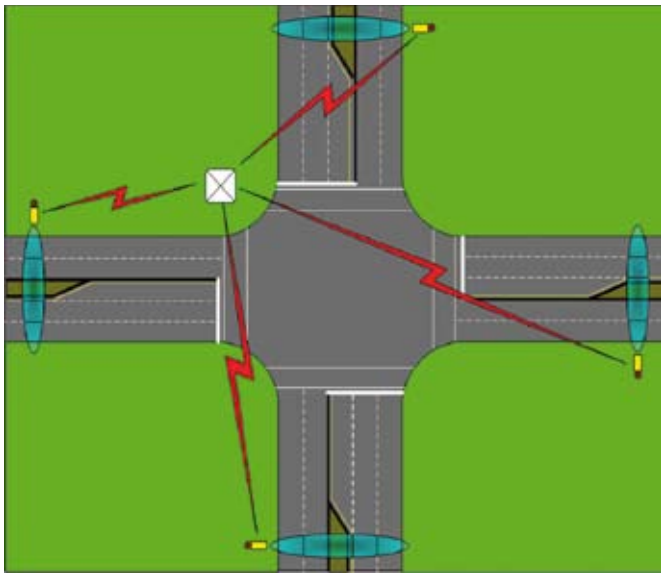


Figure 1 shows the Detection Event Reporting architecture setup

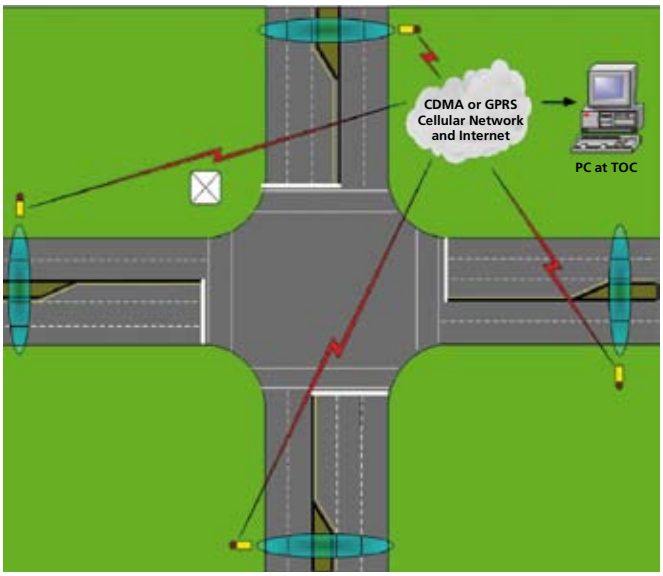
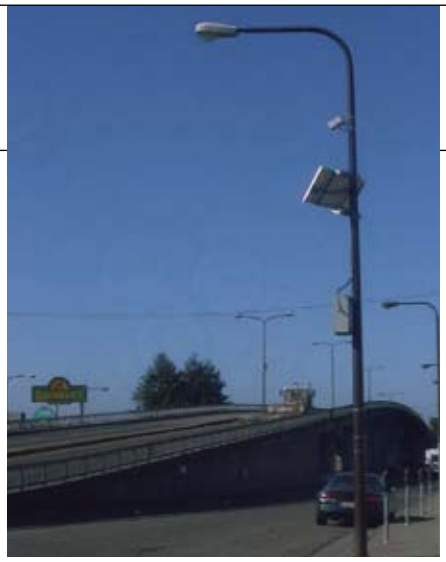


Figure 2 shows the Statistical Data Reporting architecture setup



High concentration of vehicles in an urban scene

Figure 3: The RTMS detection system can be mounted on existing poles close to the curbside

Figure 4: Zero setback capability makes the RTMS an ideal solution for urban traffic control

modem. Such wireless detection stations have proved their mettle in highway ITS applications, but have been largely overlooked by urban traffic engineers.

There are two architectural alternatives for the addition of such wireless midblock detection to an existing UTC system – Detection Event Reporting and Statistical Data Reporting. In the former, the presence of every vehicle detection is reported on a second-by-second basis, so is suitable for adaptive traffic control systems such as SCOOT. A Statistical Data Reporting architecture – in which statistical averages such as volume, occupancy, and per-lane average speed are periodically reported – is suitable for quasi-adaptive schemes in which timing plans are built and switched based on real-time data collection. Each of these architectures has its own special advantages and limitations.

In the Detection Event Reporting scheme (Figure 1), the detector immediately reports the detection in each lane. Data can be typically provided as contact closures, which interfaces directly with the existing controller. There are several advantages of this scheme. First, the traffic controller is typically ready (hardware and software) to receive the inputs, so no changes are required. Second, full and detailed information is delivered, allowing unrestricted processing in support of various adaptive control algorithms. Third, the data can be processed separately and differently during the green and red cycles. Another advantage is that the radio communications channels are highly reliable, and user-owned. Finally, data communications from the controller to the TOC can use existing channels.

Statistical Data Reporting (Figure 2) bypasses the entire network of traffic controllers and provides its data directly to the TOC. Data provided is statistical in nature and does not provide sufficient detail for some applications. There are benefits with this scheme also. For example, the wireless detection system does not burden the traffic controllers, while the communications transport is conducted by service providers.

Both schemes provide valuable and timely data cost effectively, allowing quick deployment without requiring changes in the traffic controller's software or communications network. In addition, both schemes are scalable, allowing for deployments that support anywhere from a single intersection through a busy arterial to a full area-wide solution.

ZERO SETBACK

Until recently, a main limitation of the microwave radar detectors was the need for a significant setback distance – i.e. the distance from the sensor to the first detected lane. Although this requirement is of less significance in the highway traffic management environment, urban traffic measurement is achieved from close distance and does not allow for the introduction of special poles. Existing poles are often very close to the curb, as shown in the Figure 3 and Figure 4 above. Another limitation is that of providing power to a detector on a midblock pole, often a luminaire pole. Many luminaire poles have only night-switched power.

With the introduction of the new RTMS radar by Image Sensing Systems Canada, most of these issues have been dealt with. The new RTMS supports a zero-setback requirement, which allows any existing pole to become a midblock detection station. This obviates the purchase and installation costs of a pole and makes for simple, safe and quick deployment. The low power consumption of such a station makes it feasible in many cases to utilize solar or UPS power right on the pole.

For poles that have power on a continuous basis, RTMS allows a clean non-obtrusive detection station, which can be powered from 110 or 220Vac with no need for a pole cabinet, as all of the power supplies and radio modem parts are included within the small sensor enclosure.

The proven cost-effective method of utilizing wireless traffic detection stations has now penetrated the urban traffic control market with a presence in a number of cities with high congestion and few alternatives. The new zero-setback capability of RTMS means that any existing pole in the city can now be used to improve the flow of traffic. Coupled with the 'all-in-one' RTMS G4, it simplifies the detection station and reduces its cost, while maintaining highly reliable and accurate all-weather operation. ■

To find out more information about RTMS G4, please contact Image Sensing Systems Canada by telephoning +1 416 785 9248, emailing zsafa@imagesensingca.com. Alternatively, please log on to www.imagesensingca.com