Video detection systems (VIDS) have long been the smartest choice for detecting vehicles approaching signalized intersections having mast arm poles. The mounting platform provided by such mast arms give both a stable view and an optimum location for positioning the camera sensor. For a significant portion of the nation, however, traffic signals are typically constructed with span-wire instead of ever-increasingly-expensive mast arm poles. By some accounts, nearly one-third of U.S. traffic signals are built with span-wire – including an overwhelming majority of intersections in the Northeast and the South. Until now, the drawbacks for using VIDS at span-wired signals outweighed the benefits, and as a result very few such signalization designers chose VIDS for those intersections.

Let’s recap those benefits. Compared to loop detectors, VIDS offer a number of differentiating or additional advantages. In such a comparison, VIDS have all of the following positive characteristics: (1) a lower lifecycle cost; (2) the ability to gather far more information; (3) the capability to redefine and add detection zones at will; (4) the ability to remotely view traffic conditions from the traffic manager’s desk; (5) the ability to remotely perform some maintenance from the traffic technician’s desk; (6) the avoidance of danger-filled and congestion-causing lane-blocking construction; (7) the ability to differentiate between bicycles and vehicles in the same processing unit (…well, at least one manufacturer offers this); and (8) the ability via software updating to incorporate improved detection algorithms over time.

These desirable attributes are for naught, however, if the VIDS’ primary purpose – namely, robust detection – is considered lacking. At span-wired traffic signals, it is more difficult to achieve this robustness for 2 reasons. First, the span-wire mounting does not provide a stable platform so that the camera’s image is steady enough for normal VIDS algorithms. Such a camera location will give plentiful false calls for an approach that may be totally lacking vehicles, extending the phase to maxout. A sure-fire scenario for generating lots of complaint calls! Second, mounting the camera off to the corner pole (which obviously overcomes the platform instability problem) produces angled views of the approach lanes. Such angled views can often lead to false calls and missed calls due to occlusion of vehicles in, for example, the left turn lane by large trucks in the left-most through lane. The lack of robustness for the VIDS detection output at span-wire signals has, to date, relegated this detection technology to a very low desirability position.

One vendor, Iteris, has undertaken the requisite applied research focused on solving this problem. The result is a new product that will allow signal designers to consider VIDS for span-wired signals as a viable and (with the benefits of VIDS) a desirable detection technology choice. This unit is specifically designed to be mounted on tethered span wire implementations. The technology “trick” of compensating for the camera motion is relatively simple in concept, but to achieve it requires sophisticated image processing techniques – applied for the first time to the traffic detection industry. Dynamic Zone Stabilization is the solution that Iteris has utilized to create its new SmartSpan™ product, a completely new VIDS platform within the Vantage® detection system family. Image stabilization has been commonplace in consumer digital cameras for at least a decade, and this product uses many of those proven techniques, among other secret ones – the detection algorithms developed for use in this product are complex and are company confidential intellectual property.

The ‘generation one’ Iteris product represents about two calendar years’ worth of effort by a very talented team of Iteris software engineers. Almost like magic, detector zones in the SmartSpan camera’s bouncy or wiggly field of view are dynamically adjusted in real time so that they remain solidly planted on the same patches of ground in the lane(s) being detected. The result is robust VIDS detection at truly optimal camera positions – directly in line with the approaching lanes, mid-span along the span-wire.

The complex analytics of SmartSpan all takes place on-board the processor card that is mounted in the controller cabinet. Like all VIDS, this processor is able to create multiple independent detection zones as desired within that camera’s field of view, providing multiple outputs for differing phases and/or applying delay or extension timing. Including, of course, discriminating bicycle detection – the SmartCycle™ algorithm (another 2013 innovation from Iteris) has been applied across the entire Vantage detector family. (See page 42 of this IMSA Journal for an article on the importance of bike detection.) The span wire mounted camera and processor can be used in any quantity and any combination of approaches at an intersection. The processor cards are one per camera and are compatible with all standard traffic cabinet racks.

Firstly –
VIDS for Span-wired Signal Installations
By Glenn Grayson, ITS Applications Marketing Manager, Iteris

Continued on page 37
IMSA Journal
The companion piece of hardware to the processor is the camera sensor unit. Here again, a specialized Vantage camera has been developed that is perfectly mated to the SmartSpan processor. Its form and format have been structured for optimum use in a span-wire mounting. The unit employs a small form factor camera and disengages the optics (lens assembly) from the camera electronics in order to achieve a unit that is as shallow as possible. This configuration minimizes the gravity-induced rotational movements in the vertical plane by having its mass gathered as tightly as possible along the unit’s vertical axis, as well as minimizing the wind loading on the span wire.

Because this camera sensor unit has the same functional elements as the Vantage RZ-4 Advanced™ Wide Dynamic Range camera model, this means that SmartSpan can be used with a regular VIDS camera on a problematic mast arm location. Some agencies use very long mast arms (up to 70 feet or more!), and they have reported having some objectionable up & down arm movements leading to VIDS producing false calls. In such instances, this born-for-span-wire VIDS product can also rationally be used to mitigate the “long arm bounce”. A majority of governmental jurisdictions in the ‘span-wire world’ have never had the opportunity (or desire) to use VIDS at their traffic signals. Now, with this barrier broken, it is likely that many of these agencies may be interested in trying out the technology. This product is now in production and being shipped, and Iteris is able to supply small or large quantities with relatively fast delivery times. This is not a tiny market niche being addressed; the magnitude of span-wire VIDS deployments could realistically be very large. Iteris is first to market. Where will you try out your first span-wire mounted VIDS? The benefits are beckoning.

About the Author
Glenn Grayson, Iteris’ Marketing Manager for ITS Applications, is a registered Civil Engineer in Nevada with more than 30 years of professional engineering experience. Prior to joining Iteris, Mr. Grayson was the Director of FAST at the Regional Transportation Commission of Southern Nevada, where he was responsible for managing a staff of 34 providing arterial traffic signal coordination services for the entire Las Vegas valley, and providing turnkey operations and maintenance services to the Nevada Department of Transportation for its freeway ITS deployments. Prior to his three-year service as FAST Director, he provided ten years of transportation engineering and ITS consulting and project management with Iteris. Mr. Grayson began his career as Traffic Engineer of three cities in Texas and Nevada.