**Title:** Advanced monitoring, prediction, and control methods for urban arterials

**Aim and Scope:** (up to 300 words)

Urban traffic congestion is a major problem that wastes a significant amount of time, fuel and money. One of the main contributors to urban traffic congestion are the intersections of urban arterial roads where multiple conflicting traffic streams and multiple modes must compete for the same space. Many researchers have focused on improving intersection operations (either isolated or along arterials with multiple intersections in close proximity) by considering signal operations and other spatial-temporal solutions to allow vehicles to more efficiently use the available space.

In the last decade, there has been a rapid development in sensing, vehicle, and controller technologies, and these have the potential to provide advanced methods to improve intersection operations. For example, GPS, Bluetooth and other technologies can provide data on individual vehicles as they traverse urban environments, which can be leveraged for improved monitoring, prediction or control purposes. The management and use of this data for monitoring intersections is an interesting and challenging problem due to the large amount of data available. How to efficiently manage, summarize and utilize this data, considering different data analysis techniques, including statistical analysis and machine learning, is a difficult problem to tackle. Moreover, the use of this data to predict future traffic states to plan efficient control strategies requires that either models of traffic flow are included in the data analysis, or self-learning algorithms such as deep-learning are utilized. Finally, given that the current and future state of traffic are known, new control strategies can be developed. These include better information or guidance provided to human-driven vehicles or trajectory control of individual autonomous vehicles, considering the different types of vehicles that might utilize the intersection including public transportation and freight vehicles.

**List of topics:** (up to 10 topics)

Some potential topics of interest include, but are not limited to:

1. Use of new data sources (e.g., probe, Bluetooth, video surveillance data) and new technologies (e.g., CAV) to better understand and manage arterial traffic.
2. The use of urban trajectory data (e.g., GPS, smart card, Bluetooth) for traffic estimation and prediction
3. The use of connected vehicle data for improved signal control
4. Trajectory guidance and signal control using 2-way V2I and V2V communications
5. Improving signal control in a multi-modal environment
6. Smart traffic lights based on Artificial Intelligence (AI)

7. Computer-vision approaches to traffic monitoring and collision detection
8. Data fusion for integrating and leveraging heterogeneous data sources

**History:** First time proposal

**Expected number of manuscripts / list of prospective authors and contributions:**

It is expected that at least 20 different manuscripts would be submitted to this special call. Some specific researchers that we are aware of that work in these areas include: Eleni Christofa (multimodal signal control), Eric Gonzales (signal control), Weihua Gu (traffic prediction), Nicolas Geroliminis (traffic control and prediction), Nicolas Chiabaut (multimodal signal control), Monica Menendez (traffic control and prediction), Mehmet Yildirimoglu (traffic control and data integration), Hwasoo Yeo (traffic monitoring and prediction), Md. Mazharul (Shimul) Haque (traffic conflict analysis) and many more.

**Dissemination plan:**

We have not yet contacted any presenters for this special issue. We plan on contacting the colleagues listed above directly. We will also disseminate the special call through our TRB committees – AHB45 (Traffic Flow Theory and Characteristics), ADB30 (Transportation Network Modeling Committee) and ABJ70 (Artificial Intelligence and Advanced Computing Applications).

**Contact details:**

**S. Ilgin Guler**

Assistant Professor
Department of Civil and Environmental Engineering
The Pennsylvania State University

Office address: 221B Sackett Building, University Park, PA, 16802
Phone: 814-867-6210
Email: iguler@engr.psu.edu

**Jiwon Kim**

ARC DECRA Fellow, Lecturer in Transport Engineering
School of Civil Engineering
The University of Queensland

Office address: Hawken Engineering Building, 50-S415, Brisbane St Lucia, QLD 4072, Australia
Phone: +61 7 3346 3008
Email: jiwon.kim@uq.edu.au

**Vikash V. Gayah**

Associate Professor
Department of Civil and Environmental Engineering
The Pennsylvania State University

Office address: 231L Sackett Building, University Park, PA, 16802
Phone: 814-865-4014
Email: gayah@engr.psu.edu