Special Session title
Beyond Traditional Sensing for Intelligent Transportation

Special Session proposer(s)
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Abstract
Over the past few decades, sensors have not only become more advanced but also made impressive strides across an increasing number of sensing modalities. Despite the improved capabilities and breadth of available sensor systems, those used for intelligent transportation have remained relatively uniform across platforms; as a result, the algorithms and techniques being designed for these platforms do not take full advantage of the rich information that modern sensors can provide. Since all tasks -- including perception, localisation, decision-making, and learning -- are built on top of sensing, exploring alternative approaches to sensing is a compelling research area that can render all subsequent tasks more robust and accurate.

The objective of this special session is to explore unconventional sensing for intelligent transportation in three ways. Firstly, it will investigate sensor systems that are not typically applied to certain transportation tasks, such as radar for precise localisation, audio for failure detection, and RF sensing for road traffic estimation. Secondly, it will explore nontraditional sensor configurations and placements, such as ground-facing cameras using shadows to detect occluded moving objects. Lastly, it will look into the sensing of commonly overlooked information, such as the use of atmospheric sensors for gauging road surface traction or in-vehicle sensors for driving analysis.

Via these three themes, this special session aims to stimulate discussion and research into nontraditional sensing in order to improve the reliability and accuracy of transportation systems.

Keywords
- Sensing, Vision, and Perception
- Automated Vehicle Operation, Motion Planning, Navigation
- Other Theories, Applications, and Technologies

Topics of interest
- Localisation and navigation using radars (e.g., scanning, Doppler, and ground-penetrating)
- Ego-noise and soundscape modelling and interpretation (e.g., sound-based failure detection, terrain/road surface status classification, urban sound source detection and localisation)
- Unconventional optical sensors for localisation and perception in challenging scenarios (e.g. event-based vision, multi-spectral imaging)
- In-vehicle sensing and wearable computing for failure detection, driver and passenger behavior modelling

- Novel sensor hardware and designs
- Unconventional sensor placements or multi-sensor systems
- Optimal sensor scheduling
- Astronomical (skyward-facing), atmospheric or odour-based sensing
- IoT technology for intelligent transportation and Internet of Vehicles (IoV)
- Passive Wireless/RF sensing