

# Proposal for a Special Session at the 2017 IEEE Symposium on Computational Intelligence in Vehicles and Transportation Systems (CIVTS'2017)

**Special Session Title:** “Data representation for learning vehicle intelligence”

## **Theme and Scope of this Session:**

The vehicle intelligence relies on the real-time interaction with both the external environment and the internal operating environment. The central controller of intelligent vehicle learns and makes decisions by capturing the various sensing data from the environment, such as the automotive operating data and the monitoring data about the surroundings, the road and other vehicles provided by optical and infrared cameras, Laser, ultrasound and radar. These raw monitoring data are massive, heterogeneous and statistically complex with unknown distribution. Therefore, most decision-making techniques may not be directly used to construct the prediction model for these raw data.

Recent development in representation learning shows that finding appropriate representations of data plays a critical role as a preprocessing procedure for the success of modern prediction techniques. The typical representation learning methods include *deep neural networks, sparse coding, dimensionality reduction, reinforcement learning, time series modeling, knowledge graph*, etc. By automatically extracting the useful information from the raw data acquired by sensor systems, the controller of an intelligent vehicle could be capable of efficiently sensing its environment, navigating, cruise controlling and fault detecting.

## **List of main topics:**

The main topics of this special session include, but are not limited to, the following:

- Heterogeneous data processing based on various vehicle sensors.
- Data representation for fault detection, e.g. collision detection and avoidance.
- Data representation for driver state detection and monitoring
- Data representation for driver assistance and automation systems, such as adaptive cruise control, automatic navigation and route guidance
- Learning image and video representation for object recognitions such as pedestrian detection, traffic sign detection and recognition
- Data representation for spatio-temporal traffic pattern recognition
- Data representation for trip modeling and driver speed prediction
- Data representation for vehicle fault diagnostics and health monitoring
- Data representation for vehicle energy management and optimization in hybrid vehicles
- Data representation for driver habit learning

## **IMPORTANT DATES**

- Paper Submission Deadline: July 2, 2017
  - Notification of Acceptance: August 27, 2017
  - Final Paper Submission Deadline: September 24, 2017
- <http://www.ele.uri.edu/ieee-ssci2017/ImportantDates.htm>

## **Pape Submission:**

- Please follow IEEE SSCI 2017 Submission Website:  
<http://www.ele.uri.edu/ieee-ssci2017/PaperSubmission.htm>

## **Name of Organizers:**

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