Faculty Name:

Zoran Kostic

Faculty Email:

zk2172@columbia.edu

Lab:

Lab of Prof. Kostic

Project Title:

Real-time AI-based multi-sensor multi-object object tracking and classification to support streetscape digital twins.

Description:

We research techniques for improving safety of pedestrians, traffic flow, and smart streetscape applications. We aim to accomplish precise localization and tracking of objects by utilizing infrastructure-installed multimodal sensors such as cameras and lidars to provide a global view of the behavior of smart city traffic participants. We rely significantly on traffic intersections which are particularly suitable locations for the deployment of computing, communications, and AI-based services for smart cities of the future. The abundance of data to be collected and processed, in combination with privacy and security concerns, motivates the use of machine learning and deep learning processing, and to deploythe edge-computing paradigm which aligns well with physical intersections in metropolises.

The research covers the following topics: (i) system design considerations when using smart city intersections as intelligence nodes; (ii) data preprocessing to take advantage of fixed scenery and repeatable dynamics; (iii) designing machine learning/deep learning methods for robust inference for object detection and trackig; (iv) examining latencies for sensors, high-bandwitdh communications links, and AI-based processing; (v) exploring methods to approach real time interaction in the chain from sensors to data consumers; (vi) studying the partitioning of the computation across extreme edge, edge and cloud servers; (vii) investigating cooperative sensing which combines in-vehicle and infrastructure sensors; (viii) federated inference; (ix) digital twins.

The research relies on the experimental studies performed on the COSMOS testbed located in New York City.

Location of Research:

On-Site

# of hrs/week:

20

Department/Program:

Electrical Engineering

Eligibility:

BS, Fourth Year, MS

To apply, please contact:

zk2172@columbia.edu