

# BusEdge: Spatio-Temporal Analytics for City Scale Understanding

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## BusEdge System

A bus retrofitted with onboard hardware (Edge) for online processing capabilities connected to a central server (cloudlet) for further offline processing.



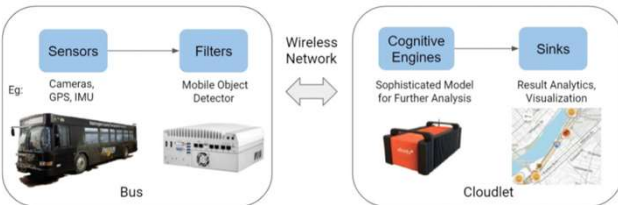
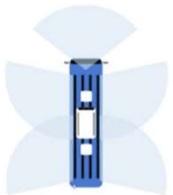
Continuous stream from 5 cameras!

Current bus:

- 4 routes everyday
- ~40 miles each route
- 5 cameras: 360° outdoor coverage

Planned second bus:

- 2 additional cameras Inside



Architecture: Pre-analyze on edge, only send relevant data to Cloudlet

## City Scale Understanding

Results from the cloudlet

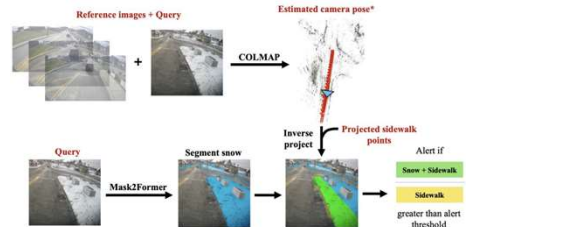
Map of the city with real-time actionable information.



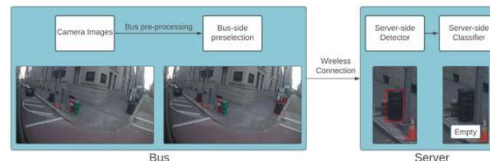
- Birds Eye View of Public Service Infrastructure
- Self Driving: Informing HD Map Updates.
- Understanding Transit specific issues.

## Informing Public Services

Snow Detection on Sidewalks and Bus Stops



Trash Can and Garbage Detection



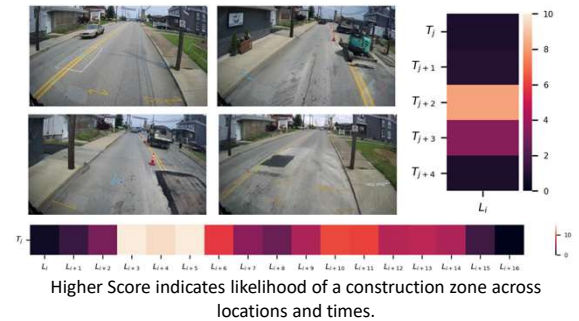
## Detecting Long-Term Developments

Detecting Crosswalk Change for HD Map Update

Added CW (blue), Unchanged CW (green), Removed CW (red)



Spatio-Temporal Mining of Construction Zones



## Future Work



- Understanding difficulties experience by people with situational challenges
- Improving vision processing capabilities on the edge
- Unsupervised detection of unsuspected spatio-temporal anomalies