CrossGuard: Enhancing Pedestrian Experience at Intersections
Award #1951789
Shubham Jain, Stony Brook University
PG, FY2020

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| Community Partners |
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| • Kyle Spencer, City of Norfolk |
| • John Stevenson, City of Norfolk |
| • Sridhar Katragadda, City of Virginia Beach |

Project Vision

Pedestrians have long been treated as second-class citizens in the design of transportation infrastructure that has been centered entirely around vehicular traffic.

It is of a fundamental importance to provide pedestrian-centric services, particularly for vulnerable pedestrians such as kids, elderly, and the disabled.

- *CrossGuard* aims to make crossing at intersections safer and, in the process, elevate pedestrians' quality of experience (QoE).

- *CrossGuard* anticipates pedestrian needs and accommodates them promptly.

- Beyond its role as a human crossing guard, *CrossGuard* ensures pedestrian safety without interfering with the flow of the vehicular traffic.

Project Overview
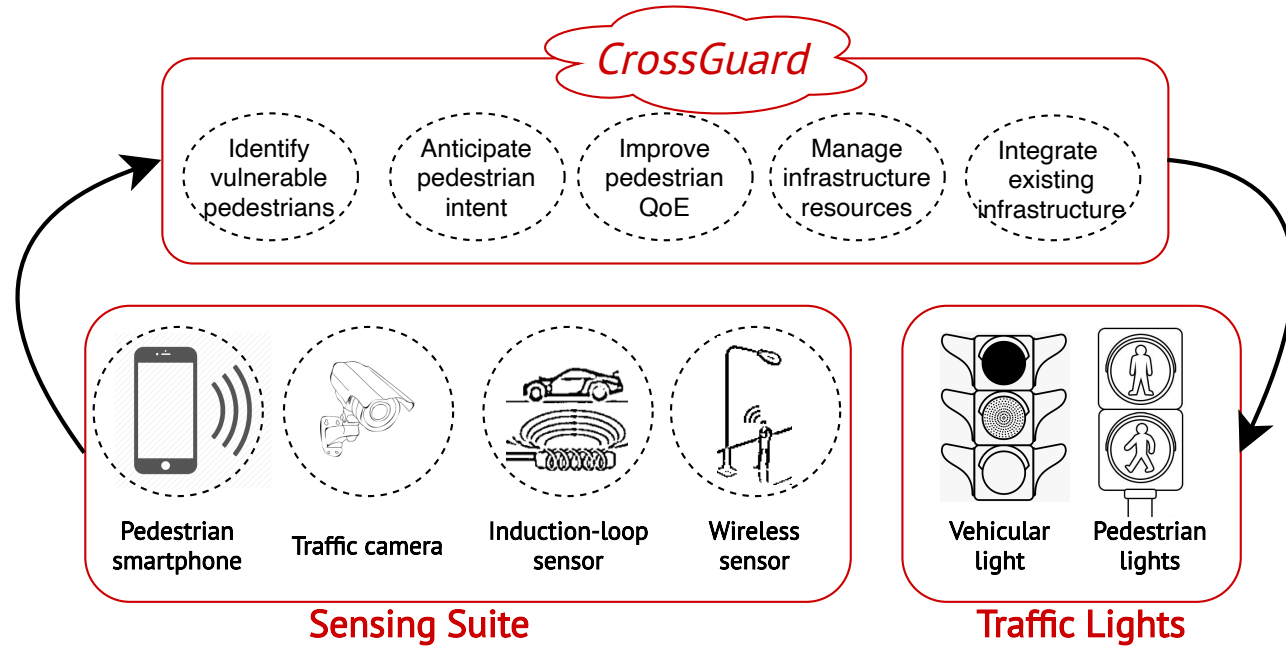
- Develop a multi-modal cyber-physical system for seamlessly integrating technology with smart mobility to improve pedestrian safety and well-being.

- Capture rich contextual data generated by sensing devices carried by the pedestrians and those installed at the infrastructure.

- Intersections equipped with traffic lights, pedestrian lights, cameras, and wireless sensing capabilities will serve as distributed compute nodes, gathering, processing, and sharing data with other nodes (intersections) in the network.

- Traffic light timings will be informed by the current intersection dynamics and by stochastic prediction of traffic volumes.

Project Update

Conducted focus groups with the following stakeholders:
- Police Officials who train crossing guards @ City of Norfolk
- Traffic Engineers @ City of Norfolk
- Public Works traffic safety officials @ City of Virginia Beach

Acquired the following data from City of Virginia Beach:
- 5-year pedestrian and bicycle crash statistics
- Oceanside pedestrian safety improvement plans
- E-scooter location traces
- 10-year event list with attendee population estimates

Ongoing tasks:
- Install a 360-degree camera suite @Norfolk for data collection
- Data analysis

Project Evolution

- We learned that cities have been seeking efficient solutions toward Vision Zero. We are currently investigating their existing measures and how best to position CrossGuard such that it is advantageous to the city.

- We discovered other hazards to pedestrian safety, such as e-scooters. We have received relevant data from City of Virginia Beach and are currently analyzing it.

- We learned that despite their interest, cities have been lacking in installing state-of-the-art infrastructure. We are working with the city of Norfolk to install a 360-degree intersection camera that is integrated with the traffic lights and sensors. This will allow us to gather data to inform the system design for the IRG submission.

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