Investigating different ways of organizing pedestrian operations in automated traffic

Master‘s Thesis of Akash Waghani

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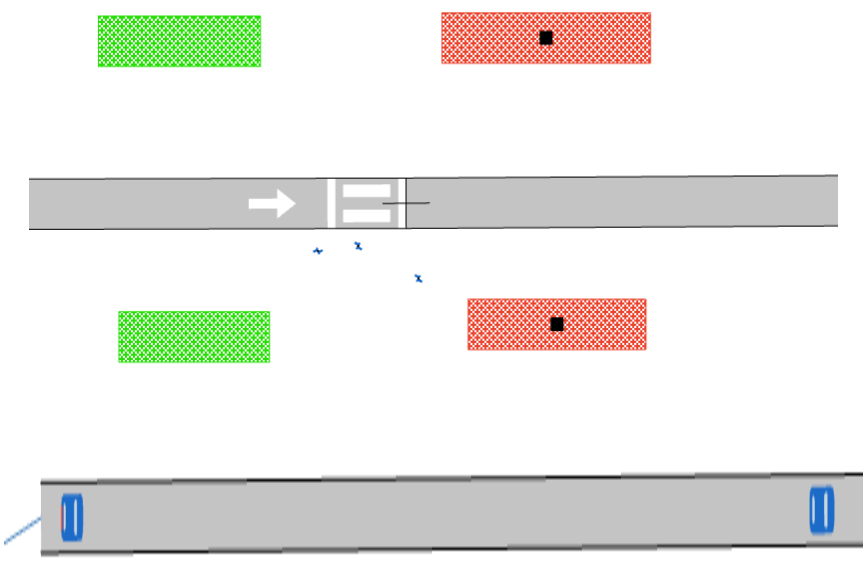
Design Goal

The proposed control approach offers to manage safe passage of pedestrians while improving traffic flow by taking out intersections, the bottle neck, from the urban road network.

- The model does not require additional infrastructure.
- The model supports AIM and does not require vehicle to stop at the traffic intersection.
- The model gives priority to the pedestrians over the vehicular traffic.
- The model uses on-vehicles sensors (LiDar) for V2V communication and pedestrian detection.

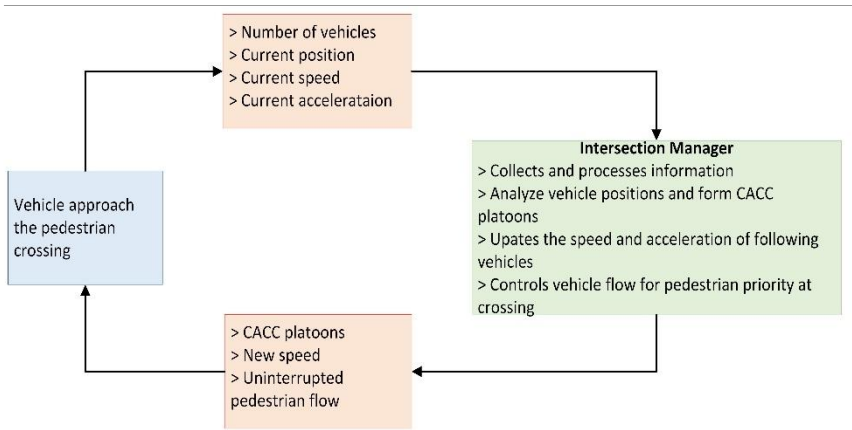
Modeling Architecture

- Aimsun Next was selected as the microsimulation software tool to be used in this study
- APIs were implemented using Python programming language
- The simulation provides number of vehicles, their position, current speed and acceleration as input to the intersection manager. The intersection of then process the data and returns CACC platoons, updated vehicle speeds and controls pedestrian crossing while giving priority to the pedestrians.



Objectives

- Literature Research on CAVs and AIM network
- investigate how different ways of organizing pedestrian operations in automated traffic influence pedestrian and vehicle levels of service.
- Two different scenarios implemented:
  - Different traffic demand scenarios
  - Pedestrian crosswalk with strict priority for pedestrians
  - signalized pedestrian cross-walk with green phases for pedestrians
  - both scenarios take advantage of V2V and V2I for a smooth trajectory planning for vehicles.



Conclusion

Developed model network was compared with traditional signal

Results show that:

- the developed thesis model has really outperformed the traditional network in vehicle delay in all scenarios i.e.:
  - Low traffic and Low number of vehicles
  - Low traffic and High number of vehicles

Limitations and Recommendation

The network was limited to one lane

Higher number of pedestrian could not be tested due to program crashes

Further studies could be made using a bigger network with high demand scenarios.