MICROSIMULATION OF CONNECTED AUTOMATED VEHICLES IN WORK ZONES

Introduction:
- Work zones
- Connected Automated Vehicles (CAVs)
- Market Penetrations (MPR)

Objectives
- To evaluate the effectiveness of CAVs on efficiency of freeway work zones using mobility and safety indicators
- To determine at what MPR the impacts of CAVs will be noticed in traffic stream

Presenter: Fehintola Sanusi
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PREVIOUS WORKS

- Bierstedt et. al (2014)
- Stanek et. al (2017)
- Atkins 2016

RESEARCH APPROACH
<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Hypothesis vs. Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel time (seconds)</td>
<td>CAVs market penetrations will improve travel time</td>
</tr>
<tr>
<td>Travel time variability</td>
<td>CAVs lower travel time variability</td>
</tr>
<tr>
<td>Delay (average vehicle per seconds)</td>
<td>CAVs lower average vehicle delay</td>
</tr>
<tr>
<td>Queue length (feet)</td>
<td>CAVs reduce queue length</td>
</tr>
<tr>
<td>Rear end conflicts</td>
<td>CAVs reduce rear end conflicts</td>
</tr>
<tr>
<td>Lane change conflicts</td>
<td>CAVs reduce lane change conflicts</td>
</tr>
<tr>
<td>Total number of Time to Collision Conflicts (TTC)</td>
<td>Percentage of conflicts in work zones</td>
</tr>
</tbody>
</table>
WHAT ARE THE FIGURES?

- **Travel time**: CAV 10%
- **Delay**: CAV 20%
- **Queue length**: CAV 10%
- **Rear end conflicts**: CAV 30%
- **Lane change conflicts**: CAV 30%
FINDINGS & CONCLUSIONS

• Advances in vehicle technologies can greatly improve traffic situations in work zones.

• CAV mobility benefits begin to appear even at lower market penetration rates (10%, 20%, 30%)

• These benefits are more significant in congested networks

• CAVs are safer than unequipped vehicles and are able to offset safety benefits at lower market penetrations

• CAV manufacturers can gain insight on the driving parameters to include in their products
Thank you for listening