**Evaluating the Impact Of Autonomous Behavior Using Micro-Simulation**

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With anticipated improvements in vehicular technology, traffic operations are expected to experience significant changes. Most recent vehicles have some autonomous functionality like adaptive cruise control or automatic emergency braking. Though there are uncertainties about when and how fully autonomous driving will be introduced, many are certain that autonomous vehicles (AV) will be on roadways in the future. The NHTSA has defined 6 levels of automation where level 0 means the vehicle is under human control, and level 5 is fully automated driving without any human intervention. Different levels of automation may affect traffic operations or traffic safety significantly. These impacts are yet to be explored. The microsimulation software package VISSIM has emerged as a popular platform to model AVs because it provides the opportunity to implement different driving behavior models through an Application Programming Interface (API). Although VISSIM's default car following model (Wiedemann) has limited ability to model CVs, it can be useful to model AVs. AVs will have zero or negligible Perception Reaction Time (PRT). Because of the negligible PRT, AV will require less lateral space, maintain a smaller standstill distance, and strictly maintain the desired speed (without distribution or oscillation), and will accelerate or decelerate more smoothly. This study will implement different levels of automation with these advanced behaviors using Wiedemann model in VISSIM. Finally, how these behaviors are going to affect traffic operation for different level and penetration rate of AV in an urban congested network will be explored. The findings of this study can be used to determine whether these behaviors should be incorporated with AVs.

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