

Undergraduate Thesis Prospectus

Obtaining Product Line Information for Software Engineering Teams
(Technical Research Project in Computer Science)

How Promoters of Autonomous Vehicles Sustain Confidence in Their
Potential
(Sociotechnical Research Project)

by

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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General Research Problem:

How may automation best improve sociotechnical systems?

Where automation is practicable, it offers numerous advantages, such as reduced labor costs, greater reliability, and greater precision. Yet not all processes can be automated with equal success, and the limits of automation are controversial.

Obtaining Product Line Information for Software Engineering Teams

How can software engineering teams keep track of product line information during development?

An ongoing issue for many software engineering teams is a lack of quick and easily accessible information about product releases, leading to missed deadlines and goals. The adopted solution for this issue was to have a dashboard containing build memory information that can be easily accessed by engineers and project teams. Constraints for other solutions includes the fact that memory information is obtained in bulk and is not easy to visualize, making it hard for engineers to interpret results without a graphing method, such as a dashboard. The current state of the art is an internal tool that obtains this information in bulk without graphing utility. Methods to obtaining a dashboard include automation with internal tools and storing data on the cloud. This was done by first having build memory data collected and sent to the cloud in an automated fashion using the Jenkins Server. A user interface with access to this data, Amazon QuickSight in this case, can now continually collect and plot this information into predefined graphs and visuals.

The result is an accurate and automated memory analyzer dashboard that is easy to interpret. This lets teams adapt to downsizes when that memory targets shrink and to

quickly identify modules that may be causing a spike in memory usage. Future implementations would be to expand this project to include teams outside of the modem group

How Promoters of Autonomous Vehicles Sustain Confidence in Their Potential

Since 2018, how have tech companies and automakers strived to sustain investment in the development of AVs despite AVs' consistently disappointing performance?

Tesla's self-driving algorithm has long proved its unreliability. In 2018, a glitch in Tesla's Autopilot technology caused the fatal crash of Walter Huang's Tesla Model X, turning itself into an oncoming lane (Lee, 2020). According to Tesla, "the only way for this accident to have occurred is if Mr. Huang was not paying attention to the road." However, the crash report shows that the vehicle accelerated to 72.8 mph before the crash, likely giving him little time to react and redirect the steering wheel (Korosec, 2019).

Li, Seth, and Cummings (2019) evaluated the safety of the Normal, Cautious, and All- Knowing versions of CoEXist, a self-driving algorithm, finding that "Fleets of AVs did not demonstrate large improvements for traffic efficiency and safety seen by in other research." This was because even the more conservative versions posed more potential risks to traffic. For example, long highway segment passing times and slower acceleration led to more traffic conflicts with normal drivers (Li, Seth, & Cummings, 2019).

Lawmakers have faulted Tesla for exaggerating its self-driving features. Tesla has been sued for such claims, including "indicating that a fully self-driving, fully autonomous Tesla vehicle was just around the corner, often expressly stating that would occur by the end of that calendar year or 'within the next year'" (Mayorquin, 2022). In 2017, the Union of Concerned Scientists warned that "While self-driving vehicles have the

potential to reduce vehicle-related fatalities, this is not a guaranteed outcome” (UCS, 2017).

Since October 2018, 5 months after Huang’s crash, Tesla has released vehicle safety report information; such disclosures often assert that drivers are safer with Tesla’s Autopilot. For example, in the 4th quarter of 2021, Tesla stated that “we recorded one crash for every 4.31 million miles driven in which drivers were using Autopilot technology For drivers who were not using Autopilot technology ... we recorded one crash for every 1.59 million miles driven” (Tesla, 2022). In fall 2018 Musk was under fire for stating falsely that Tesla would go private. Since then, Tesla has released 2 new vehicles, the Model Y and the Cybertruck, and has opened a gigafactory in China.

Philip Koopman, a researcher at Carnegie Mellon University, condemns the “drive-fail-fix” method typical of automated vehicle development (Koopman 2018).

Petit and Schladover (2014) identified cyberthreats to connected vehicles. GPS jamming is an inexpensive attack (about \$20) that can prevent an antitheft system from locating a stolen vehicle. An EMP attack can damage onboard sensors and processors; maps can be poisoned to take control of navigation systems (Petit & Schladover, 2011).

The Autonomous Vehicle Industry Association and Partners for Automated Vehicle Education (PAVE) represent member companies such as Cruise, Ford, and Motional, which want to protect their business from the reputational damage that overpromising can cause (AVIA, 2021; PAVE, 2022).

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