

Thesis Project Portfolio

Dynamic Order Generation for Automated Testing

(Technical Report)

How Autonomous Vehicles Will Impact Social Perception of Vehicle Safety

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Automation technologies can increase efficiency in many different fields, saving people time that can be spent on more important tasks. These technologies can also automate processes that are dangerous to humans, saving lives. For a multinational conglomerate e-commerce business which for the purposes of this project will be referred to as Company X, this means creating new tools to automate repetitive tasks in order to save the time of engineers. Company X offers online shopping services to its customers. Customers can place orders online and either have the items delivered to their homes or pick them up in-store. The quality engineering team in Company X spent a significant portion of their time creating sample online orders for use in pre-deployment testing. Online orders were sent through XML (Extensible Markup Language) files. These XML files were used to store all of the details associated with an order. Creating each sample order involved creating several layers of XML and manually inserting all of the order information into the file, a process that required a substantial time commitment from engineers. Furthermore, once an order was created, it needed to be published to the correct development environment. Engineers also performed this task manually, and needed to publish each sample order separately. Not only did these inefficient tasks waste the time and talent of engineers, time spent creating these orders increased testing time and therefore increased overall costs for the company.

In order to reduce time spent by engineers creating XML files, an application was created to automate the sample order generation process. This application allowed Company X engineers to create sample orders by executing a few lines of code and eliminated the need to manually write up the order file. Similarly, the application had the ability to publish the newly

created sample order to the appropriate development environment. This also allowed engineers to perform order publishing programmatically rather than manually.

This application decreased the amount of time needed to complete pre-deployment testing by twenty to twenty-five percent. This decrease in testing time, along with the increase in availability of quality engineers to work on other projects, is likely saving Company X a significant amount of money. A possible expansion of this application would be to add the ability to not only generate and publish sample orders but also track published orders and ensure they are successfully routed to the correct team. The technical paper below is a detailed design document for the application built for Company X. This document will discuss considerations made when determining which technologies to use, provide a detailed overview of each component of the core system architecture, and evaluate what additional preparation students need from the university in order to succeed in the workforce.

Another automation technology with great potential is autonomous vehicles. Each year, road vehicles emit substantial amounts of carbon dioxide into the atmosphere and 1.3 million people lose their lives in road related incidents (World Health Organization, 2021). If successfully implemented, autonomous vehicles would eliminate these unnecessary deaths and would also lead to great social and environmental benefits (Rose-Harman, 2021). However, even though autonomous vehicles would be several magnitudes safer than human drivers when perfected, a large factor influencing their use would be how their safety is perceived by the public. Without high safety perception from the public, autonomous vehicles are unlikely to be widely adopted by the public, substantially limiting their benefits described above. The main factors that will impact social perception of autonomous vehicles are: perception of AV driving capability and knowledge, amount of control over the vehicle passengers perceive, and passenger

comfort with AV ethical decision making. The STS research paper below contains an analysis on how these different factors will affect social perception of autonomous vehicle safety and how to design autonomous vehicles in order to maximize public adoption.