

Undergraduate Thesis Prospectus

Digital Product Management: Ensuring Value for a Digital  
Transformation

(technical research project in Computer Science)

The Promotion of Autonomous Vehicles in the United States

(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 do U.S. tech companies innovate?*

Fidelity (2022) estimates the market capitalization of the U.S. information technology sector at \$11.59 trillion. Tidd and Bessant (2005) caution, however, that even established IT businesses are vulnerable and must continually innovate to survive.

## **Digital Product Management: Ensuring Value for a Digital Transformation**

*How were product management skills employed to develop a digital product at my internship?*

This research is under the Department of Computer Science with Briana Morrison as the technical advisor. Revenue of the software industry in the U.S. alone is projected to be \$297 billion in 2022 (Statista, 2022). The vast proportion of revenue only goes to the creators of software that is valuable. It is essential for there to be management of the software product to ensure it will be valuable and financially successful. In many cases, a product manager is responsible for this success and must determine detailed requirements for the product so it will meet the demands of its consumers (Pichler, 2022). The aim of this research is to document how I employed product management skills and methodologies at my internship in 2021. The only major constraint is that I must maintain a level of abstraction to comply with NDAs. Actions taken to guarantee value while developing software will be detailed and be useful for anyone seeking to create successful software.

## **The Promotion of Autonomous Vehicles in the United States**

*How do proponents of autonomous vehicles advance their agendas in the United States?*

Since 2014, \$200 billion has been invested in autonomous vehicles (AVs) by incumbent auto companies (Holland-Letz et al., 2022). Precedence Research (2022) estimates the value of the AV market in 2021 at \$94 billion; it forecasts a value of \$1.8T by 2030. Molina et al. (2017) speculated that AVs would be a reality in “a few years”; five years later they still are not. Nevertheless, investment in AVs continues. AVs have been tested on some U.S. public roadways, where they can expose people to risks (Koopman et al., 2019). California may regulate AVs on public roadways; a similar bill has been introduced in Congress (CLI, 2021; Congress, 2021). Though AV developers have claimed their systems can improve road safety, there is skepticism amongst researchers and individuals (Reed et al. 2021; Clifford Law, 2021; Sotudeh, 2020).

Miller (2020) examined urban centers’ reliance on private automobiles and found sustainability “is multifaceted, has contested definitions, and difficult tradeoffs.” The challenge is to meet current needs without compromising those of future generations. According to Miller, state and federal policymakers neglect sustainable transportation modes in favor of automobiles, despite their extraordinary limitations.

Chakraborty et al. (2021) examined the transportation sector’s impact on climate change. The sector contributed an estimated 23 percent of global CO<sub>2</sub> emissions in 2021, largely from the 90 percent of vehicles that use petroleum fuels. The researchers suggested looking at other types of fuels to lower emissions. In 2019, electrification and biofuels limited the increase in emissions from transportation to an increment less than any previous annual increase over the 19 previous years.

In a study of transportation inequalities in U.S. cities., Jones proposes that better mass transit could reduce poverty.

The Autonomous Vehicle Industry Association (AVIA), a trade association sponsored by Uber, Waymo, Ford and other companies, promotes “the safe and timely deployment of autonomous driving technology,” primarily through online publicity (AVIA, 2022a). It distributes research that presents AVs favorably and issues press releases to influence the narrative around AV events (AVIA, 2022b; AVIA 2022c). One press release contends that because conventional driving is subject to “dangerous behaviors like speeding, impaired and distracted driving,” AVs are the safer alternative. (AVIA, 2022d). Another states that a proposed ban on AVs is “disappointing” because “self-driving technology has the tremendous potential to save lives and enable mobility” (AVIA, 2016).

Tesla, which aspires to develop AVs, claims its vehicles are “engineered to be the safest cars in the world” (Tesla, 2022). Tesla publicizes its cars’ high safety ratings, claiming for example that its Model 3 has “the lowest probability of injury of any vehicle ever tested by NHTSA” (Tesla, 2018). NHTSA, calling the claim inaccurate, directed Tesla to stop making it (Everts, 2019). Three years later, the claim is still prominently displayed. In 2021, Waymo, a subsidiary of Alphabet Inc., released a report claiming its vehicles would have averted crashes over 80% of the time compared to a human driver in simulations (Scanlon et al., 2021). Tesla has been subject to criminal investigation about their claims (Etherington, 2022).

Outside the industry, many critics of AVs argue that such vehicles’ safety benefits have been inflated and that they introduce many new hazards (Sotudeh, 2020). The combustible lithium-ion batteries that are standard for AVs pose significant fire risk (Clifford Law, 2021). AVs may foster overconfidence, causing drivers to be less attentive while behind the wheel

(Akhim, 2022). Highly connected AVs may be vulnerable to cyberattack (Clifford Law, 2021). Scant regulations and the pressure to innovate quickly may be a dangerous combination.

Siddiqui, Lerman, and Merrill (2022) reported that 273 vehicles running Tesla Autopilot have been involved in crashes from approximately June 2021 to June 2022. Tesla CEO Elon Musk has promised that in so-called Full Self-Driving mode, its vehicles could be “safer than a human” by the end of 2022 (Misoyannis, 2022). Although news reports often cover AVs’ faults, they have also touted AVs as “a safer ride” and highlight other theoretical advantages; for example, “when [an AV] drops you off, the vehicle goes back home instead of you paying for parking,” and “perhaps your vehicle will be part of a city’s rideshare network and picks up fares during the day” (Saltzman, 2022).

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