

Thesis Portfolio

A Space-Based Solution To Improve Roadway Safety And Efficiency In Virginia: Real-Time Winter Weather Data For Navigation
(Technical Report)

Social Media and the Deterioration of Constructive Political Discussion
(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
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In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Wrapping up my 4th year during 2020 and 2021 such a tumultuous time in politics gave me plenty of STS related topics to discuss. As an avid viewer of online platforms related to politics, researching the relationship between social media and political discourse was a natural approach to my STS Research Paper assignment. This of course was before the Capitol storming that took place on January 6th, 2021. That event demonstrated to everyone in the country that something ominous is happening. Something that the country has not dealt with before, and although there is no way to know what that is, I am confident that social media is at least contributing to it. My research paper reflected this interest by investigating what characteristics of social media were degrading political discourse in the U.S. The goal of STS is to understand the relationship between technology and society, the impacts they have on one another, and the ethical consideration engineers should be aware of when they bring a new technology into the world. In the 21st century I could think of no more impactful technology than social media. Admittedly my technical project, which involved finding an imager for the Spacecraft Design II CubeSat that was capable of detecting snow and ice on roadways in Virginia, had very little connection to my Research Paper.

In my STS research, I discovered there were at least six significant characteristics of social media that made it detrimental to U.S. political discussion. Many of these characteristics unfortunately were also a defining feature of the technology and not something that could just be fixed with a simple software update. Characteristics such as physical separation, instantaneous transmission of information, and shortness of publishing platforms like Twitter's 240-character limit. Other characteristics that degrade constructive discussion of political topics include social media's tendency to reward emotionally charged statements and moral grand standing. Social media also gives everyone the ability to post, including bad actors aiming to spread

misinformation. The last politically detrimental characteristic I discovered related to the algorithms that steer social media users into ideological echo chambers in which counter opinions rarely penetrate. In my research I stumbled upon the work of Stevan E. Hobfoll. In his book *Tribalism* he discusses the environmental triggers and evolutionarily developed behaviors that drive humans to act in hyper partisan ways. His work significantly contributed to the understanding of why the social media characteristics discussed have such a negative impact on political discourse.

The work done on my technical project produced the selection of an instrument that was best suited for fulfilling the purpose of the proposed satellite CLAYTON. For the MAE 4700 Spacecraft Design II class, there was multiple functional groups tasked with putting together a satellite named CLAYTON. A satellite that could detect ice and snow on Virginia roadways at a sufficient update frequency as to give drivers advanced notice of hazardous road conditions and improve traffic safety. I was the Instruments team co-lead and we established the requirements necessary for an instrument to detect snow and ice using research done on the GOES-R satellite which fulfills a similar function. Once these requirements were established, we determined that the HyperScape100 would be the best imager to use for snow and ice detection because of its high spatial resolution, small size, and sufficient spectral range.

Conclusion

The technical project produced results that were both educational and rewarding. The knowledge I gained regarding remote sensing techniques has left me better prepared to work with remote sensing should the opportunity present itself in my career. I have no regrets about choosing to research a subject that related very little to my technical project. My intention with

doing so was to prevent myself from becoming pigeon holed into only one area of expertise. My research paper has broadened my perspective of technological and societal understanding in a way that has made me far more aware of the social consequences of technology. Social media's influence on human psychology has illuminated to me the fact that engineers have an ethical responsibility to strongly consider the possible consequences of the technology they create, because too often good intentions can produce catastrophic results.

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