

**Thesis Portfolio**

**Molecular Dynamics Simulation of Thin Film Conductor Tensile Properties**

(Technical Report)

**Informational Apathy: The Impact of the Information Age**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science  
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree  
Bachelor of Science, School of Engineering

Dylan Culfogienis  
Spring, 2020

Department of Engineering Science

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## **Sociotechnical Synthesis**

Recent advancements in the capability of digital hardware, including improved processing power, memory, storage, flexibility, power consumption and reduced cost-to-manufacture, have resulted in a dramatic explosion in devices that expand the reach and effect of social media and information-gathering software. Wearable devices, for example, such as Fitbits, Jawbones, and other heartrate monitors make data available about our own bodies and health, both to us and social media platforms. Increasing acceptance of location-tracking has resulted in dramatic changes to the way crimes are investigated; being near a crime scene with a location-tracking device now can make the device's owner a suspect. (Valentino-DeVries, 2019) These are just a few examples of devices that are increasing the presence that cloud services such as social media play in the average person's life.

The Capstone Project is a series of low-level atomistic simulation of thin-film conductors, determining their mechanical properties in an aqueous environment, and the causes of deviation of mechanical properties from expected bulk-material properties in thin films due to size effects. Thin film conductors are an essential component of flexible electronics, and an understanding of their mechanical properties are essential to building flexible electronics that can be reliably used after the many loading cycles that, for example, a bracelet or smart shirt would go through being put on and taken off.

This basic research benefits one of many fundamental technological advances driving an device market that is increasingly integrated with daily human life, and with greater potential for invasive use and data collection. The speed at which these new devices are being developed and adopted, with the smartphone market just coming into existence in 2007, to dominating the

device market by 2012 (Taylor, 2012), presents a new realm of morals, ethics and regulation that are necessary to keep pace with the rapid development of software and hardware.

The STS Research Paper peers into how social media and information society propagates misinformation, willful disinformation and uninformation. Paritcularly how high volumes of information resulting from a low-barrier-of-entry to creating posts and articles on social media networks can result in informational apathy; a state in which an individual has been exposed to such a high volume of untrustworthy information that they cease to care about veracity or validity, and choose to develop their worldview based on feeling as opposed to evidence. This is analyzed through the lens of paradigm shift, comparing and contrasting the development of news channels to the development of the internet, and how corporatization and advertisement-driven profits have resulted in a degradation of information quality.

Working on both pieces of research allows for a look at the broad topic of information technology development from both the top and the bottom; from the very transistors and foundational physics research that allows computers to work in the first place, to the ultimate, short- and long-term effects that these technologies and the products that they enable have on society. I will actually say that this is the thing I've enjoyed most about my major as a whole; I understand, at least at an introductory level, computers, all the way down; the physics, the nanotechnology, the hardware, the software, the services, and enormous organizational structures humans have built to control and manage these things, and the ultimate effect all of these things have on us. I feel that having this holistic, X-ray style look at a technology allows for far more informed speculation and prediction.

For example; an understanding of the pace at which flexible electronics leads to an understanding of what flexible electronics will be capable of in the near future; thin-film

electronics that can be embedded during surgery, which can be worn on or in the body, have many many hours of battery life, and can be charged by ambient power sources, are likely very possible within the next decade or two of development. These same technologies will also enhance the spaces of Augmented Reality and of course make smartphones ever lighter, more versatile, flexible and ubiquitous. The trajectory of connected devices is one of increased pervasiveness. With such a high level of infiltration, regulation is not inevitable, but rather necessary to continue living a reasonably private, dignified life; one where both technology companies and the information they deal in can be held to a reasonable code of human ethics. The future of these technologies doesn't afford room for society adapting reasonably without change. The culture of information must change, or the way it is regulated must change; as the technology will not be ethical, standing alone.

## References

Taylor, C. (2012, February 3). *Smartphone Sales Overtake PCs for the First Time [STUDY]*. <https://mashable.com/2012/02/03/smartphone-sales-overtake-pcs/>

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