

**Thesis Project Portfolio**

**Smart Shoe-Insole**

(Technical Report)

**Improving The Public Perception of Artificial Intelligence in Medicine**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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Bachelor of Science, School of Engineering

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## **Sociotechnical Synthesis** (Executive Summary)

### *Reducing the Cost of Healthcare with Sustainable Design Patterns*

Healthcare in the United States is currently an inefficient and expensive system that alienates 31 million Americans from receiving adequate treatment. My technical project and STS research were loosely based on reducing the cost of healthcare services and increasing accessibility. The technical project was the creation of a shoe-insole that would measure the foot pressure distribution (FPD) of an individual to be used as a tracker throughout physical activity. The design was made to be durable and have easily replaceable parts to contribute to the sustainability of medical devices. My STS research was about the poor public perception of using artificial intelligence (AI) in healthcare, despite its immense potential to reduce treatment costs and improve workflow efficiency.

As described earlier, my technical project was a shoe in-sole that would record FPD data to a CSV file. The motivation behind this project stemmed from all my capstone team members having played sports in the past. The hardware consisted of the processor, Bluetooth module, battery, and sensors that were all interfaced together using a printed circuit board. These components allowed the device to function wirelessly if a Bluetooth connection was maintained and the battery was charged. A computer software program was made to accompany the hardware, with the objective of creating a data-viewing application to increase user-friendliness. The software featured all the pressure sensors laid out which would change color based on pressure to provide visual feedback. To increase accessibility, a sensitivity slider was also added to the color-changing points to accommodate more body weights. All the data could be recorded and exported to a CSV file for future viewing. When finished, our project had a lower

manufacturing cost compared to similar market products and had better sustainability due to the ease of repairing.

My STS research went over why public distrust in artificial intelligence was high. AI has proven effectiveness already by being able to match or exceed the accuracy of human doctors while providing results in a fraction of the time. To uncover why the reception of AI in medicine was poor, the principal-agent problem was used. Ceric (2012) shows that conflicts of interests between two parties are caused by not having full information of each other, otherwise known as asymmetric information. Decreasing the asymmetric information between two parties without a contract would be the most important for minimizing risks and moral hazards. I studied the development phases of medical technology to determine the people that interact with it and was able to create a network of interactions between parties. Based on the network, I concluded that the two most important parties for AI in medicine were the patients and developers. Therefore, making information of AI systems more available to the public would help decrease doubts of patients.

The focus between the technical project and STS research paper was the creation and refinement of cheaper technology for healthcare. My technical project showed how products designed to be easily repairable contribute to long-term sustainability and lower costs while the STS research paper shows the importance of transparency to gain public trust. These two projects form a pipeline, where the technical project is the conception and construction phase. Then, the STS research paper comes with the next steps on improving public trust. These projects demonstrate the importance of accessibility whenever any new technological project is created. The creation of any new technology is just a small part of making a more ethical future.