Thesis Project Portfolio

Wearable Technology: Developing a Skin-Like Temperature Sensor

(Technical Report)

Exploring the Adversarial Relationship between Tourism and Marine Pollution as an Incentive for Improving Waste Management Practices

(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

Georgia White

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Sociotechnical Synthesis

Current prosthetics have limited tactile sensing abilities which hinders their functionality and creates a disconnect with the user. These limitations are evident by the choice of 21% of upper limb amputees to forego using prosthetics altogether. Creating sensory capabilities for prosthetics offers the opportunity to greatly increase the quality of living of their users. As such, we built a skin-like sensor which measures temperature, one of the many types of sensing capabilities of skin. The materials and design replicate the stretchability and flexibility of skin among other mechanical properties. The sensor has channels of electrically active material, and changes in the resistance of the sensor's channels are used to measure its temperature. Constructing skin-like temperature sensors is just one step in replicating human skin for prosthetics, and much more research and development is needed. The technology has the potential to improve the inclusivity felt by disabled persons and increase their accessibility in their communities.

Whereas my technical project focuses on the construction of a skin-like temperature sensor, I concurrently conducted research into the adverse relationship between marine pollution and tourism. Marine pollution shares the qualities of infrastructure as defined by Star (1999), particularly the characteristics of embeddedness, reach & scope, embodiment of standards, invisible until broken and fixed in increments. Viewing marine pollution as infrastructure makes it a tangible problem for policymakers to address. I specifically analyzed its relationship with tourism and how tourism management can be used to address marine pollution. Document analysis of current recommendations and policies demonstrate that smaller, tourism-dependent countries have taken the lead in implementing the most effective and sustainable policies. Global

initiatives by international organizations cannot be enforced but help raise awareness for marine pollution and reflect the international nature of the issue. It is imperative to continue identifying financial incentives for countries to address marine pollution through sustainable solutions. My technical project and STS research seek to separately improve the lives of people through environmental and medical mechanisms.