

Thesis Portfolio

Investigating Novel Proximity Monitoring Techniques Using Ubiquitous Sensor Technology

(Technical Report)

Addressing Social and Operational Impacts of Wearable Sensors in Sports' Response to Covid-19

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

The spread of the novel coronavirus resulted in the immediate stoppage of sports leagues across the world during March, 2020. Gradually, these leagues have begun to reopen, with player safety paramount. Many regulatory procedures have been enacted, including mandating players and staff to have wearable sensors. These sensors have many capabilities. Leagues have created thorough contact tracing protocols if a user tests positive with the technology's data. The technology has shown to be an effective social distancing solution as well, containing alarms that beep when users are within 6 feet of another. As these sensors have been implemented globally, questions about measurement accuracy, social impact, and physical comfort have arisen.

My research will address these questions at a social and technical level. On the technical front, I will compare the accuracy and reliability of different wearable proximity solutions. Mathematical models will be created to predict distance using three different types of wearable sensors: Bluetooth, ultrasound, and Ultra-Wideband. The accuracy and error of these models will be analyzed keeping the scope of sports in mind. Socially, I will address this technology by learning its impact on player's psychology, team dynamics, and physical comfort. This will help evaluate the potential side effects of the device's implementation across the world. I will also analyze the procedures, protocols, and technologies used by different leagues globally in order to combat the novel coronavirus.

The synthesis of these two aspects of wearable sensor technology in sports will provide a holistic analysis on the topic. Recommendations on how to properly implement these devices in sports will be backed with a multidimensional approach and should be used by organizations globally.