

Thesis Project Portfolio

Gesture Controlled Robotic Vehicle

(Technical Report)

**The Current and Future Impacts of Motion-Controlled Technology on the Disabled
Community**

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

For my technical project, my group and I decided to build a gesture controlled robotic vehicle. The idea was to use the gestures and movements of one's hand and fingers to control a robotic car. For that, we built a glove and simultaneously a car. Integrating Bluetooth into the microcontrollers of both the glove and the car, we were able to make both the devices communicate with each other. The glove's main functionality is to read the user's commands through their hand and finger movements and convert that to a form of data to send over to the car. Once the car receives the data from the glove, it converts those data into motor instructions and moves accordingly. The car also has two forms of feedback that it sends to the user. First is a sensor that can read the proximity of other objects. If the car senses an object nearby, it will send haptic feedback data to the glove. There is a tiny motor attached to one of the fingers of the glove and depending on the proximity of the object that the car senses, the motor on the glove will vibrate with a certain frequency. The closer the car is to the object, the faster the motor on the glove will vibrate alerting the user to not crash into the object while driving. The other form of feedback is a camera attached to the front of the car. The idea is to be able to drive the car through an external monitor without having to follow the car around. This is mainly implemented if this technology is ever used for search and rescue operations. Our target audience is mainly tech enthusiasts, especially teenagers and young adults who have an interest in things like driving remote controlled cars or drones. Our project is basically taking that interest to the next level where the user can control a device through gestures. There is an obvious learning curve to this, but at the same time we believe this would be more exciting and fun to play with. After successfully completing our technical project, we are confident that this could be made into something that is marketable.

For my STS paper, I decided to talk about the impacts of motion-controlled technology on the disabled community. I talked about both the current impacts and the future effects of this technology on people with physical disabilities. The motivation came from my capstone project where I realized even though motion-controlled technology might be mostly used for entertainment purposes, it certainly has the potential for being used for practical reasons, specially be useful for people with physical disabilities. In my paper, I initially introduced this technology to the readers and then gave some background on certain devices that use this type of motion/gesture driven techniques. For my main research topic, I conducted that through reviewing literatures and other research papers regarding motion-controlled technology and their effects on disabled people. I figured out what kind of motion-controlled devices already exist that were designed for the disabled community, what their current problems and proposed solutions are, and what their effects might be once there is an improved version made in the future. I also looked over certain proposals and prototypes of devices with this technology, what strategies were used to design these devices, how they can help the disabled community, and their future improvements. Furthermore, I investigated some case studies of these technologies and what the users' experiences were. This not only helped me gain the perspectives of the users, but at the same time showed me the issues those devices had. This was important because most problems with a certain technology only come about once testing is done by individuals. I then looked for what the researchers' solutions were for those specific issues and talked about all of these in my paper. I also used the STS framework, Actor Network Theory (ANT), to further delve into the characters that are involved with this technology, their effects on each other, and their roles and contributions in keeping the entire network alive. For that, I considered the technology itself, the people who are involved in the creation of this technology, the people who are using this

technology, and the people who are working in making sure the creation and the distribution of this technology is done without any concern. Upon finishing my research and conducting my ANT analysis, I was able to fully answer my research question by reaching a conclusion on what the current and future impacts of motion-controlled technology are on the disabled community.