Woodshop Glove

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# Abstract:

This program is designed to help avoid injuries in a woodshop. A SensorTile is used to map a 3D area around a table saw blade and then sends a signal to a Wi-Fi enabled outlet to turn off if the sensor goes into that area.

# Introduction:

Data collection is primarily motion based. Quaternions and sensor fusion were used to help map the physical exclusion area of the table saw using unicleo-GUI. After the exclusion area is established from the SensorTile, if the SensorTile re-enters the exclusion area then an “Off” signal is sent to the Wiz outlet. Gestures are also used to turn on and off the Wiz outlet during normal use to allow for a safer workspace.

# Related Work:

3D mapping related work: <http://www.audentia-gestion.fr/STMicroelectronics/PDF/en.SensorExpo_SensorTile_Hands_on_Workshop.pdf>

Gesture recognition related work: <https://github.com/teomaras76/AI_on_STM32_Gesture_recognition>

# Software & Developing Tools

## Software

* STM32 Cube IDE 1.7.0
* STM32 ST-Link Utility
* Unicleo-GUI
* Putty
* AWS IoT
* ST BLE Sensor iOS app
* Wiz app
* Github

## Desktop Setup

* HP Omen Desktop
* Powered 4-port USB HUB

## Sensor and Hardware Setup

* STEVAL-STLKT01V1
* NUCLEO-F303RE
* Raspberry Pi 3 B+
* Wiz outlet

# Milestones:

I was able to get the firmware flashed onto the SensorTile and establish a connection between all of the required devices. I was able to establish passing data from the card to being mapped on unicleo-GUI.

# Results & Discussion:

I was not able to finish programming the gestures that I wanted and get it to a repeatable level. I spent too much time trying to figure out how to get everything connected and create the 3D exclusion area. This led to the project being incomplete at the moment, but I am going to continue to develop it.

# Conclusion:

I was overly ambitious with my approach and was unable to come up with a finished project. I have however learned all of the skills I need to develop the rest of the programs that I want to use. Now that I have the infrastructure established I can finish creating a workable product.

# Future Work:

* Complete the gesture recognition
* Allow for the 3D area to be reset easily between uses
* Speed up the communication between the SensorTile and the Wiz outlet

# References:

* <https://sites.google.com/view/ucla-stmicroelectronics-iot/home>
* <https://www.st.com/en/embedded-software/stblesensor.html>
* <https://www.st.com/en/development-tools/unicleo-gui.html>
* <https://forum.digikey.com/t/cloud-logging-with-sensortile-box-and-aws/13312>
* <https://us-west-2.console.aws.amazon.com/iot/home?region=us-west-2#/dashboard>
* <https://docs.aws.amazon.com/iot/latest/developerguide/iot-thing-management.html>
* <http://www.audentia-gestion.fr/STMicroelectronics/PDF/en.SensorExpo_SensorTile_Hands_on_Workshop.pdf>
* <https://github.com/teomaras76/AI_on_STM32_Gesture_recognition>
* <https://github.com/UnderwaterWookie/WoodshopGlove/upload>