Course Project Proposal

CSE521S

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Gesture Control Smart Home

Description:

In this project, we will be implementing a wristband that can control certain smart home devices with specific hand gestures. With this control wristband, users with speech disabilities or loss of limbs can have more functionality of their Alexa Echo device and control other smart home devices.

Other gesture recognition systems are quite expensive and can only read limited gestures using EMG muscle sensors which become unreliable with sweating and external electrical interference. With light force-sensitive resistor (FSR) sensors, gyroscope, and accelerometer, our band will be able to read as many or more gestures at a much lower cost by measuring small changes in wrist movement.

The device will take these wrist measurements, transfer them via Bluetooth to a Raspberry Pi that can connect to the Amazon Cloud over WiFi. In the Cloud, these readings can be analyzed and determined to be a specific gesture that will then map to a specific smart home device command.

Team Member Responsibility:

* Kevin Van Cleave:
  + Implementing and testing the hardware from the force sensors to the analog-sampling Arduino, transferring the data to the Raspberry Pi and aiding transfer to Amazon Cloud.
* David Yang:
  + Implementing the data pipeline to collect training data (sensor readings) and their labels to train a classification machine learning model. Deploy the model to Amazon Cloud to predict gesture classification upon data arrival.
* Jiangnan Liu:
  + Building the MQTT service between Raspberry Pi 3 and Amazon EC2, processing the gesture signals into human-readable images, transferring the gesture information into direct order to the Amazon Echo Dot.

Hardware:

Sparkfun RedBoard Artemis Nano, Raspberry Pi 3, Amazon Echo Dot, FSR402(force sensitive resistor) x8, accelerometer/gyroscope, smart plug for each smart home device