Phantasos

Team Number: 06

Members: Carter Harrod, Grant Holmes, Sandy Urazayev, Malena Schoeni, Rodrigo Figueroa

Project Name: Phantasos

Project Synopsis:
Develop a system which expands the user's interactive capability of interfacing with a computer using multiple sensors.

Project Description:
The project aims to help develop a new interface that integrates movement from the arms as well as eye tracking hardware and software for user input in a computer system. EMG signals can be collected and analyzed from an arm band. We can also use accelerometer and gyroscope sensors (and possibly other sensors as well) to provide information about the movement and orientation of the arms. Since the forearm muscles control hand and finger movement, we can train a machine learning classifier on the armband EMG data to classify different discrete gestures. Such classification will allow us to directly map intentional hand gestures to traditional key or mouse bindings. We can train an additional machine learning model using the processeed gesture classification, accelerometer, and gyroscope data as inputs to produce more complex, higher level physical directives that include information from the arms in addition to the hands. This project could also be used to help people with limited mobility interact with their environment in addition to creating a new modality of virtual interaction for those with normal mobility. Additionally, eye tracking could be used to increase users productivity by allowing dynamic focus switching of windows and text boxes. Furthermore, eye tracking software could be used to augment gaming experiences by allowing dynamic mouse acceleration to improve players' performance and accuracy of mouse movements.

Project Milestones:

- Semester 1
    - Acquire funding order products and handle the shipping (Oct. 10rd, 2021)
        - Everyone
    - Familiarizing ourselves with the APIs (software interface) (Oct. 31st, 2021)
        - Everyone
    - Develop processing techniques for raw sensor data smoothing (Nov. 30, 2021)
        - Sandy and Malena

    - Work on feature extraction algorithms from smoothed signal (Dec. 10th, 2021)
        - Rodrigo and Carter
- Semester 2
    - Work classification of gestures (Feb. 20th, 2022)
        - Grant and Rodrigo
    - Work on API for classification of discrete gestures and tune performance (March 13th, 2022)
        - Malena and Carter
    - Augment API to allow for combinations of gestures to be recognized as well as provide documentation for API (April 17th, 2022)
        - Everyone

Project Budget:

We need budget by: ASAP

Device/Product	Description/purpose	Vendor	Estimated Cost
Eye tracker	Track eye movement	Tobii Eye Tracker 5	$299
VR Headset	Integrate interface		$299
2 x EMG Armband	Gesture detection		$1000-$2000

Team 6 Gantt Chart