**Haptic Feedback for Stroke Rehabilitation in Virtual Environment**

**Instruction Document**

Hardware Setup and PCB design – Akshatha (avallamp@uci.edu)

Communication setup and code – Swathi (shashidh@uci.edu)

VR Game Design – Hasini (hpatloll@uci.edu)

MECPS’23-24 students

**Hardware Setup:**

All components are placed in the box which has Haptix 2.0 (below picture) sticker on it.

A plastic container with a box and a box with a label

Description automatically generated with medium confidence

**Prototype picture:**

The prototype of this project contains a Haptic glove with Power PCB attached as shown in the below image. It has Flex PCBs (Not working as there’s a fault in the PCB design) attached at the fingers of the glove. Power PCB will have ESP32 microcontroller, 2 LiPo batteries (450mAh already placed in the Power PCB case but not connected), SPDT switch, flex PCB connector (Bottom pin configuration).

A white electronic components on a table

Description automatically generated with medium confidence

**Power PCB components:**

1. ESP32 Wroom 32 controller
2. 2 SPDT switches
3. 2 LiPo batteries
4. 8 Flex connectors

Power PCB Altium design files are attached in GitHub. (Please contact Akshatha for any doubts).

We have used Altium for PCB designing, JLCPCB for fabrication.

**Flex PCB components:**

1. TCA9548A (I2C mux)
2. DRV2605L
3. ERM motor
4. Resistors, capacitors

Flex PCB Altium design files are attached in GitHub. (Please contact Swathi for any doubts).

Flex PCB already present in the kit are not working because, there are vias (connects tip and bottom layer by drilling) in the PCB design which are not drilled making no connection between top and bottom layer. Tried scratching the top and bottom layer to expose copper, made a hole and soldered a wire, but since the components are nearby, they are coming out of their placement. Better to go with a new flex pcb but with drills.

The kit has ERM motors close to 50 in number. It is placed in a black Adafruit box.

A person holding a box with plastic bags in it

Description automatically generated

This below yellow color kit has drivers, flex connectors (both top and bottom configuration)

A box with a package of electronics

Description automatically generated with medium confidence A hand holding a white plastic package

Description automatically generated A hand holding a plastic bag

Description automatically generated

The below JLCPCB box has batteries, battery connectors, unsoldered power PCBs, LiPo battery charger, switches.

A hand holding a box with several packages

Description automatically generated

Apart from this, the kit has Raspberry pi kit, jumper wires, bread boards, LEDs, resistors that were used to make the bread board circuit. Below are the list.

|  |  |
| --- | --- |
| Raspberry pi kit |  |
| Power PCB | 3 |
| Glove setup(Power PCB with battery and SPDT) |  |
| ESP32 |  |
| LIPO battery conector |  |
| Switch |  |
| I2c mux(TCA9548A) | 2 |
| Jumper connectors | In a box |
| LiPo battery (4000mAh) | 2 |
| Breaad boards | 3 |
| FPC connector | 3 reels |
| DRV2605L | 15 |

**Hardware Connection Diagram:**



References:

1. [Lipo Battery Safety Warning](https://power.tenergy.com/lipo-safety-warnings/?srsltid=AfmBOop_w6hpt7yJkgIHK2e1gFh1HhD659gnc-de8kwVHrpPinM6hYaO)
2. [ESP32 Wroom 32 Datasheet](https://www.espressif.com/sites/default/files/documentation/esp32-wroom-32_datasheet_en.pdf)
3. [DRV2605L datasheet](https://www.ti.com/lit/ds/symlink/drv2605l.pdf)
4. [I2C mux datasheet](https://www.ti.com/lit/ds/symlink/tca9548a.pdf)
5. [ERM motor Datasheet](https://cdn-shop.adafruit.com/product-files/1201/P1012_datasheet.pdf)