Assignment 2 – Haptic Glove Lite: Electronics

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***Abstract*—This paper details the electronics being used for my project with the game hardware course. My product is a haptic glove for enhancing VR experiences.**

Keywords—electronic, haptic, feedback, sensor, motor

I. Introduction

This report is for assignment 2 of the INFR 3380U: Industrial Design for Game Hardware course. My product is a slim, affordable haptic glove called 'Haptic Glove Lite'. My haptic glove would provide vibration feedback to simulate physical interactions with virtual objects, which would help enhance the user's virtual reality experience. The glove would not have any motion tracking or force feedback/movement restriction, as it is meant to be used with regular VR controllers. This paper details the electronics needed to create the product.

II. Electronics

Details on the electronics used for the hardware are explained in this section.

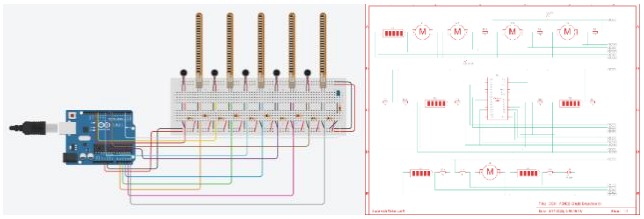
A. Bill of Materials

The bill of materials is shown below, which lists all required components, their quantities, their cumulative prices, and their roles for this project. The component entries all provide links for where they can be purchased, which is also where the price points come from. The total amount spent may vary in practice if cheaper options are discovered. Along with the table below, the bill of materials can also be found in an excel document provided with this submission.

Component	Quan.	Price	Role
Flex Sensor (2.2")	5	$14.75	Tracks the bends of the user's fingers.
Arduino Uno R3	1	$27.99	Supplies power to all the components.
Vibration Motor (Mini - 10mm)	5	$3.59	Vibrates in reaction to elements in the virtual environment to simulate physical interactions for the player.
1 kΩ Resistor (1/4W at 5%)	11	$0.25	Regulates power for various components in the breadboard.
Blue LED (1W)	1	$1.50	An LED light that blinks to indicate that the device is turned on.
Wire (3" (M-M) Jumper Wire)	57	$2.50	Wires used for connecting different components together and transferring power.
Breadboard (Full Size)	1	$7.80	A board for inputting all the components and transferring power to them.
Total	81	$144.49	

B. Schematics

The schematics for the hardware piece are shown below, both in breadboard form and schematic form.



III. Circuitry Integration and Working Simulation

The circuitry integration and working simulation were both produced using TinkerCAD. The TinkerCAD setup includes all listed components, printing the values of the flex sensors, toggling on and off the vibrators, and showcasing the blinking LED light. It was shown off in the video presentation, and can be found here.

IV. Project Progression and Planning

This is an independent project, so I am the sole contributor. The plan is to make a 3D model and Unity simulation, so no realized physical product is planned beyond what is required for the final project. The remaining assignments are listed below.

- Assignment 3 – Design – 03/11/2022
    - Technical Drawings, Parts, and Assemblies Simulation
- Assignment 4 – Progress Presentation – 03/18/2022
- Assignment 5 – Makerspace – 03/25/2022
    - Iterative Design and 3D printing.
- Final Presentation and Report – 04/14/2022