Rock, Paper and Scissors Game

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1.Introduction

The goal of this project is to recreate a more innovative and engaging version of the game "Rock, Paper, Scissors" with recognition of the sensor movements of the player. The sensors read the hand movement as a certain hand gesture and transmit it to the machine, and the machine itself raises a stick with a hand gesture via servo motors. Thus, the winner of the round is displayed on the screen. Some limitations of our project are the motion recognition sensor, as it sometimes recognizes movements with errors due to technical inaccuracy or wear of the device. Despite this, errors are rare, and the game itself remains exciting.

2.Materials and Method

Arduino Board
Breadboard
3 Servo Motors
Accelerometer
Active Buzzer
I2C LCD1602 Display
Potentiometer
Wires
Cardboard/Carton
Color prints
Acrylic paints
Ribbon
Hot Glue Gun
Double Sided Tape
Glove

3.Results

Video link:
https://drive.google.com/file/d/1_xall0RDZDl0OLeWfgfLp-JJRns4-wC0/view?usp=drivesdk

3.1 Schematic illustration of the game

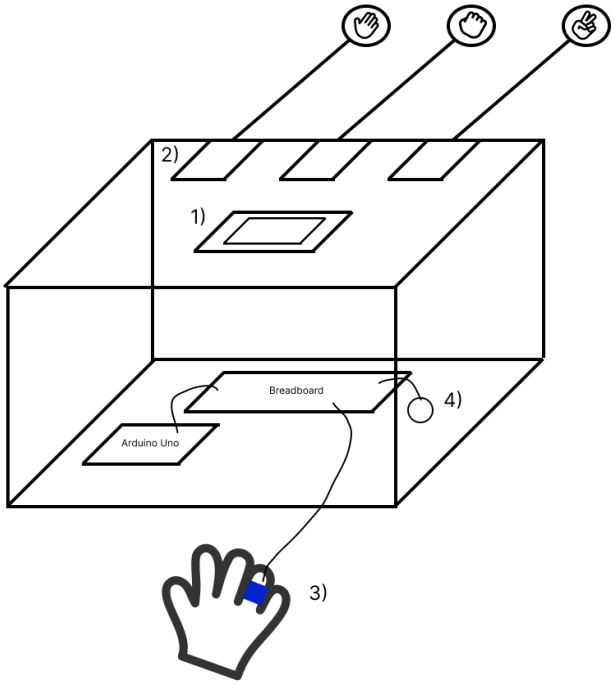

Figure 1. Blueprint of the game

Table 1. Description of the scheme shown in Figure 1

Number	Description
1	I2C LCD1602 Display
2	Servo Motor
3	Accelerometer
4	Active buzzer

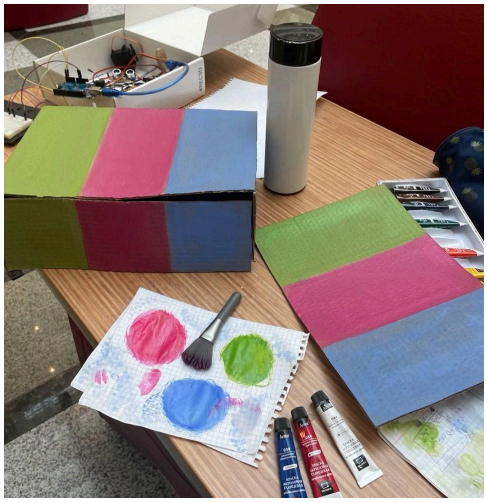

Figure 2. Working prototype

3.2 Description of the project

The program turns on with the buzzer sound. The display lights up with the phrase "Rock Paper Scissors!". The sensor reads the movement of the player's hands and at the same time the program picks up a random stick with a hand gesture using a servo motor and displays the names of these gestures on the display. Example of display output:
"*You: Scissors*
CPU: Paper"

Then it gives one of the results:
1) Results: CPU wins
2) Results: You win
3) Results: Draw

In this case, the player wins and it is displayed on the screen as *"Results: You win"*. Specific gesture patterns are mapped to Rock, Paper, and Scissors using acceleration thresholds. For example, a steady hand is interpreted as "Rock," a forward tilt as "Paper," and a quick shake or swipe as "Scissors."

We made it so that when the sensor moves along certain axes, it reads hand gestures like Rock, Paper or Scissors. For users to properly play the game, we sewed the accelerometer to the glove.

4.Software

Link to the full code:
https://drive.google.com/file/d/1unC5zGsSbxyChEfBbJKgyHg0aiLtsD7Y/view?usp=sharing

5.Discussion and Conclusions

The Gesture-Based Rock-Paper-Scissors game was designed to simulate a human-vs-computer interaction using hand movements instead of traditional buttons. The MPU6050 accelerometer plays a central role by capturing hand gestures through acceleration data on the X, Y, and Z axes.

One of the major problems of this project was adjusting the axes. It took plenty of trials to come up with decent coordinates, and even then it needs adjustments and specific rules of showing certain gestures in the game. In this game, for the sensor to correctly identify your gesture, you have to show scissors not with fist tilted to the side, but with scissors parallel to the ground due to the sensor's location and implemented code.

Another major issue was fixing certain components in their places. Our I2C LCD1602 Display is located on the surface of the box, but due to the hollowness of the box, we had to sew the display to the box in order to avoid damaging the components. Also, initially the display would not show anything, but it was quickly solved by adding a potentiometer.

There were also some minor issues with wires as they were not long enough to reach the glove for the player to play and test the program out. That is why we had to use several wires and tape them together to elongate the distance between the glove and the game.

By designing and implementing this project, we wanted to show how wearable technology can be used for interactive games.

6.Student Contributions

Aisana Abdrayeva wrote the code for each of the servo motors, sensor and other parts of the construction.
Ulmeken Totanova and Amina Aidyn worked on the circuit design, building of the construction, implementation and testing of the work of the project.