EW1: Final Evaluation

SIMON SAYS

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MOTIVATION

- To create an educational and entertaining game that enhances memory and cognitive skills.

- To showcase how simple and cost-effective it can be to design a game that combines learning with fun.

- Personal motivation to better understand game design and using Arduino.
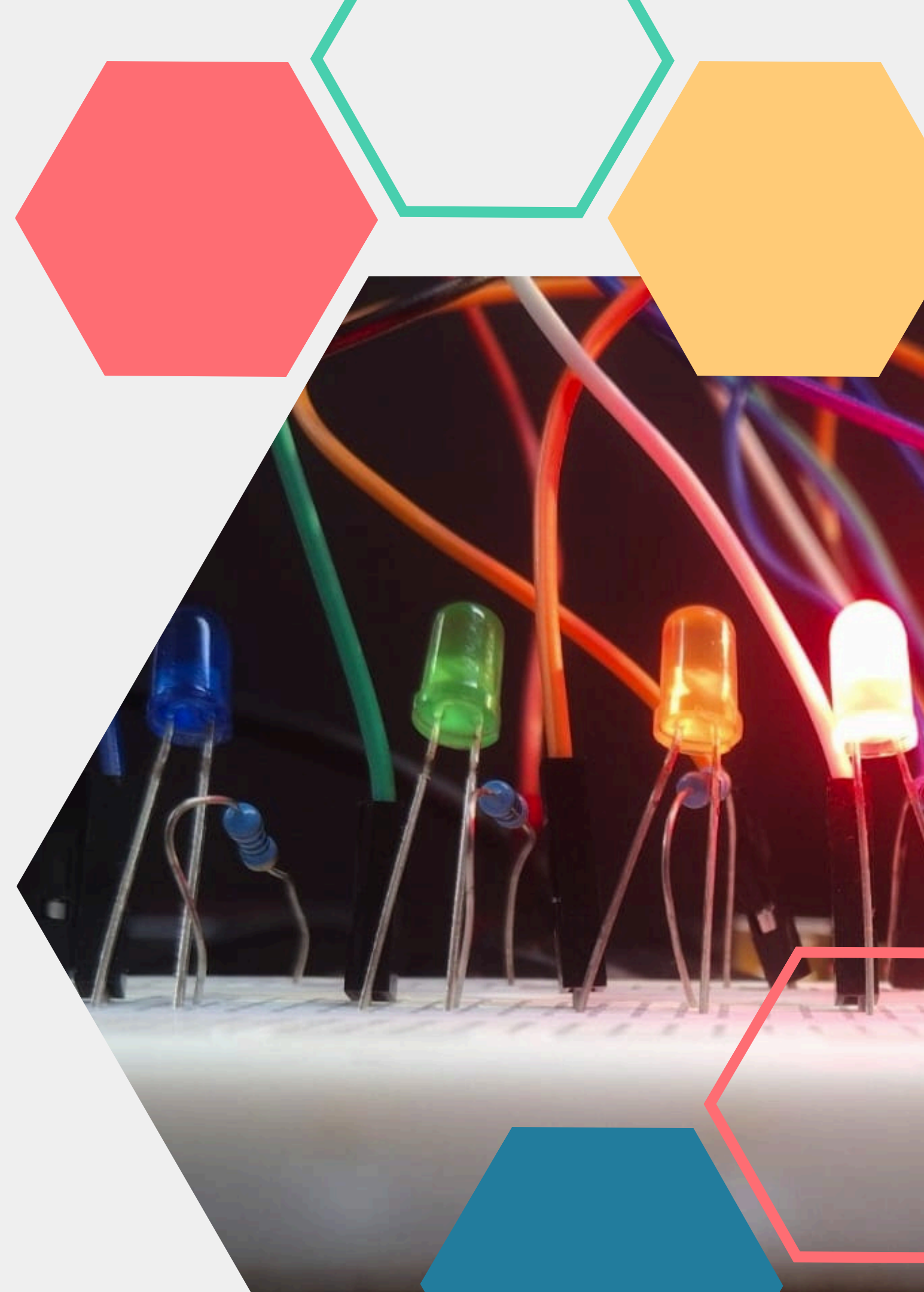
PROBLEM STATEMENT

- To develop a Simon says game inspired by the original Simon game, while incorporating additional features to enhance gameplay.

- To implement a Simon says Arduino game using LEDs and push buttons that generates a random sequence which the user needs to recreate.
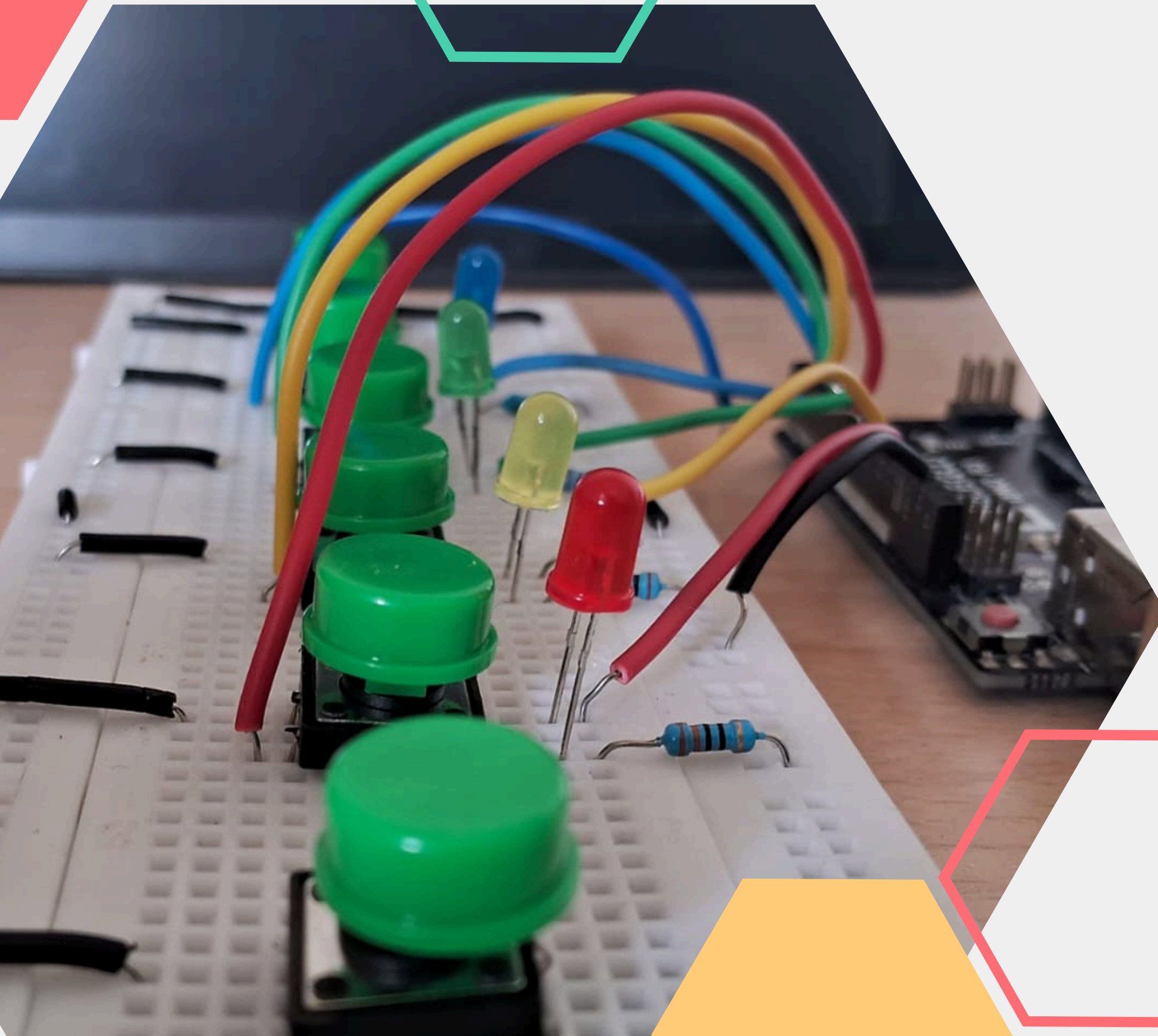
PROPOSED DESIGN

PUSH BUTTONS

A button that controls each LED and two separate buttons that allow mode selection for single or double player game.
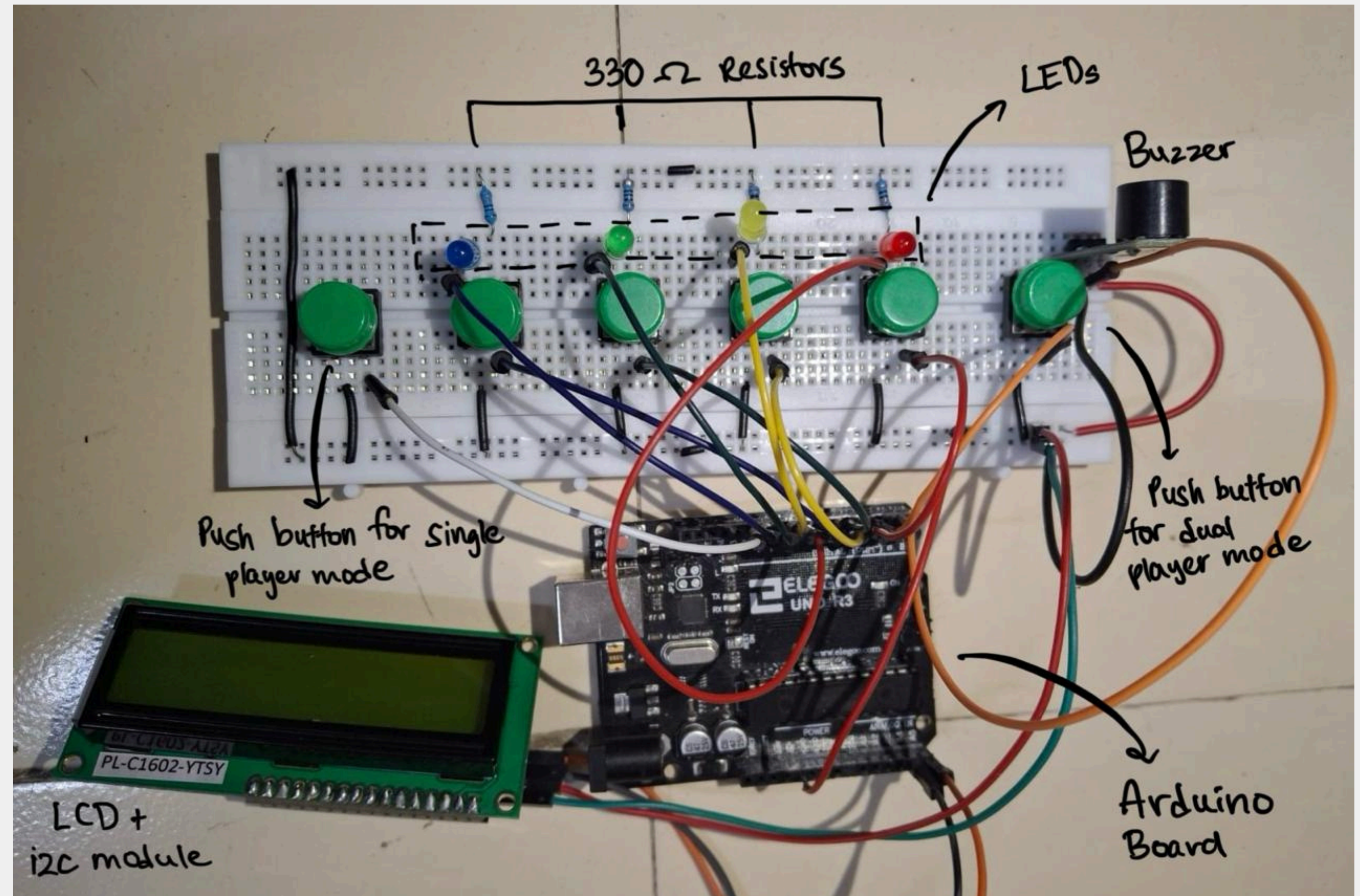
LCD DISPLAY

To provide prompts, instructions and display score.

BUZZER

Plays different melodies to indicate game start, success, or failure.

MULTIPLE MODES

Supports single and dual-player modes.

330 Ω Resistors

LEDs

Buzzer

Push button for single player mode

Push button for dual player mode

Arduino Board

LCD + i2c module

PL-C1602-YTSY

- **Random Sequence:** Generated using randomSeed() function which leverages atmospheric electrical conditions ensuring variability and randomness.

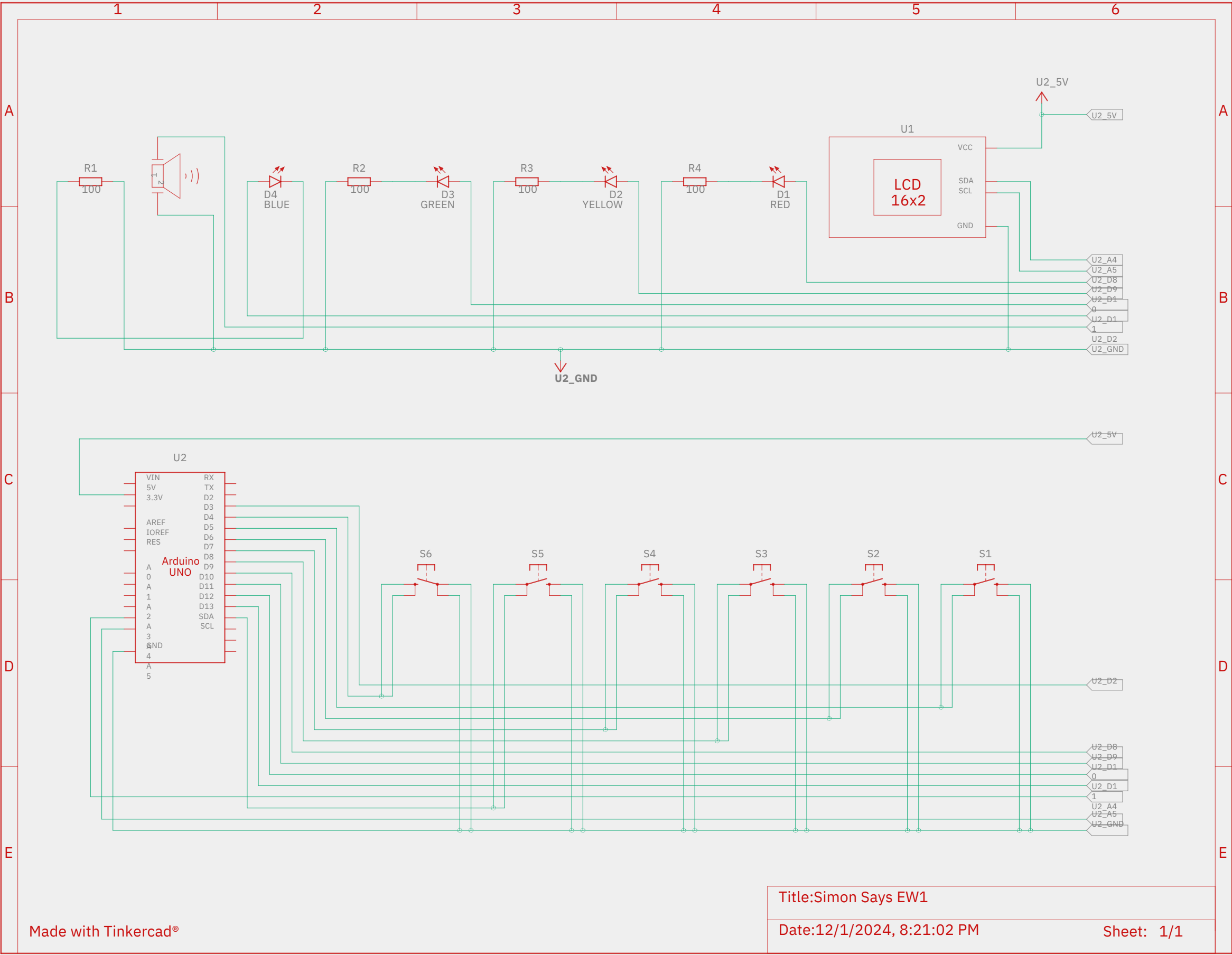- **Error feedback:** Flashing of LED sequence and buzzer notes to indicate incorrect input.

PROPOSED DESIGN

BLOCK DIAGRAM OF CODE

CIRCUIT DIAGRAM

Title:Simon Says EW1

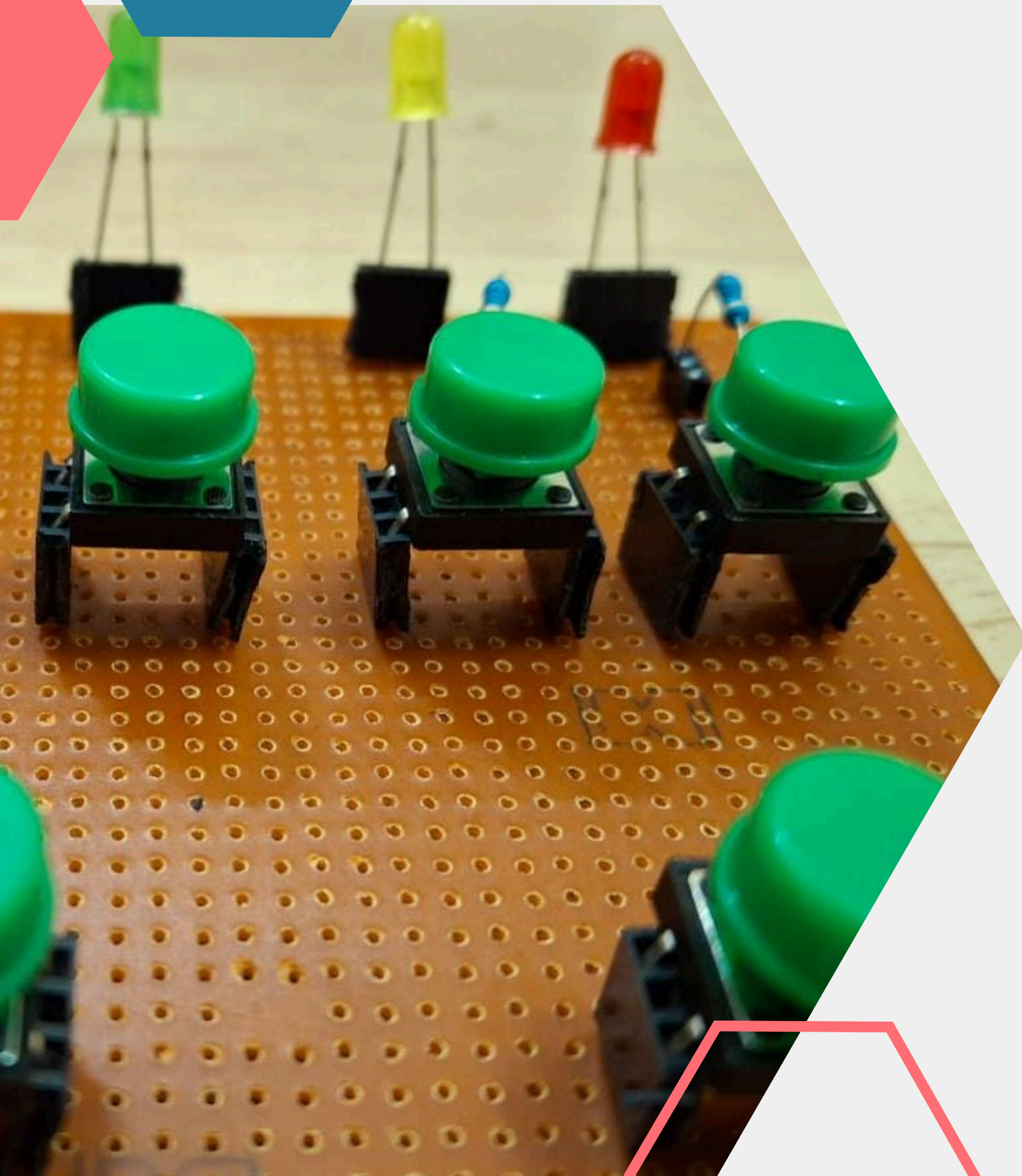Date:12/1/2024, 8:21:02 PM

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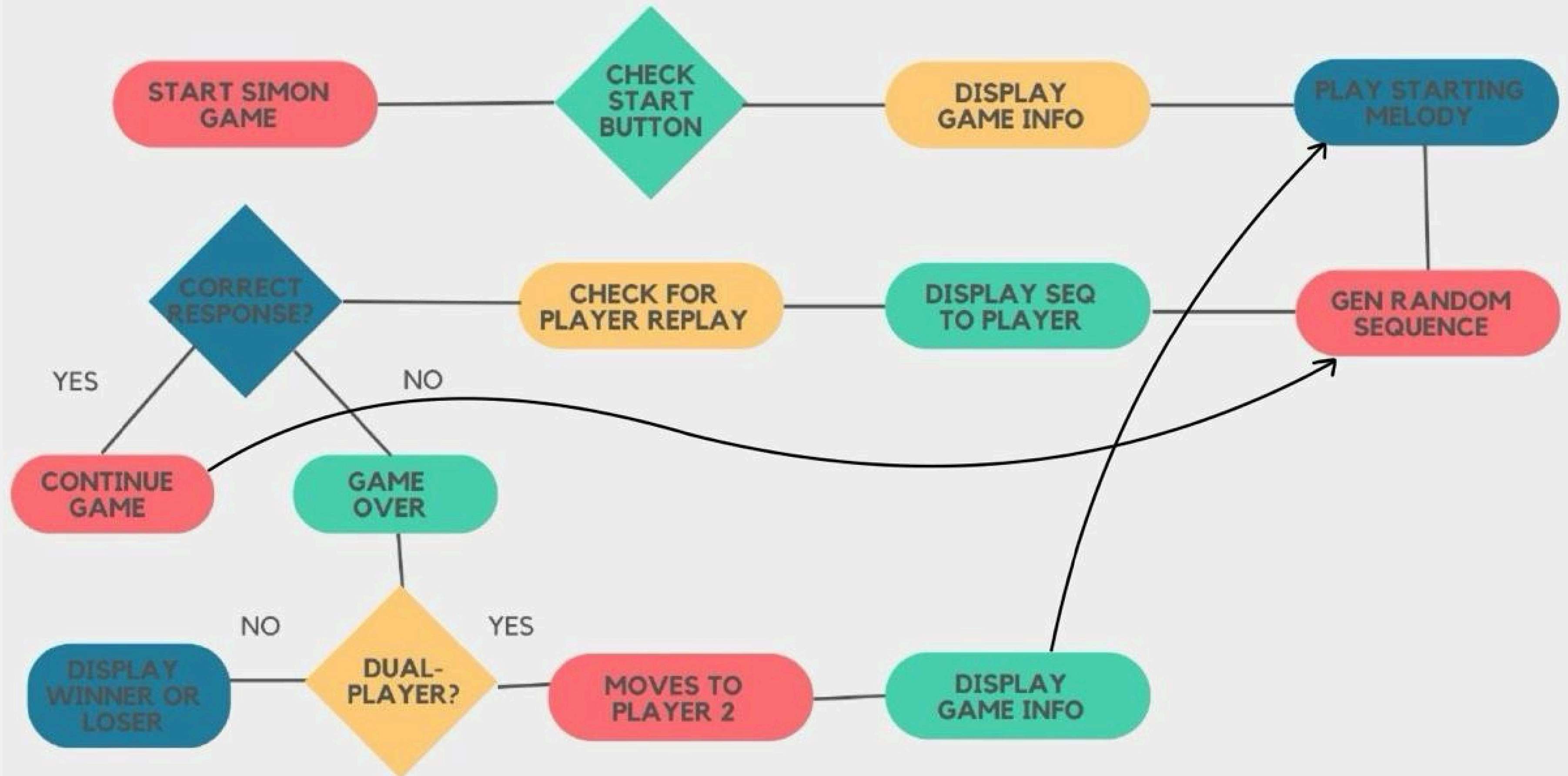
VIDEO DEMO

Drive Link for the Video:

https://drive.google.com/file/d/1mkfiYlqx3matYgo7QBld1w3DL2f2IaZM/view?usp=drive_link
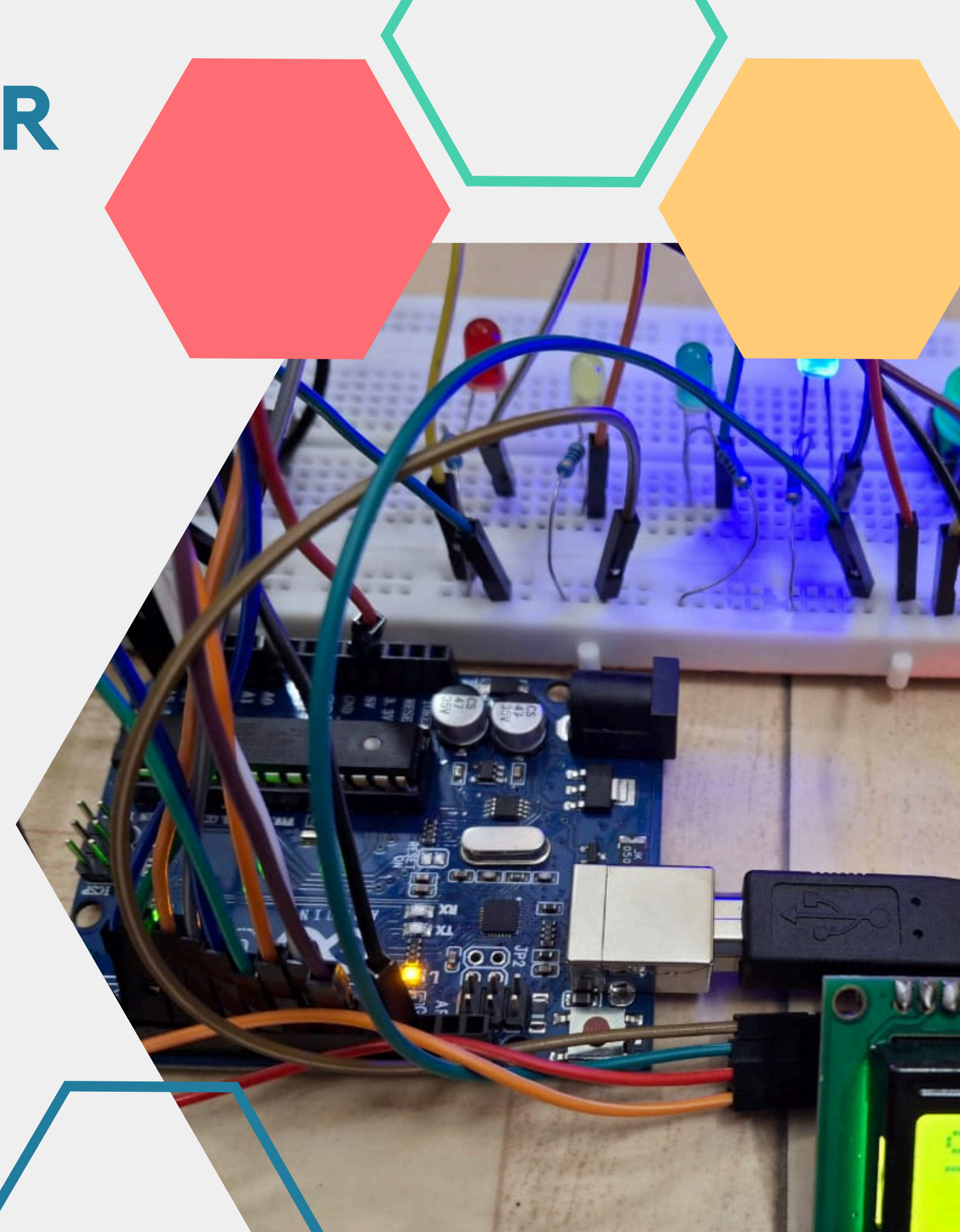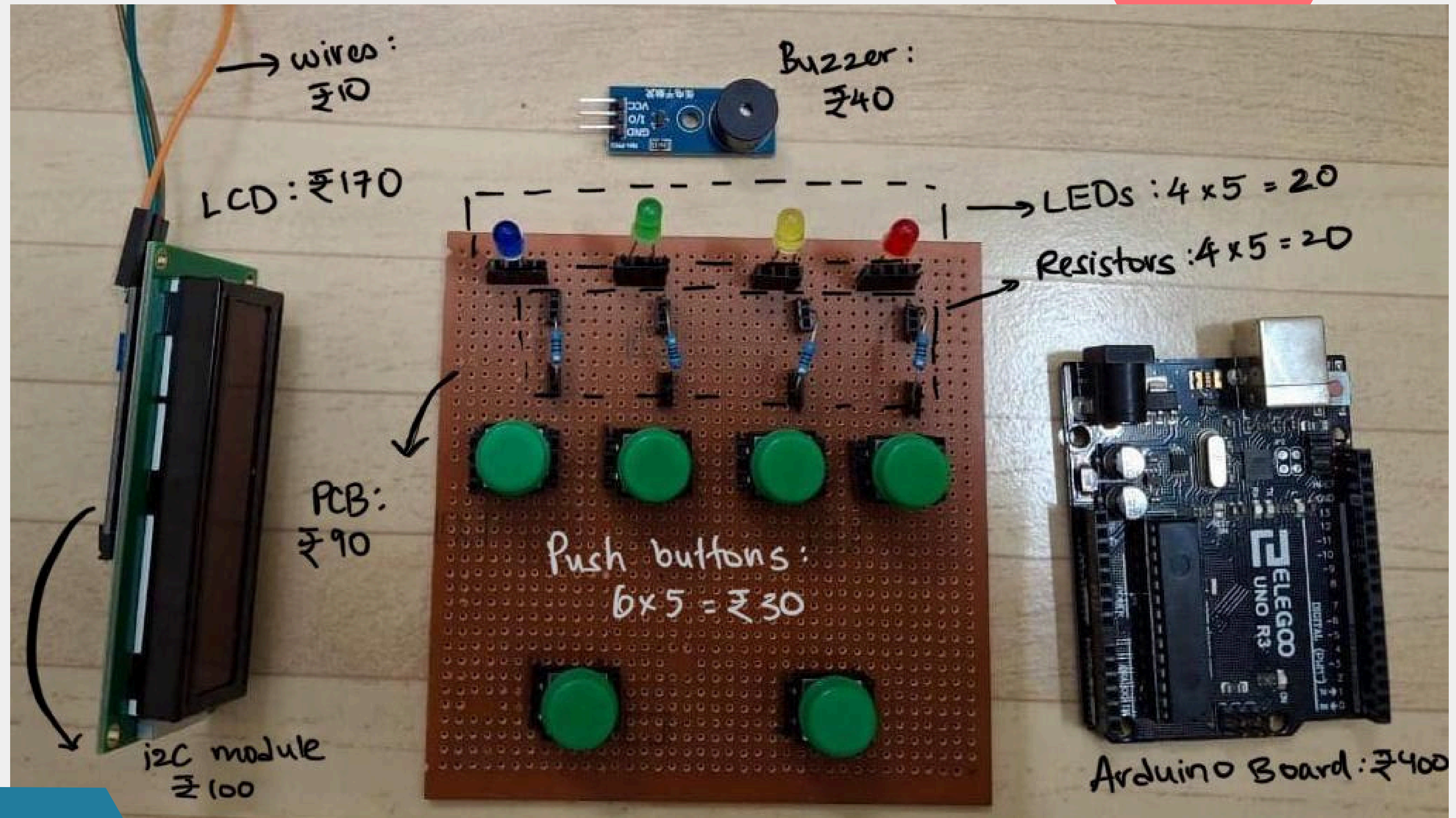
PERFORMANCE INDICATOR

- **Complexity:** Uses simple hardware like LEDs and push buttons. Usage of buzzer along with LCD and i2c module makes it moderately complex.

- **Time Response:** Efficient time response, keeping in mind debounce delays, delays for light flashes and buzzer tones.

- **Practical deployment Complexity:** Soldered onto a PCB and presented in a robust box that helps keep hardware decluttered.

- **Ease of Control Parameters:** Parameters like number of players, number of levels, delay times and melody sequences can easily be modified in the code. Almost all parameters are controlled through the code.
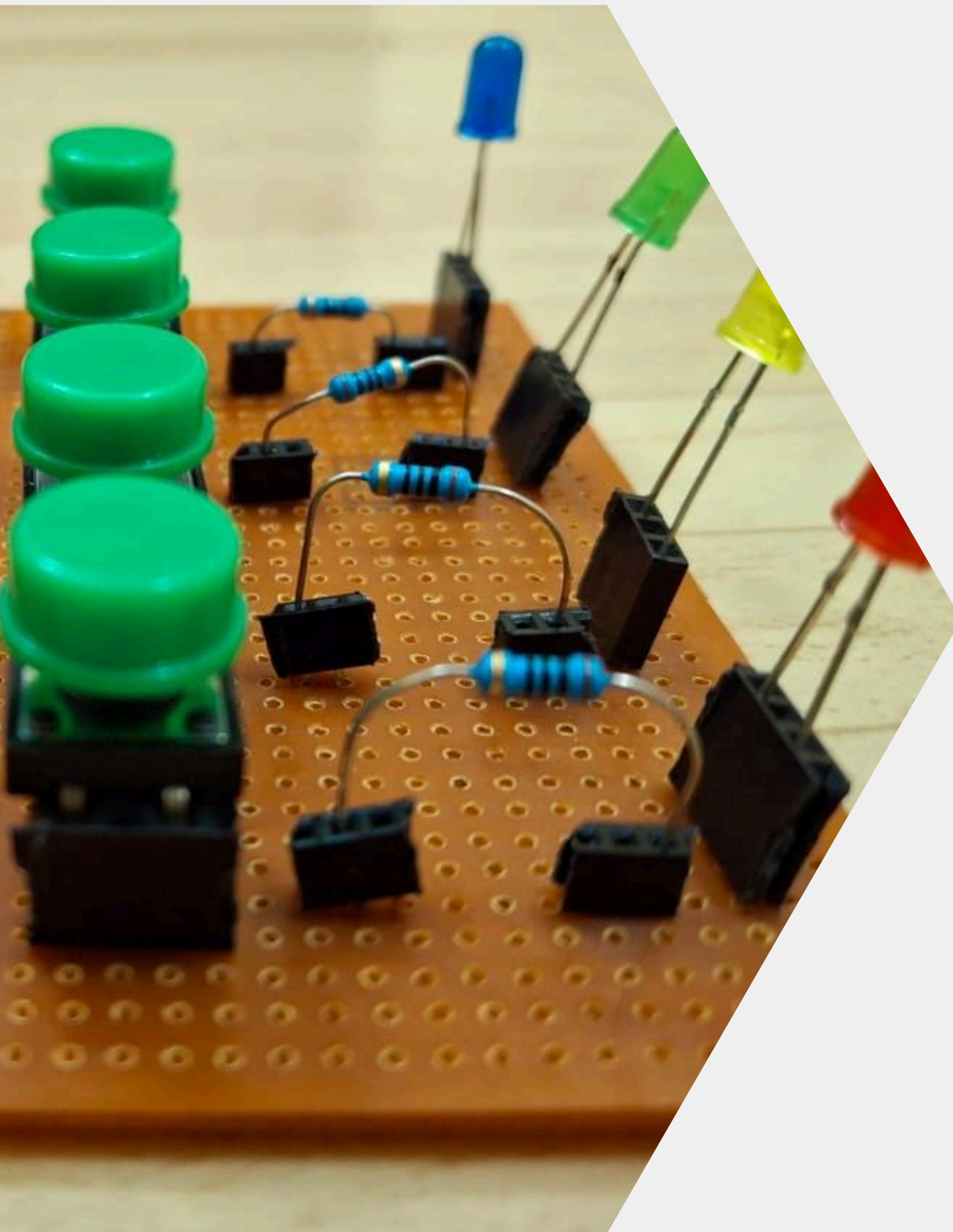
PERFORMANCE INDICATOR

- **Cost effective:** Cost effective solution, with total cost being 880 for the whole setup without the packaging.

- **Durability:** Allows for easy swapping of the components in case of malfunction. Sturdy packaging that prolongs shelf life.

- **User Interaction:** Clear instructions that provide an engaging experience for all ages of people. Allows for single or dual player modes. Design made ensuring portability and convenience.

- **Safety:** Ensures proper insulation and regulates current through resistors to avoid damage.

COST OF SOLUTION

wires: ₹10

Buzzer: ₹40

LCD: ₹170

LEDs: 4 × 5 = 20

Resistors: 4 × 5 = 20

PCB: ₹90

Push buttons: 6 × 5 = ₹30

i2C module ₹100

Arduino Board: ₹400

Total Cost: 880 rupees

REMARKS

- **Technical difficulties:**
1. Faulty Arduino Board and Buzzer made it difficult to troubleshoot the exact problem.
2. Component Replacement and debugging the hardware issues took more time than   expected, slowing down the overall project.

- **Feasibility:** Easily available and cost effective components makes this game feasible and easy to implement.

LEARNING OUTCOMES

USING LCD

Learnt how to use an LCD display along with an i2C module as well to display prompts and instructions.

BUZZER FUNCTIONALITY

Gained understanding of various buzzers and chose the one most suitable for our requirements. Used the appropriate functions to produce melodies.

DELAY MANAGEMENT AND USER INTERACTION

Ensuring smooth working between all the different components and user by employing suitable delays.

DESIGN IMPROVEMENTS

Making the design robust by soldering and neat packaging. Using battery for better portability.

REFERENCES

- **Overall Setup:** https://www.youtube.com/watch?v=8ORj7vU1hU0

- **LCD:** https://www.youtube.com/watch?v=CvqHkXeXN3M&t=12s

- **Buzzer Melodies:** https://docs.arduino.cc/built-in-examples/digital/toneMelody/

- **3D Printing:** https://www.youtube.com/watch?v=MDbnw7U_0-Q