Report

Electronics Design Workshop

Mini-Project Report - Interactive India

Under the guidance of

D.V. Gadre

Electronics and Communication Department

Student: Arsh Poddar - 2021UEC2518

Student: Rishita Gupta - 2021UEC2677

Student: Khushi Singh - 2021UEC2634

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Motivation

The motivation behind making this electronics mini project is manifold. Firstly, this project helped us in gaining a better understanding of the fundamental concepts of electronics. By applying these concepts practically in our project, we can gain hands-on experience and develop a deeper appreciation of how electronic devices and circuits work. Secondly, electronics-based projects promote creativity, problem-solving skills, and innovation in students. As we worked on our project, we were encouraged to think outside the box and come up with unique solutions to problems. Additionally, this project helped us to develop project management skills, teamwork, and communication skills as they work together to complete their projects. Finally, this project inspired us to pursue further education and careers in electronics field.

Contents

1. Introduction

This project aims to provide an interactive and educational tool for school students who are unfamiliar with the location and basic information of the states in India. Through this project, students can easily learn about the different states in India, their locations, and key facts about each state. The interactive nature of the tool will help students to engage with the material and retain the information more effectively. This project will provide an efficient and enjoyable way for students to memorize important information about the states of India, which will be useful in their studies and beyond.

This project will be a valuable resource for students who are preparing for exams or seeking to improve their knowledge of India's geography and culture. By making the learning experience interactive and enjoyable, this tool will encourage students to take an active interest in the subject matter and develop a deeper understanding of the different states and regions of India.

2. Components Used

- Arduino Uno
- 20*4 LCD display
- Joystick
- Neopixels LED strip (5V)
- Optical fibres

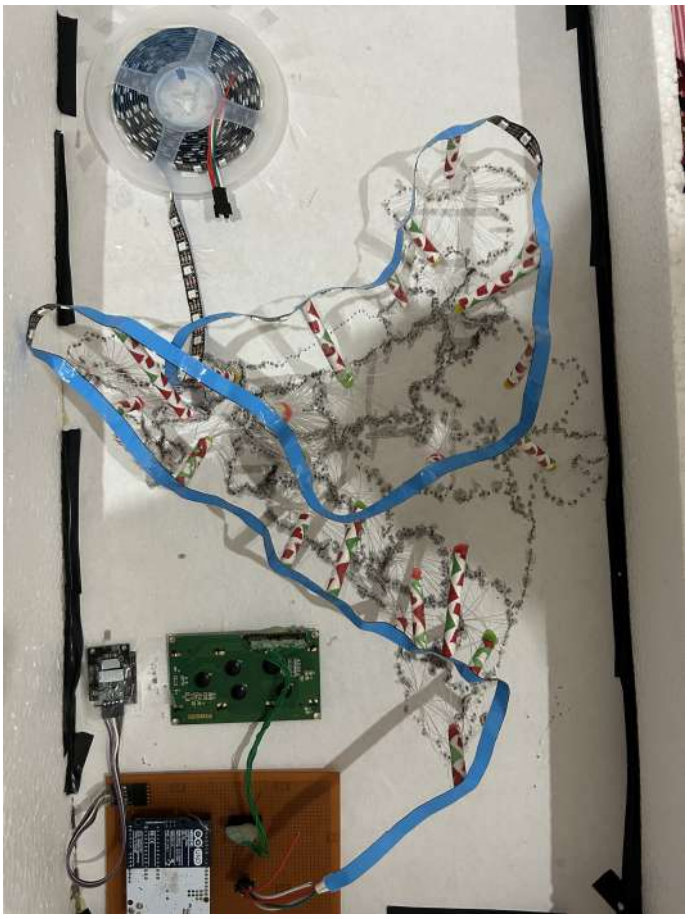
3. Working

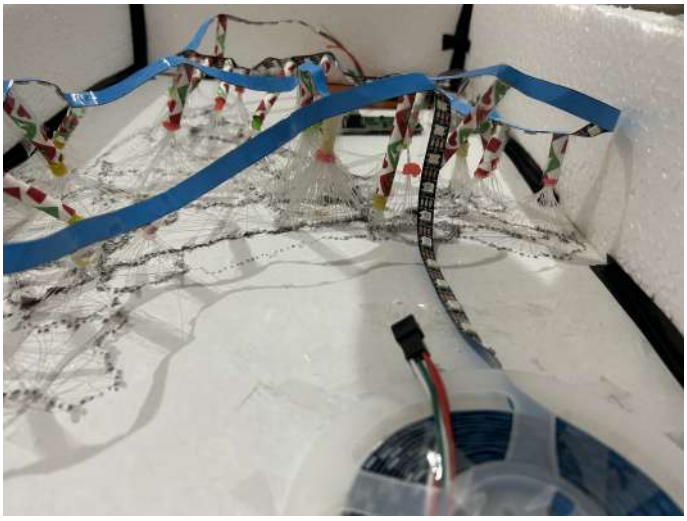
Our project has an interactive display that showcases all the states of India, allowing users to learn about their locations and key facts in a fun and engaging way. The display is controlled through a joystick, which allows users to navigate through the different states and select the ones they wish to learn more about.

When the joystick button is pressed, basic information about the selected state is displayed on the screen. This information may include its capital city, population, major industries, cultural landmarks, and other important details. The display is designed to cater to students who are unfamiliar with the states of India, as well as those who are seeking to expand their knowledge.

To make the learning experience more interactive, each state corresponds to an LED on the strip, which glows when that state is displayed. This feature helps students to visually identify the state being discussed and to reinforce their learning. Additionally, using optical fibre, that particular state is highlighted on the map, making it easier for students to understand its geographical location in relation to other states in India.

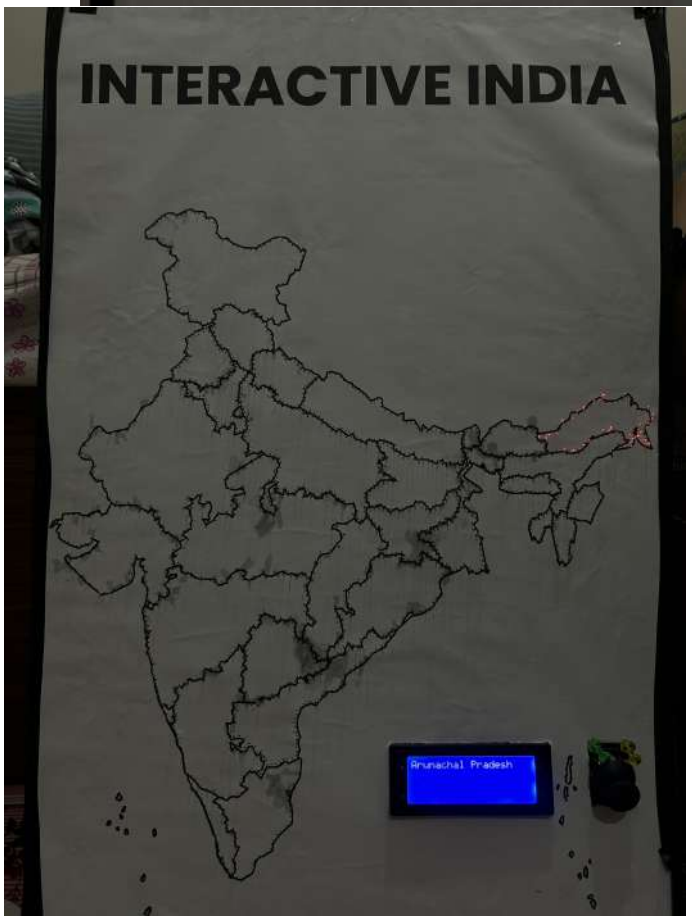
4. Snapshots of project



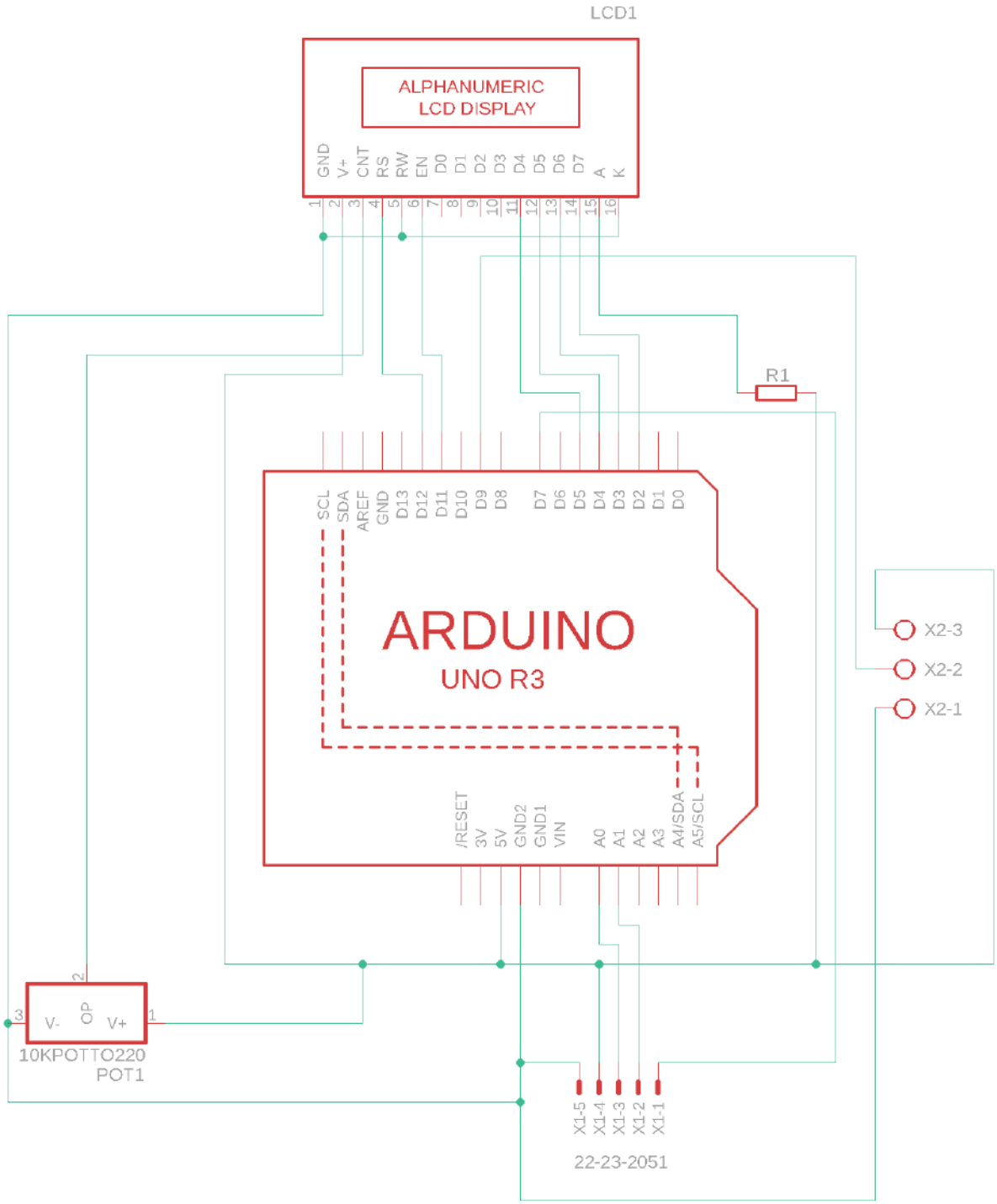



INTERACTIVE INDIA
Jharkhand

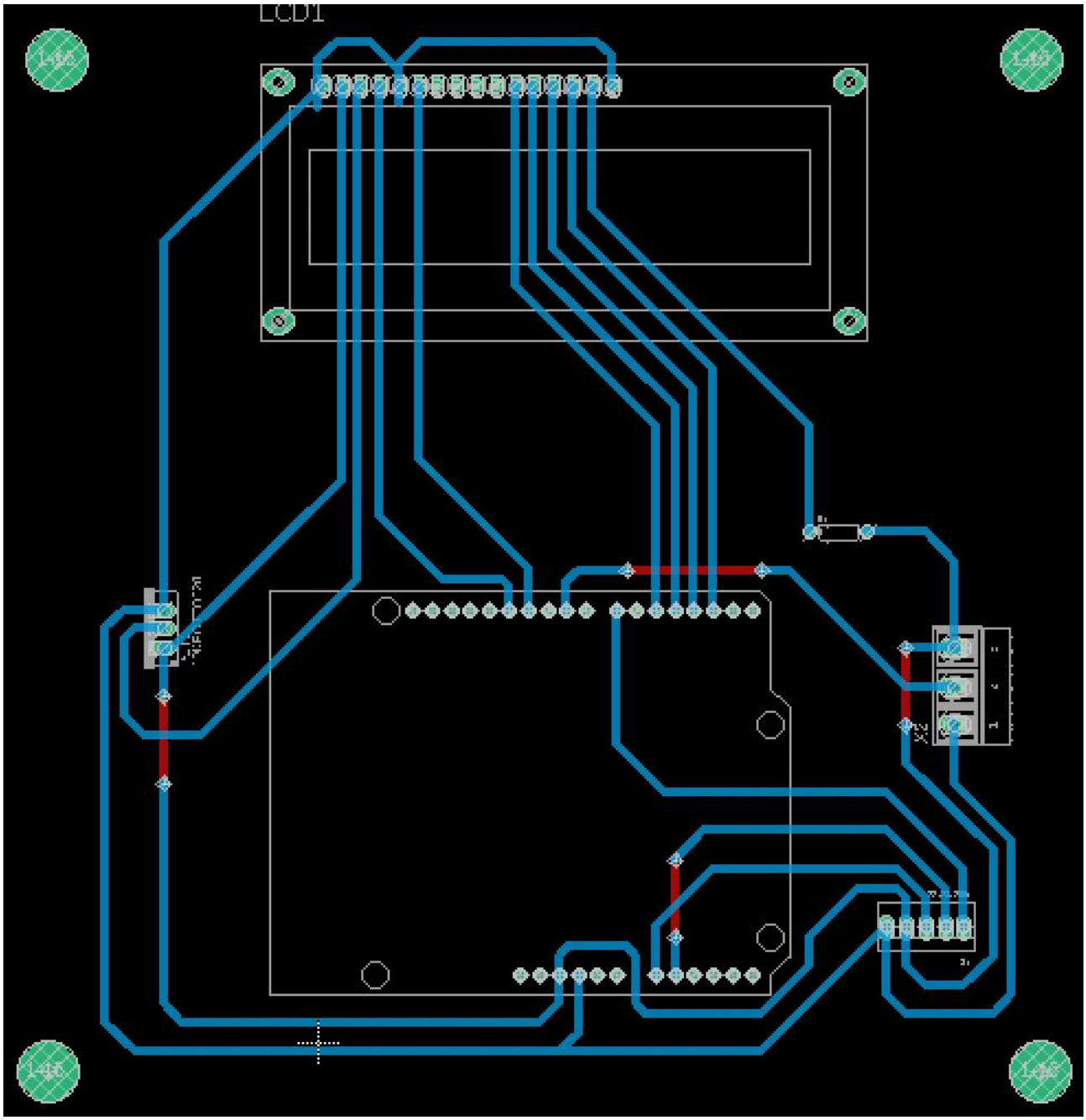

INTERACTIVE INDIA
Mizoram


INTERACTIVE INDIA
Arunachal Pradesh

5. Circuit Diagram



6. PCB layout



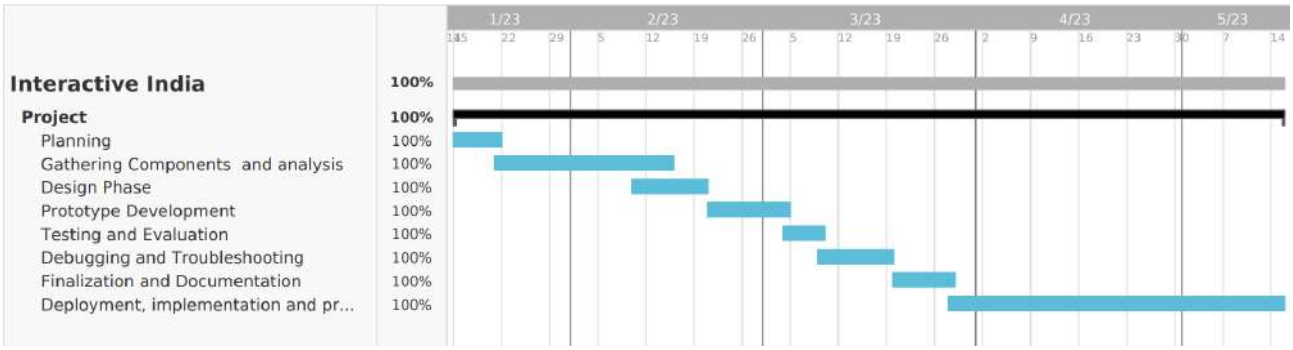
7. Arduino Code

```
#include <LiquidCrystal.h>
#include <Adafruit_NeoPixel.h>

#define LED_PIN 9
#define LED_COUNT 90

LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
Adafruit_NeoPixel strip(LED_COUNT, LED_PIN, NEO_GRB +
   NEO_KHZ800);

int joy_x = A0;
int joy_y = A1;
int joy_sw = 7;
bool displayed_info = false;

char* states[] = {"Andhra␣Pradesh", "Arunachal␣Pradesh", "
   Assam", "Bihar", "Chhattisgarh", "Gujarat", "Haryana", "
   Himachal␣Pradesh", "Jharkhand", "Karnataka", "Kerala", "
   Madhya␣Pradesh", "Maharashtra", "Manipur", "Meghalaya",
   "Mizoram", "Odisha", "Punjab", "Rajasthan", "Sikkim", "
   Tamil␣Nadu", "Telangana", "Tripura", "Uttar␣Pradesh", "
   Uttarakhand", "West␣Bengal","Jammu␣and␣Kashmir"};
long areas[] = {160205, 83743, 78438, 94163, 135191,
   196024, 44212, 55673, 79714, 191791, 38863, 308252,
   307713, 22327, 22429, 16579, 155707, 50362, 342239,
   7096, 130058, 112077, 10486, 240928, 53483,
   88752,222236};
long population[] = {53903393, 1570458, 35607039,
   124799926, 29436231, 63872399, 28941133, 7306183,
   38593948, 67562686, 35699443, 85358965, 123144223,
   3091545, 3366710, 2299724, 46356334, 30141373, 81032689,
    690251, 77841267, 39184011, 4169794, 236410968,
   11141032, 996093, 12541302};
double literacyRate[] = {67.02, 66.95, 72.19, 63.82, 71.04,
    79.31, 76.64, 83.78, 66.41, 75.36, 96.2, 69.32, 82.34,
   79.85, 75.48, 80.11, 72.87, 76.68, 67.06, 81.42, 80.33,
   66.54, 87.75, 67.68, 79.63,76.2,68.74};
char* stateCapitals[] = {"Amaravati", "Itanagar", "Dispur",
    "Patna", "Raipur", "Gandhinagar", "Chandigarh", "Shimla
   ", "Ranchi", "Bengaluru", "Thiruvananthapuram", "Bhopal"
   , "Mumbai", "Imphal", "Shillong", "Aizawl", "Bhubaneswar
   ", "Chandigarh", "Jaipur", "Gangtok", "Chennai", "
   Hyderabad", "Agartala", "Lucknow", "Dehradun", "Kolkata"
   ,"Srinagar(s),Jammu(w)"};
```

```
int state_leds[] =
   {14,30,28,42,17,55,62,74,45,11,8,51,12,27,36,26,19,63,59,39,5,13,25


int num_states = 27;
int current_state = 0;

void setup() {
  lcd.begin(20, 4);
  strip.begin();
  strip.show(); // Initialize all pixels to 'off'
  // Set up the joystick
  pinMode(joy_sw, INPUT_PULLUP);
  Serial.begin(9600);
}

void loop() {
  // Read the joystick values
  int x = analogRead(joy_x);
  int y = analogRead(joy_y);
  int sw = digitalRead(joy_sw);

  Serial.println(sw);

  // Determine the direction of the joystick
  int dir = -1; // -1 for no direction
  if (x < 100) {
    dir = 0; // Left
  } else if (x > 900) {
    dir = 1; // Right
  } else if (y < 100) {
    dir = 2; // Up
  } else if (y > 900) {
    dir = 3; // Down
  }

  // Update the current state based on joystick input
  if (dir == 0) {
    // Move left (wrap around to last state if necessary)
    strip.setPixelColor(state_leds[current_state], strip.
       Color(0, 0, 0));
    current_state--;
    if (current_state < 0) {
      current_state = num_states - 1;
    }
    displayed_info = false;
    //delay(100)
```

```
  } else if (dir == 1) {
    // Move right (wrap around to first state if necessary)
    strip.setPixelColor(state_leds[current_state], strip.
       Color(0, 0, 0));
    current_state++;
    if (current_state >= num_states) {
      current_state = 0;
    }
    displayed_info = false;
    //delay(100)
  }
  strip.setPixelColor(state_leds[current_state], strip.
     Color(255, 0, 0));


  if (sw == LOW) {
    display_state_info(current_state);
  }else{
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print(states[current_state]);

  }

  strip.show();
  delay(200);
}

void display_state_info(int current_state) {
lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print(stateCapitals[current_state]);
    lcd.setCursor(0, 1);
    lcd.print("Area:");
    lcd.print(areas[current_state]);
    lcd.setCursor(0, 2);
    lcd.print("Population:");
    lcd.print(population[current_state]);
    lcd.setCursor(0, 3);
    lcd.print("Literacy␣Rate:");
    lcd.print(literacyRate[current_state]);
    displayed_info = true;
    delay(50);

}
```

8. Gantt Chart



9. References Used

- https://www.arduino.cc/en/Guide
- https://learn.adafruit.com/series/learn-arduino
- https://www.youtube.com/watch?v=weZWQdkKhaY
- https://www.youtube.com/watch?v=YGrb7HJ3AOo
- https://arduinogetstarted.com/tutorials/arduino-neopixel-led-strip