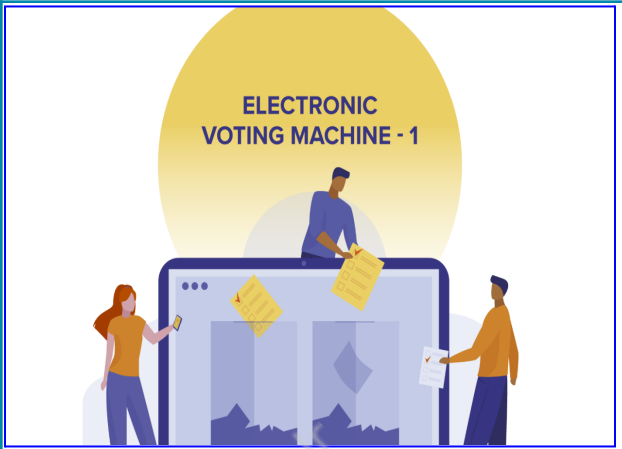**Electronic Voting Machine-1**

What is our GOAL for this CLASS?

In this class, we learned to design an electronic voting machine on an OLED display. We also learned to program a push button easily using a library.
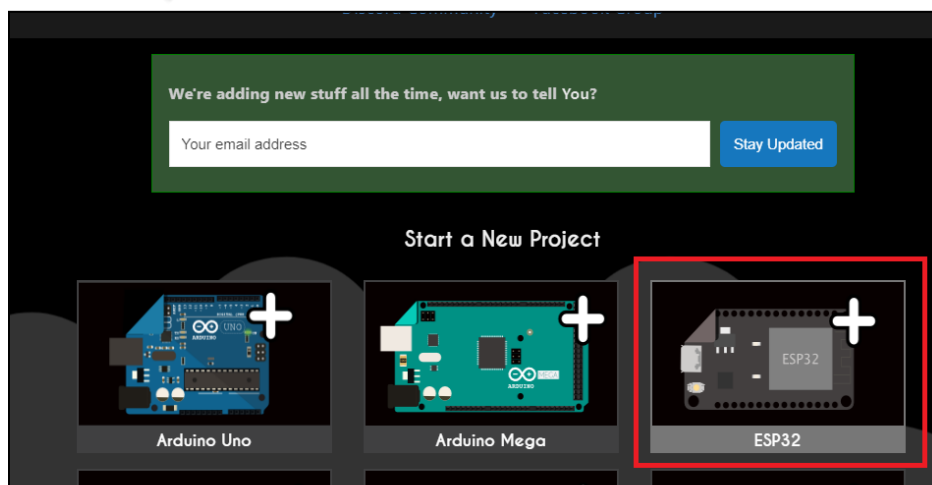
What did we ACHIEVE in the class TODAY?

- Designed EVM on an OLED display
- Displayed data on OLED display

Which CONCEPTS/ CODING BLOCKS did we cover today?

- Printed data on OLED.
- Programmed a push button easily using a library i.e. **ezButton.h**

How did we DO the activities?

1. Open wokwi and start a New Project using **ESP 32.**

2. Select the material from the Simulator. (Click on ⊕ Sign to add a new part.)
   - 1 x **ESP32** (It will be already added in the simulator)
   - 1 x **SSD1306 OLED display**
   - 5 x **Pushbutton**s (4 push buttons for different vote parties and 1 push button for Result.)

3. Connections:

   The circuit of this project consists of an **ESP32** Controller, pushbuttons, and an **OLED** screen.
   Here we are taking five buttons where -
   - the first button is for A Party,
   - the second for B Party,
   - the third is for C Party,
   - the fourth is for D Party and
   - the last button is used for calculating or displaying results.

   Once we have added 5 push buttons, connect the button to the **ESP 32** board.
   - We will connect the push button's **1.l** pin directly to a digital pin. In this case,

Button id	ESP 32 pin
btn1	13
btn2	33
btn3	14
btn4	27
btn5	26

   - Then, connect the **2.r** pin to the **GND**. Change the color of the wires connected to **GND** to black.
     Click on the wire to change its color. Watch this [reference video](#) to learn how to change the color of the wires.

   - Click the push buttons and change the color of the buttons as following-
     Click on the button to change its color. Watch this [reference video](#) to learn how to change the color of the buttons.
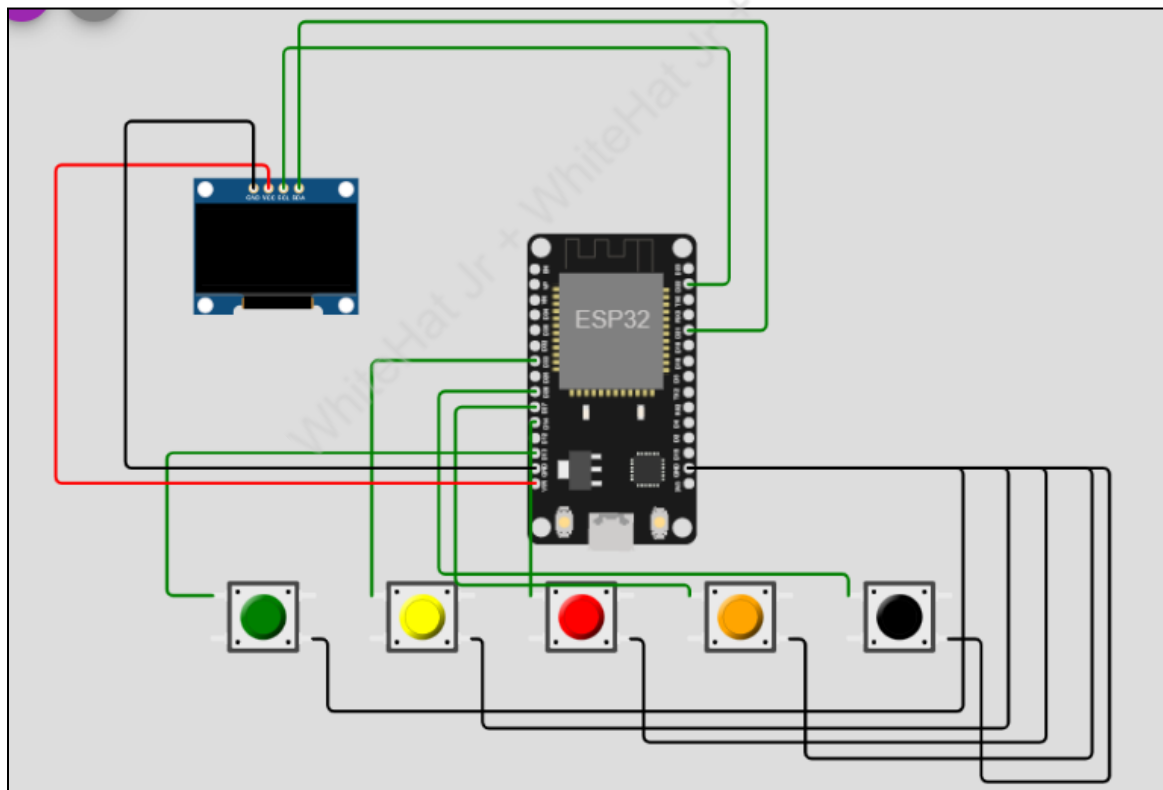
Button id	Color
btn1	green

btn2	yellow
btn3	red
btn4	orange
btn5	black

4. Connect the **OLED display** with the **ESP 32** board as shown below:

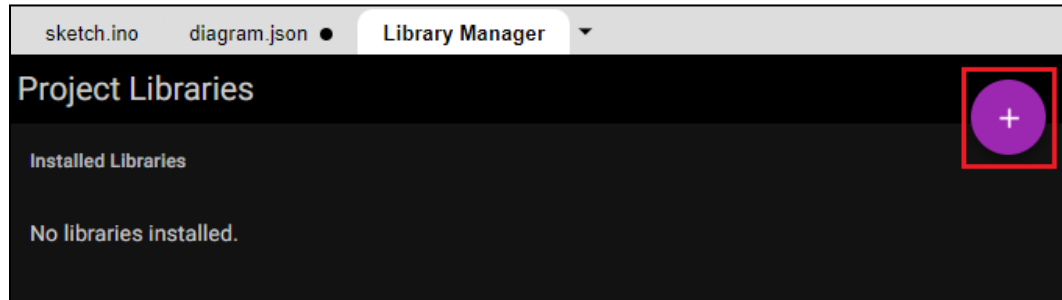| OLED pin	ESP32 pin
VCC	VIN
GND	GND
SCL (CLK)	GPIO 22
SDA (DATA)	GPIO 21

Reference Diagram:

5. To control the **OLED** display, we need to install libraries

   ● Open the **Library Manager**.

- Click on the [+] icon.

- Install **Adafruit SSD1306** and **ezButton** library.

6. Once this is done, go to the **sketch.ino** file and include these header files in the **sketch.ino** file.

```
#include <ezButton.h>
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>
```

7. Define **SCREEN_WIDTH & SCREEN_HEIGHT** for OLED

```
#define SCREEN_WIDTH 128
#define SCREEN_HEIGHT 64
```

8. Declaration of an **SSD1306** display that connects to **I2C** communication using **Wire** Library
   - Initialize a **display** object with the **SCREEN_WIDTH** & **SCREEN_HEIGHT** defined earlier with the I2C communication protocol.
   - A value of **(-1)** indicates that our OLED display does not have a **RESET** pin. Sometimes OLED displays have a RESET pin on the OLED, in that case, we should connect it to a GPIO and should include the GPIO number as a parameter.

```
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1);
```

9. After this, we will define the **setup()** method. Use **Serial.begin()** to set the data rate.

```
22
23    void setup()
24    {
25        Serial.begin(9600);
26    }
27
```

10. Now, let's initiate new instances of the buttons-

```
diagram.json    sketch.ino    libraries.txt    wokwi-project.txt    Library Manage

1      #include <ezButton.h>
2      #include <Wire.h>
3      #include <Adafruit_GFX.h>
4      #include <Adafruit_SSD1306.h>
5
6      #define SCREEN_WIDTH 128 // OLED display width, in pixels
7      #define SCREEN_HEIGHT 64 // OLED display height, in pixels
8
9      // Declaration for SSD1306 display connected using software S
10     Adafruit_SSD1306 oled(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1)
11
12     //   button objects
13     ezButton button1(13);
14     ezButton button2(33);
15     ezButton button3(14);
16     ezButton button4(27);
17     ezButton button5(26);
18
```

11. Let's initiate the variables for **vote1, vote2, vote3, vote4**.

    The number of votes will be integers. So, we will use **int** datatype to declare these variables.

    We will store votes of party **A**, **B**, **C** and **D** in the variables **vote1**, **vote2**, **vote3** and **vote4** respectively.

```
int vote1 = 0, vote2 = 0, vote3 = 0, vote4 = 0;
```

12. Now, in the **setup()** method,
    ● we need to set the debounce time for each button.

```
22
23    void setup()
24    {
25      Serial.begin(9600);
26
27      button1.setDebounceTime(25);
28      button2.setDebounceTime(25);
29      button3.setDebounceTime(25);
30      button4.setDebounceTime(25);
31      button5.setDebounceTime(25);
32
```

13. Initialize the OLED display with the **begin()** method.
   If the OLED displays nothing, check the OLED address at **0x3C**. In our case, the address is 0x3C.
   If we are not able to connect to the display, it prints a message on the Serial Monitor.If something fails, don't proceed further, try to repeat the process using a **for()** loop.

```
// initialize OLED display with I2C address 0x3C
if (!oled.begin(SSD1306_SWITCHCAPVCC, 0x3C)) {
  Serial.println(F("failed to start SSD1306 OLED"));
  while (1);
}
```

14. **Print data on OLED:**
   - In order to allow the OLED to initialize, add a **two-second delay** before writing text.

   ```
   delay(2000);
   ```

   - Clear the display buffer with the **clearDisplay()** method after initializing the display.

   ```
   oled.clearDisplay();
   ```

   - To **write** text, you must first set the font size, color, and location where the text will be displayed in the OLED and the data which needs to be printed.

   - Set the font size using the **setTextSize()** method.

```
oled.setTextSize(1);
```

- Set the font color using the **setTextColor()** method.**WHITE** sets white font and black background.

```
oled.setTextColor(WHITE);
```

- Using the **setCursor(x,y)** method, specify the starting point of the text. In this case, the text will be started at **(2,5).**

```
oled.setCursor(2, 5);
```

- The next step is to display data using the **println()** method.

```
oled.setCursor(2, 5);
oled.println("Start");
oled.setCursor(2, 21);
oled.println("voting..");
```

- Finally, we need to call the **display()** method to actually display the text on the screen.

```
oled.display();
```

- Add a 2 seconds delay after this.

```
delay(2000);
```

Reference Code:

```
void setup()
{
  Serial.begin(9600);

  button1.setDebounceTime(25);
  button2.setDebounceTime(25);
  button3.setDebounceTime(25);
  button4.setDebounceTime(25);
  button5.setDebounceTime(25);

  if (!oled.begin(SSD1306_SWITCHCAPVCC, 0x3C)) {
    Serial.println(F("SSD1306 allocation failed"));
    for (;;);
  };

  delay(2000);          // wait two seconds for initializing
  oled.clearDisplay(); // clear display
  oled.setTextSize(2);       // set text size
  oled.setTextColor(WHITE);    // set text color

  oled.setCursor(2, 5);
  oled.println("Start");
  oled.setCursor(2, 21);
  oled.println("voting..");

  oled.display();          // display on OLED
  delay(2000);
}
```

15. Also, we need to call the **loop()** method for each button to make them work.

```
void loop() {

  button1.loop();
  button2.loop();
  button3.loop();
  button4.loop();
  button5.loop();


  delay(10);
}
```

16. Now, we need to display the information about which button represents which team.

- First, initiate a variable named **flag** to 0**.**

- Write an if condition which will run only when the flag equals 0.

```
if (flag == 0) {


}
```

- Now, write code to show the button & team information.

```
oled.clearDisplay(); // clear display
oled.setTextSize(2);          // set text size
oled.setTextColor(WHITE);     // set text color

oled.setCursor(2, 0);         // set position to display
oled.println("A - Green ");
oled.setCursor(2, 16);        // set position to display
oled.println("B - Yellow");
oled.setCursor(2, 32);        // set position to display
oled.println("C - Red");      // display on OLED
oled.setCursor(2, 48);        // set position to display
oled.println("D - Orange");
oled.display();
```

- Change the flag to 1 now. This will make sure that this portion of code will only run once when the flag is 0.

```
flag=1;
```

Reference Code:

```
void loop() {

  button1.loop();
  button2.loop();
  button3.loop();
  button4.loop();
  button5.loop();

  if (flag == 0) {
  // set text
    oled.clearDisplay(); // clear display
    oled.setTextSize(2);        // set text size
    oled.setTextColor(WHITE);   // set text color

    oled.setCursor(2, 0);       // set position to display
    oled.println("A - Green ");
    oled.setCursor(2, 16);      // set position to display
    oled.println("B - Yellow");
    oled.setCursor(2, 32);      // set position to display
    oled.println("C - Red");    // display on OLED
    oled.setCursor(2, 48);      // set position to display
    oled.println("D - Orange");
    oled.display();
    flag=1;
  }

  delay(10);
}
```

Reference Output:
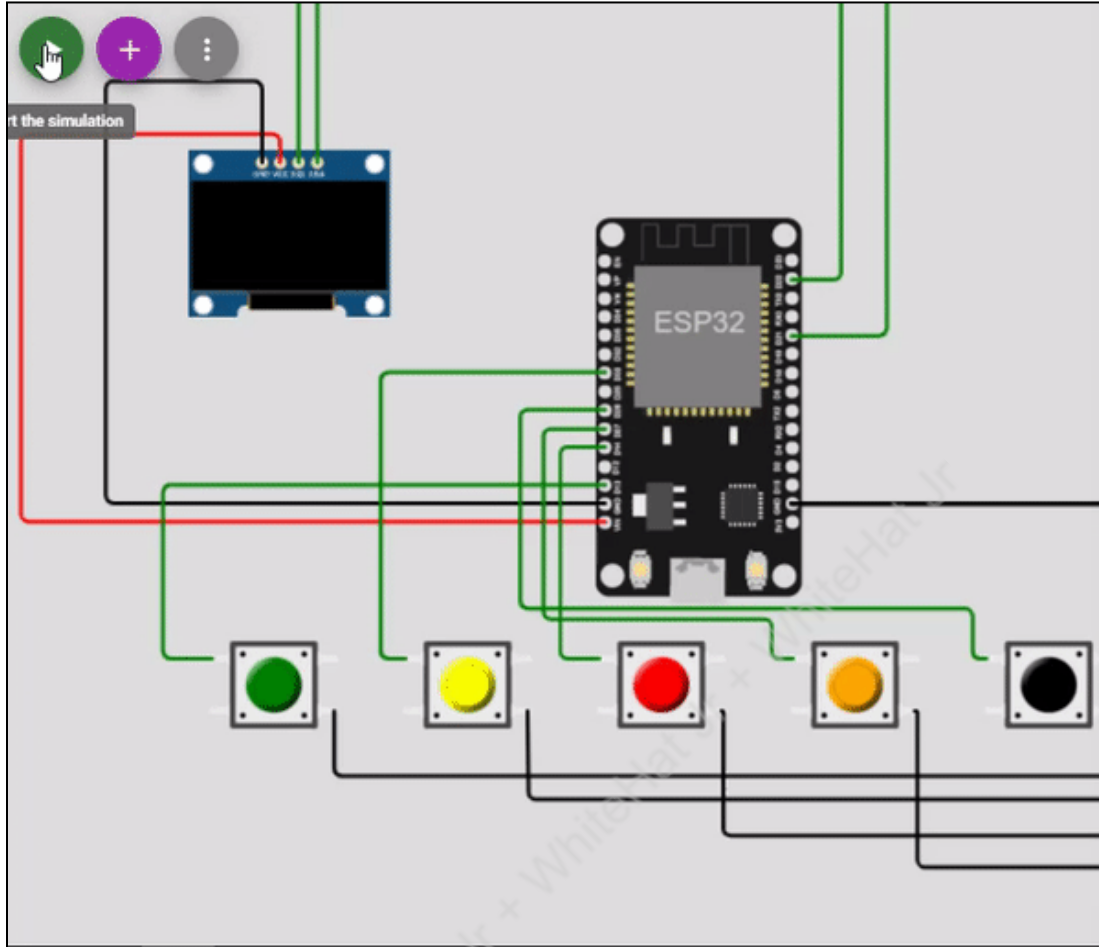
[Click here](#) to view the reference video.

What's NEXT?

In the **next class**, we will complete the code for Electronic voting machine**.**

Expand Your Knowledge

To know more about **different categories of OLED [click here](#)**.