Traffic light simulator with accessibility feature and Timer

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Description:

The mini project is a traffic light simulator that uses an ESP8266 board to imitate a real traffic light. The LEDs are synchronized to follow a specific pattern:

The loop starts with the red light on for 5 seconds.

The yellow light joins for an additional 3 seconds while the red light is still on.

Both lights are then switched off, and the green light is activated for 8 seconds.

The green light blinks three times

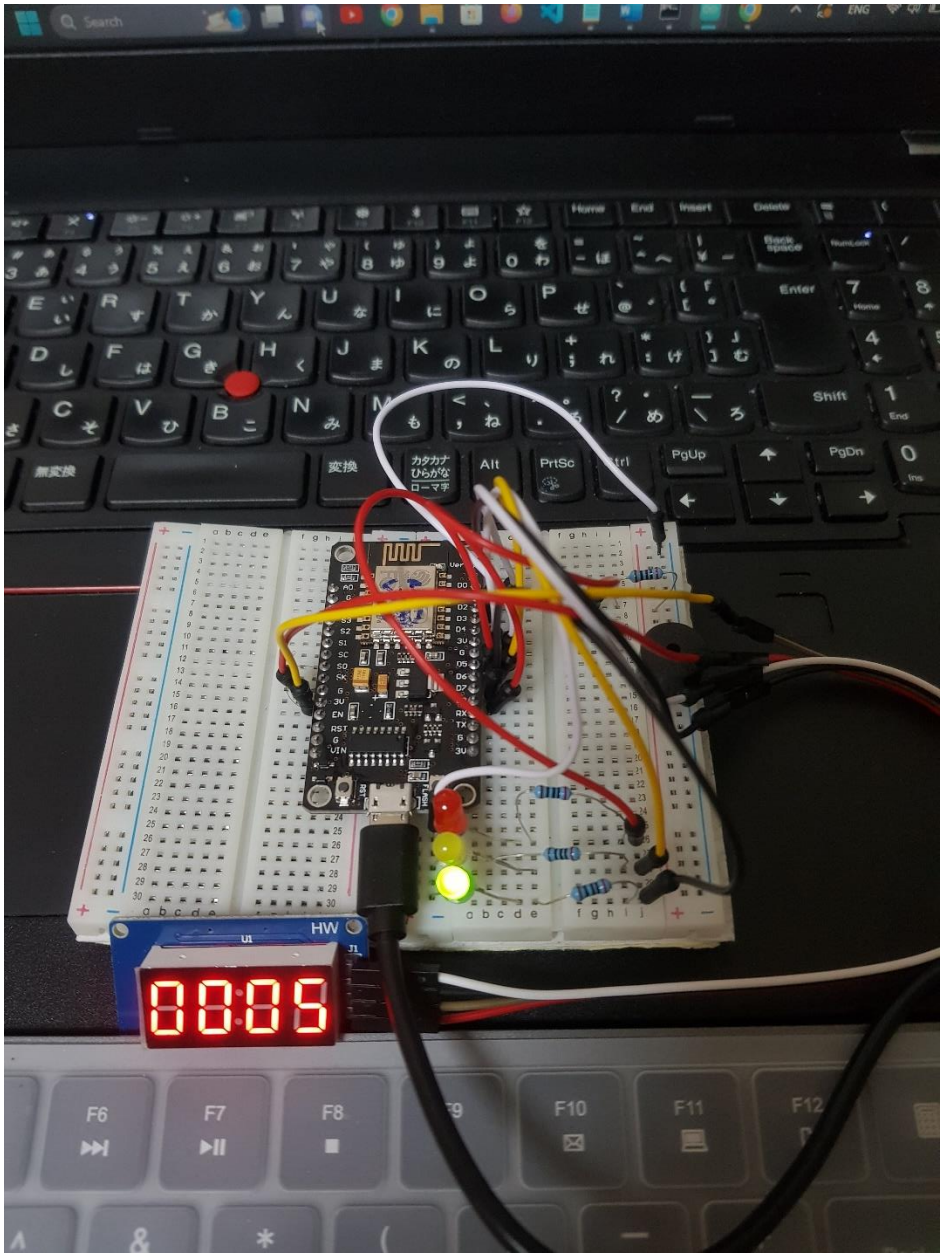
Then the yellow light is active for 2 seconds.

The loop then starts again from the beginning.

Additionally, I added a sound alert to the green light to help people with visual impairments know when the green light is active. The sound pattern changes and becomes faster while the green light starts to blink to alert of the near change.

I have also implemented a feature that incorporates a countdown timer, which tracks and displays the remaining seconds until the next lighting event. This addition enhances the user experience by providing a clear and convenient way to anticipate when the next light will occur.

Picture of the Project:



Video of the project:

https://drive.google.com/file/d/1UG67dfxLN7pujLGZ0PvsZyHdKMzbzPYM/view?usp=sharing

Source code of the project:

```
#include <TM1637Display.h>

// Define the TM1637 pins
const int CLK_PIN = 5;
const int DIO_PIN = 4;

// Create a TM1637Display object
TM1637Display display(CLK_PIN, DIO_PIN);


void setup()
{
  pinMode(14, OUTPUT); // Red LED connected to pin D5 on the board
  pinMode(12, OUTPUT); // Yellow LED connected to pin D6 on the board
  pinMode(13, OUTPUT); // Green LED connected to pin D7 on the board
  pinMode(15, OUTPUT); // Buzzer connected to pin D8 on the board
  // Initialize the TM1637 display
  display.setBrightness(7);
  display.clear();
}

// define the display countdown function
void countdown(int initialValue, int targetValue) {
  for (int i = initialValue; i >= targetValue; i--) {
    display.showNumberDec(i, true);
    delay(1000); // Delay for 1 second
  }
}

//Define function for green light behavior
void greenLight(int initialValue, int targetValue) {
  digitalWrite(13, HIGH);
  for (int i = initialValue; i >= targetValue; i--) {
    display.showNumberDec(i, true);
    greenLedSoundAlert();
  }
}

//Define function for blinking green light
void blinkGreenCountdown(int initialValue, int targetValue) {
  for (int i = initialValue; i >= targetValue; i--) {
    display.showNumberDec(i, true);
    greenLedBlink();
  }
}
```

```
// Define the sound Alert function of the green Light
void greenLedSoundAlert() {

  digitalWrite(15, HIGH);
  delay(100);
  digitalWrite(15, LOW);
  delay(400);
  digitalWrite(15, HIGH);
  delay(50);
  digitalWrite(15, LOW);
  delay(450);

}

// Define the greenLedBlink function with sound alert pattern
void greenLedBlink() {

    digitalWrite(15, HIGH);
    digitalWrite(13, LOW);
    delay(100);
    digitalWrite(15, LOW);
    delay(100);
    digitalWrite(15, HIGH);
    delay(100);
    digitalWrite(15, LOW);
    delay(100);
    digitalWrite(15, HIGH);
    delay(100);
    digitalWrite(13, HIGH);
    digitalWrite(15, LOW);
    delay(100);
    digitalWrite(15, HIGH);
    delay(100);
    digitalWrite(15, LOW);
    delay(300);
    digitalWrite(13, LOW);
  }



// define the display countdown function
void countdown(int initialValue) {
  for (int i = initialValue; i >= 1; i--) {
    display.showNumberDec(i, true); // Show the current number with
leading zeros
    delay(1000); // Delay for 1 second
  }

  display.clear();

}
```

```
void loop() {
  // Red LED active for 5 seconds
  digitalWrite(14, HIGH);
  countdown(5,1);

  // Yellow LED active for 3 seconds
  digitalWrite(12, HIGH);
  countdown(3,1);

  // Deactivate Red and Yellow
  digitalWrite(14, LOW);
  digitalWrite(12, LOW);

  // Activate green light with bip sound and countdown
  greenLight(11,4);


  // Green LED blinks 3 times with alert sound pattern
  blinkGreenCountdown(3,1);

  // Activate Yellow LED
  digitalWrite(12, HIGH);
  countdown(2);

  // Deactivate Yellow LED
  digitalWrite(12, LOW);
}
```