

ARDUINO

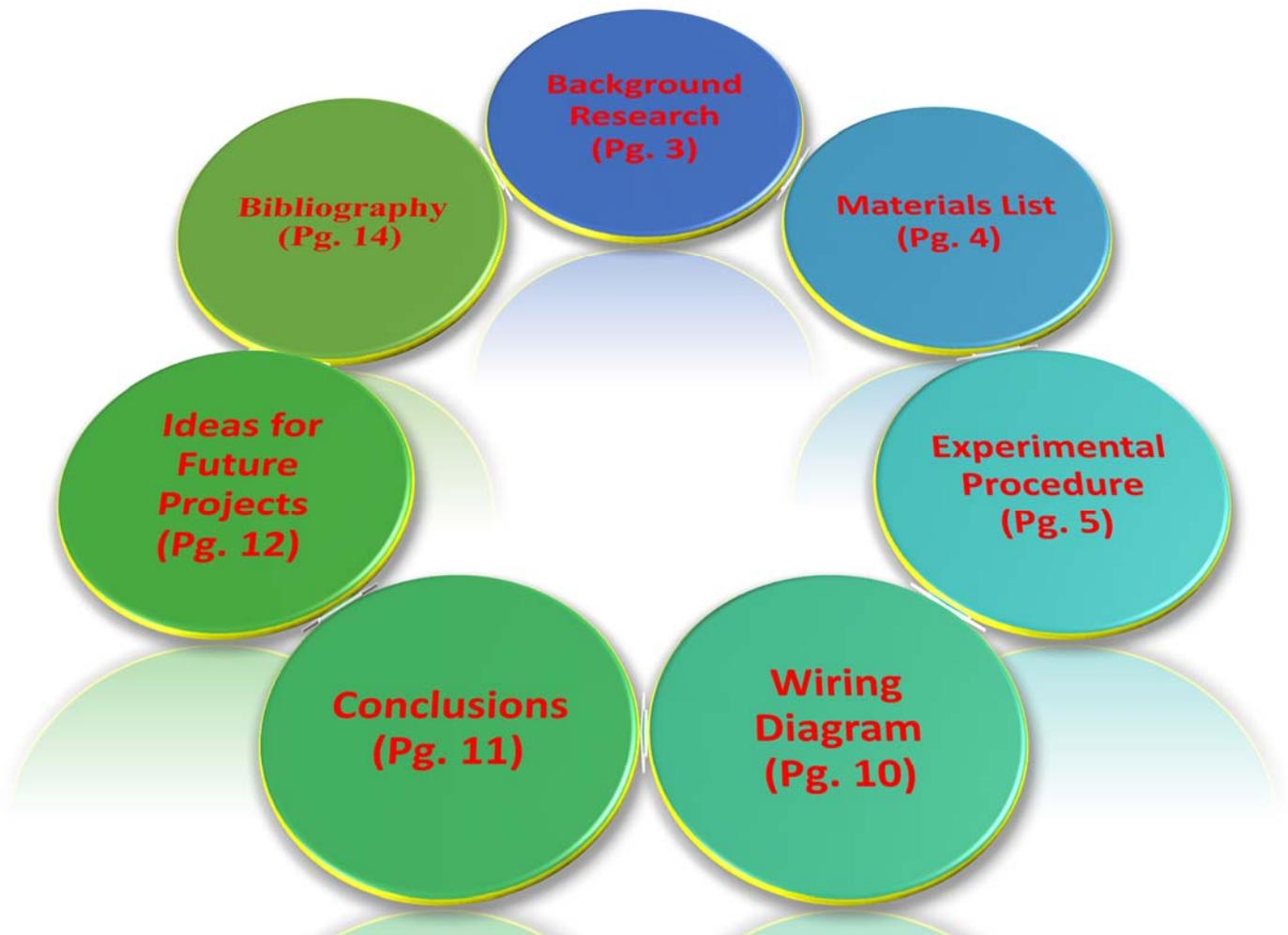
A Project Assembled by

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TEJ4M BREADBOARD/ARDUINO ASSIGNMENT #1

Table of Contents



Background Research

The only research involved in this assignment was concerning the wiring of a button to the arduino board. All other work on the assignment was based off of knowledge of the subject.

Materials List

- 1 Breadboard
- 1 Laptop
- 3 LEDs
- 1 1K Resistor
- 3 10K Resistors
- 1 Button
- 8 Wires

TEJ4M BREADBOARD/ARDUINO ASSIGNMENT #1

Experimental Procedure

First, we hooked up the three LEDs with 10K resistors. The LEDs are hooked up to digital ports 4, 7, and 10. A ground current and a 5v current are established accordingly. A button was plugged in so that electricity flows to a 1K resistor that connects to the button, which then sends a reading through to analog 0 then finally to ground.

The LEDs begin displaying **sequence one**, which shows the red LED light up for three seconds, followed by the red LED for three seconds and lastly the yellow LED for three seconds until the button is pressed. After the button is pressed, **sequence two** will begin, causing the red and green LEDs to flash in an alternating pattern for half a second each proceeding to light up the yellow LED for five seconds and will stop there until the button is pressed to start the next sequence. **Sequence three** will then commence, lighting up red and green for three seconds with yellow flashing on and off at quarter second intervals afterward for five seconds until the button is pressed. **Sequence four**, being the final sequence will show all of the LEDs flashing in an alternating pattern for five seconds at half second intervals. After this, green will then light up for three seconds and the sequence will then end. A final press of the button reverts the pattern in which the LEDs light up to sequence one. The next page shows the code used to make the circuit function.

TEJ4M BREADBOARD/ARDUINO ASSIGNMENT #1

Code

```
/* **** */
/* Traffic Light Program */
/* Justin Coombs & Tyler Cortese */
/* Version 2.1 */
/* Written November 4, 2013 */
/* TEJ4M */
/* **** */

// LED Variables
int ledRed = 10; // pin for red led
int ledYellow = 7; // pin for yellow led
int ledGreen = 4; // pin for green led

// Button Variable
int button = 0; // input pin for button
int buttonMode = 1; // variable for recording button presses

void setup()
{
  pinMode(ledRed, OUTPUT); // declare red led as output
  pinMode(ledYellow, OUTPUT); // declare yellow led as output
  pinMode(ledGreen, OUTPUT); // declare green led as output
  pinMode(button, INPUT_PULLUP); // declare button as input
}

void loop()
{
  check_button(); // check if button is pressed

  sequence_selector(); // activate appropriate mode
}
```

TEJ4M BREADBOARD/ARDUINO ASSIGNMENT #1

```
void check_button()
{
  if (digitalRead(button) == LOW)    // check if button is pressed
  {
    buttonMode += 1;                 // button pressed - count a press

    // once the button has been pressed 4 times, reset back to 1
    if (buttonMode == 5)
    {
      buttonMode = 1;
    }
  }
}

void sequence_selector()
{
  // buttonMode activate appropriate modes
  if (buttonMode == 1)
  {
    // SEQUENCE 1
    sequence_1();                    // reference sequence 1 for instruction
  }

  else if (buttonMode == 2)
  {
    // SEQUENCE 2
    sequence_2();                    // reference sequence 2 for instruction
  }

  else if (buttonMode == 3)
  {
    // SEQUENCE 3
    sequence_3();                    // reference sequence 3 for instruction
  }

  else if (buttonMode == 4)
  {
    // SEQUENCE 4
    sequence_4();                    // reference sequence 4 for instruction
  }
}
```

TEJ4M BREADBOARD/ARDUINO ASSIGNMENT #1

```
void sequence_1()
{
  // SEQUENCE 1
  digitalWrite(ledRed,HIGH);           // turn red led on for 3 seconds
  delay(3000);
  digitalWrite(ledRed,LOW);           // turn red led off

  digitalWrite(ledGreen,HIGH);        // turn green led on for 3 seconds
  delay(3000);
  digitalWrite(ledGreen,LOW);        // turn green led off

  digitalWrite(ledYellow,HIGH);       // turn yellow led on for 3 seconds
  delay(2000);
  digitalWrite(ledYellow,LOW);       // turn yellow led off
}

void sequence_2()
{
  // SEQUENCE 2
  for (int i = 0; i < 5; i = i + 1)   // repeat for approximately 5 seconds
  {
    digitalWrite(ledRed,HIGH);       // turn red led on for 0.5 seconds
    delay(500);
    digitalWrite(ledRed,LOW);       // turn red led off

    digitalWrite(ledGreen,HIGH);     // turn green led on for 0.5 seconds
    delay(500);
    digitalWrite(ledGreen,LOW);     // turn green led off
  }

  digitalWrite(ledYellow,HIGH);      // turn on yellow led for 5 seconds
  delay(5000);
  digitalWrite(ledYellow,LOW);      // turn off yellow led

  delay(2000);                       // pause for 2 seconds
}
```

TEJ4M BREADBOARD/ARDUINO ASSIGNMENT #1

```
void sequence_3()
{
  // SEQUENCE 3
  digitalWrite(ledRed,HIGH);           // turn red led on
  digitalWrite(ledGreen,HIGH);        // turn green led on
  delay(3000);                          // keep on for 3 seconds
  digitalWrite(ledRed,LOW);            // turn red led off
  digitalWrite(ledGreen,LOW);          // turn green led off

  for (int k = 0; k < 10; k = k + 1)    // repeat for approximately 5 seconds
  {
    digitalWrite(ledYellow,HIGH);      // turn on yellow led for 0.25 seconds
    delay(250);
    digitalWrite(ledYellow,LOW);       // turn off yellow led for 0.25 seconds
    delay(250);
  }
}

void sequence_4()
{
  // SEQUENCE 4
  for (int j = 0; j < 3.33; j = j + 1)  // repeat for approximately 5 seconds
  {
    digitalWrite(ledYellow,HIGH);      // turn yellow led on for 0.5 seconds
    delay(500);
    digitalWrite(ledYellow,LOW);       // turn yellow led off

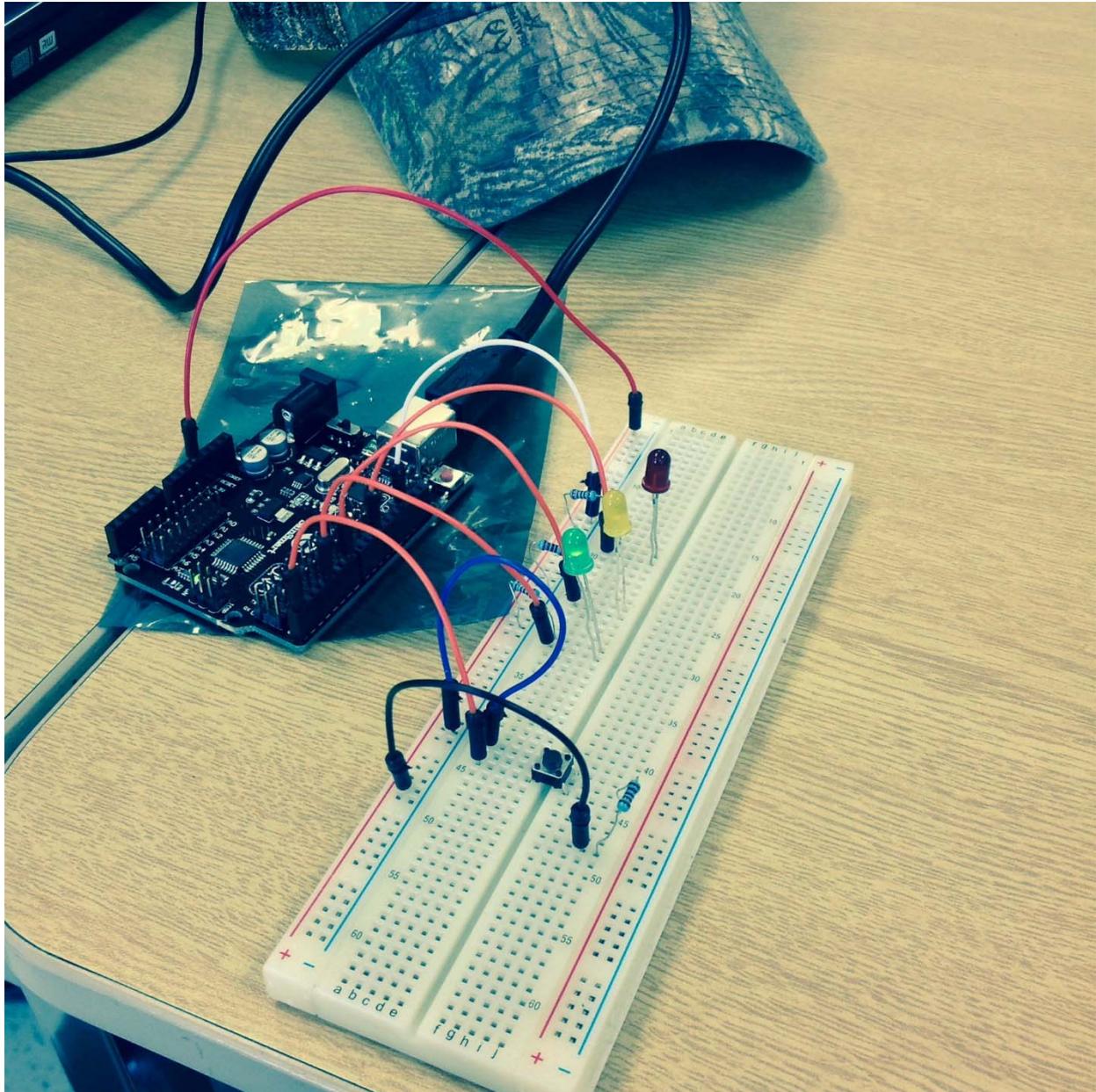
    digitalWrite(ledGreen,HIGH);       // turn green led on for 0.5 seconds
    delay(500);
    digitalWrite(ledGreen,LOW);        // turn green led off

    digitalWrite(ledRed,HIGH);         // turn red led on for 0.5 seconds
    delay(500);
    digitalWrite(ledRed,LOW);          // turn red led off
  }

  digitalWrite(ledGreen,HIGH);         // turn green led on for 3 seconds
  delay(3000);
  digitalWrite(ledGreen,LOW);          // turn green led off
  delay(2000);                          // pause for 2 seconds
}
```

TEJ4M BREADBOARD/ARDUINO ASSIGNMENT #1

Wiring Diagram



Conclusions

In conclusion, this assignment improved our understanding of wiring a button in correlation with LEDs to activate different sequences of power in the LEDs. This will help us complete future projects that involve buttons and different sequences in code.

Ideas for Future Projects

Idea #1: Two rows of 3 LEDs each consisting of a green, yellow and red LED in that order. The first sequence begins with **ROW 1** starting on the green light and **ROW 2** starting on red. A push of the button will cause **ROW 1** to turn the green light off as it lights up yellow, then proceeding to do the same to progress to the red light. **ROW 2** will do the opposite to end up on the green light. Another push of the button will reverse the procedure so that **ROW 1** will end up on green again.

Idea #2: Three LEDs put in order of green, yellow and red. Green and yellow light up indefinitely until the button is pressed. Upon pressing the button, yellow turns off and red lights up until the button is pressed. A third button press causes green to turn off and yellow to turn on again. A fourth press makes yellow turn off and green light up. A final fifth press reverts it back to the beginning with green and yellow lit up.

Idea #3: 3 LEDs put in order of green, yellow, red. 2 additional LEDs (**LED 1** and **LED 2**) are placed above and in between green and yellow, and yellow and red. A final LED (**LED 3**) is then placed above and in between **LED 1** and **LED 2**. **LED 1** will only light up if green **AND** yellow are lit up. **LED 2** will only light up if yellow **AND** red are lit up. **LED 3** will only light up with **LED 1 AND LED 2** are lit up.

Ideas for Future Projects

Idea #2: First, a 5v current and a ground current must be established. Next, three wires need to be hooked up to three different digital ports. Then, resistors must carry the current from the wires to the positive end of the LED. A button must then be placed onto the board, with a 10k resistor carrying current from the 5v wire to the button, which is then hooked up to an analog port and ground. Lastly, code must be implemented to cause each LED light up indefinitely according to a specific order until the button is pressed.

**TEJ4M BREADBOARD/ARDUINO ASSIGNMENT
#1**

Bibliography

Button, Arduino,

<http://arduino.cc/en/Tutorial/Button>, 2013