

Polytechnic University of Puerto Rico
Electrical & Computer Engineering and Computer Sciences Department



COE 4341 Microcomputer Interfacing Laboratory

Laboratory No 1: Introduction to the Arduino Developed Board

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Introduction

In this experiment, we will be using the Arduino Ide to compile and upload different sketches to the Arduino MEGA board. The first sequence will turn the LED, connected to pin 13, ON for 1 second and turn it OFF for the same amount of time. This delay will increment until it gets to 10 seconds then the process will restart. The second sequence will imitate the Night Rider. Finally, the first sequence will be repeated but the LED will be substituted by a 110V bulb.

Objective

Familiarize with the basic operation and functionalities of the Arduino MEGA board and the Arduino IDE.

Methods

Procedure C Language Program

Blink:

In this experiment, we will turn an LED on for 1 second and then off for 1 second and terminate the process.

Afterwards, we will turn the LED on and off respectively for increments of 1 second until we reach a 10 second total delay. Finally, we will terminate the process.

Night Rider:

In this experiment we will use 5 LEDs. We will turn the first light bulb on and then off.

Subsequently we do the same for the neighboring lightbulb. We do this process until we reach the end and then we wrap back around until we reach the initial LED.

Light Bulb:

In this experiment, we will connect an Analog light bulb to our processor and utilize the same coding process from the “Blink” experiment to turn on the light bulb.

Source Code for the C Language Program

Blink:

```
/*  
Blink  
  
Turns an LED on for one second, then off for one second, repeatedly.  
  
Most Arduinos have an on-board LED you can control. On the UNO, MEGA and ZERO  
it is attached to digital pin 13, on MKR1000 on pin 6. LED_BUILTIN is set to  
the correct LED pin independent of which board is used.  
If you want to know what pin the on-board LED is connected to on your Arduino  
model, check the Technical Specs of your board at:  
https://www.arduino.cc/en/Main/Products  
  
modified 8 May 2014  
by Scott Fitzgerald  
modified 2 Sep 2016  
by Arturo Guadalupi  
modified 8 Sep 2016  
by Colby Newman  
  
This example code is in the public domain.  
  
https://www.arduino.cc/en/Tutorial/BuiltInExamples/Blink  
*/  
  
// the setup function runs once when you press reset or power the board  
void setup() {  
  // initialize digital pin LED_BUILTIN as an output.  
  pinMode(LED_BUILTIN, OUTPUT);  
}  
  
// the loop function runs over and over again forever  
void loop() {  
  digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)  
  delay(1000); // wait for a second  
  digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW  
  delay(1000); // wait for a second  
}
```

Modified Blink:

```
/*  
Blink  
  
Turns an LED on for one second, then off for one second, repeatedly.  
  
Most Arduinos have an on-board LED you can control. On the UNO, MEGA and ZERO  
it is attached to digital pin 13, on MKR1000 on pin 6. LED_BUILTIN is set to  
the correct LED pin independent of which board is used.  
If you want to know what pin the on-board LED is connected to on your Arduino  
model, check the Technical Specs of your board at:  
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https://www.arduino.cc/en/Tutorial/BuiltInExamples/Blink  
*/  
  
// the setup function runs once when you press reset or power the board  
void setup() {  
  // initialize digital pin LED_BUILTIN as an output.  
  pinMode(LED_BUILTIN, OUTPUT);  
}  
  
// the loop function runs over and over again forever  
void loop() {  
  int count = 1000;  
  for(int i = 0; i<10;i++)  
  {  
    digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)  
    delay((i+1)*count);             // wait for a second  
    digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW  
    delay((i+1)*count);             // wait for a second  
  }  
}
```

Night Rider:

```
void setup() {
  // put your setup code here, to run once:
  DDRA = 0b11111111;
}

void loop() {
  // put your main code here, to run repeatedly:
  int time = 100;
  for(int i = 22; i<30; i++)
  {
    digitalWrite(i,HIGH);
  }

  for(int i = 22; i<30; i++)
  {
    digitalWrite(i,LOW);
    delay(time);
    digitalWrite(i,HIGH);
  }

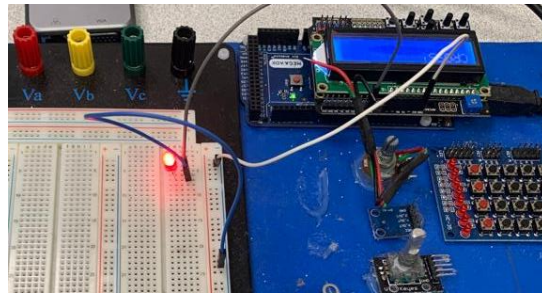
  for(int i = 28; i>22; i--)
  {
    digitalWrite(i,LOW);
    delay(time);
    digitalWrite(i,HIGH);
  }
}
```


Results

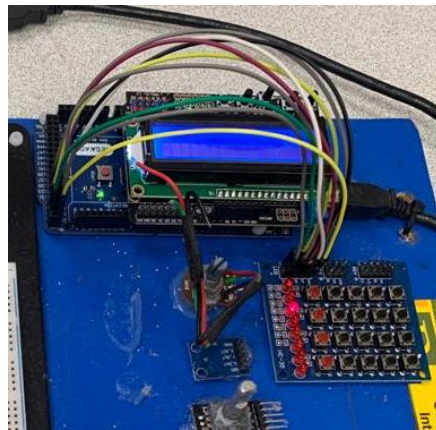
Blink LED Image 1:



Blink LED Image 2:



Night Rider Image:



Light Bulb Image:

Conclusion

This experiment using the Arduino Mega Board was so much easier than last trimester experiments using ARM language and the Tiva Board. Since we know how to code in C, the task was so simpler than using ARM language because C is much easier to read compared to C. Arduino comes with its one compiler which makes more easier for us because we choose the board, and we have manuals for the pins and ports so we can make them as outputs or inputs simpler. More things could be completed in less time via this technology.