

AMERICAN INTERNATIONAL UNIVERSITY BANGLADESH

Faculty of Engineering

Laboratory Report Cover Sheet



Please submit all reports to your subject supervisor or the office of the concerned faculty.

Students must complete all details except the faculty use part.

Laboratory Title: Study of a Digital Timer using millis() function of Arduino to avoid problems associated with the delay() function.

Experiment Number: 04 Due Date: 09/10/2023 Semester: Fall 2023-2024

Subject Code: COE_3104 Subject Name: Microprocessor & Embedded System. Section: L

Course Instructor: PROTIK PARVEZ SHEIKH Degree Program: B.sc CSE

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Faculty comments _____

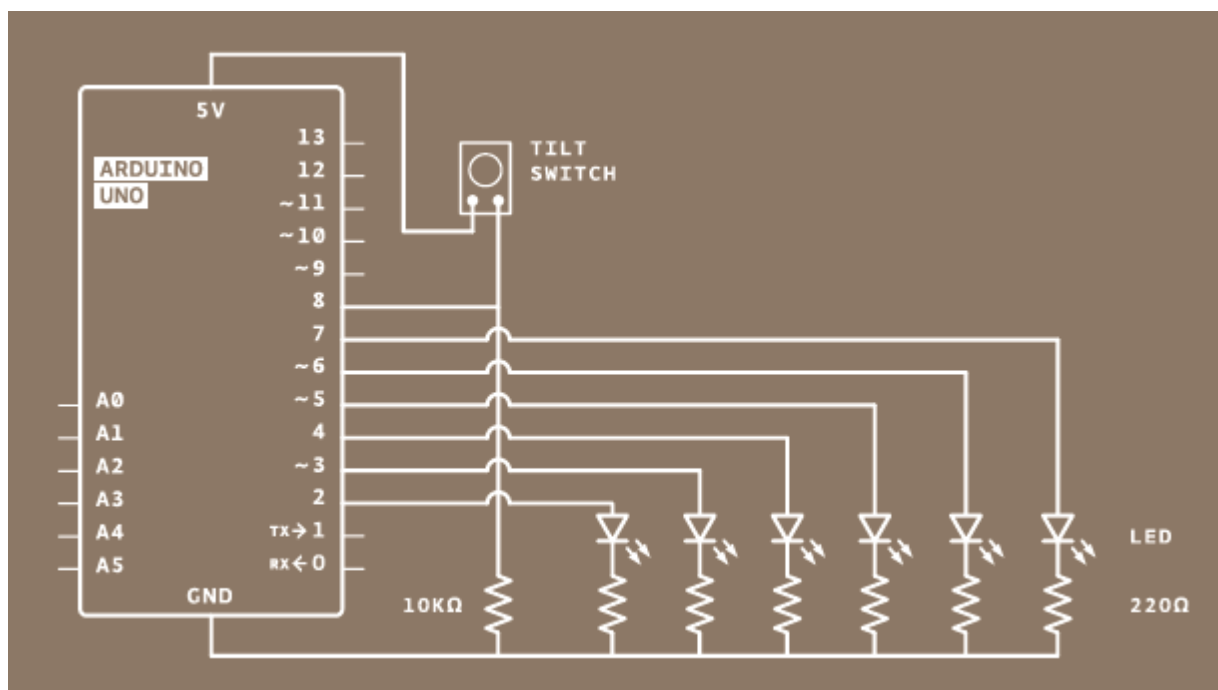
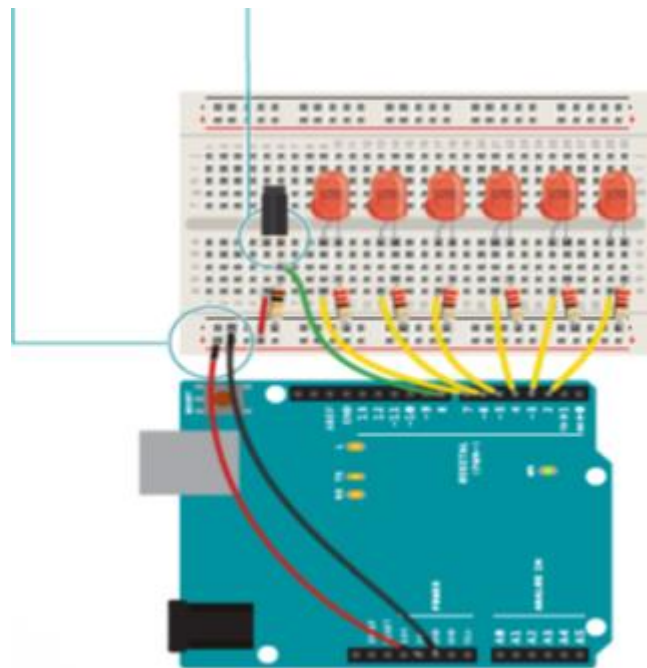
Title: Study of a Digital Timer using millis() function of Arduino to avoid problems associated with the delay() function.

Introduction: In this project, you'll build a digital timer that turns on an LED every minute. Besides, you will be able to know how long you are working on your projects by using Arduino's built-in Timer.

Apparatus:

- Arduino Uno/Arduino Mega Microcontroller Board.
- Tilt sensor (One).
- LEDs (Six)
- Resistors (One 10 k Ω and Six 100 Ω)

Circuit Diagram:



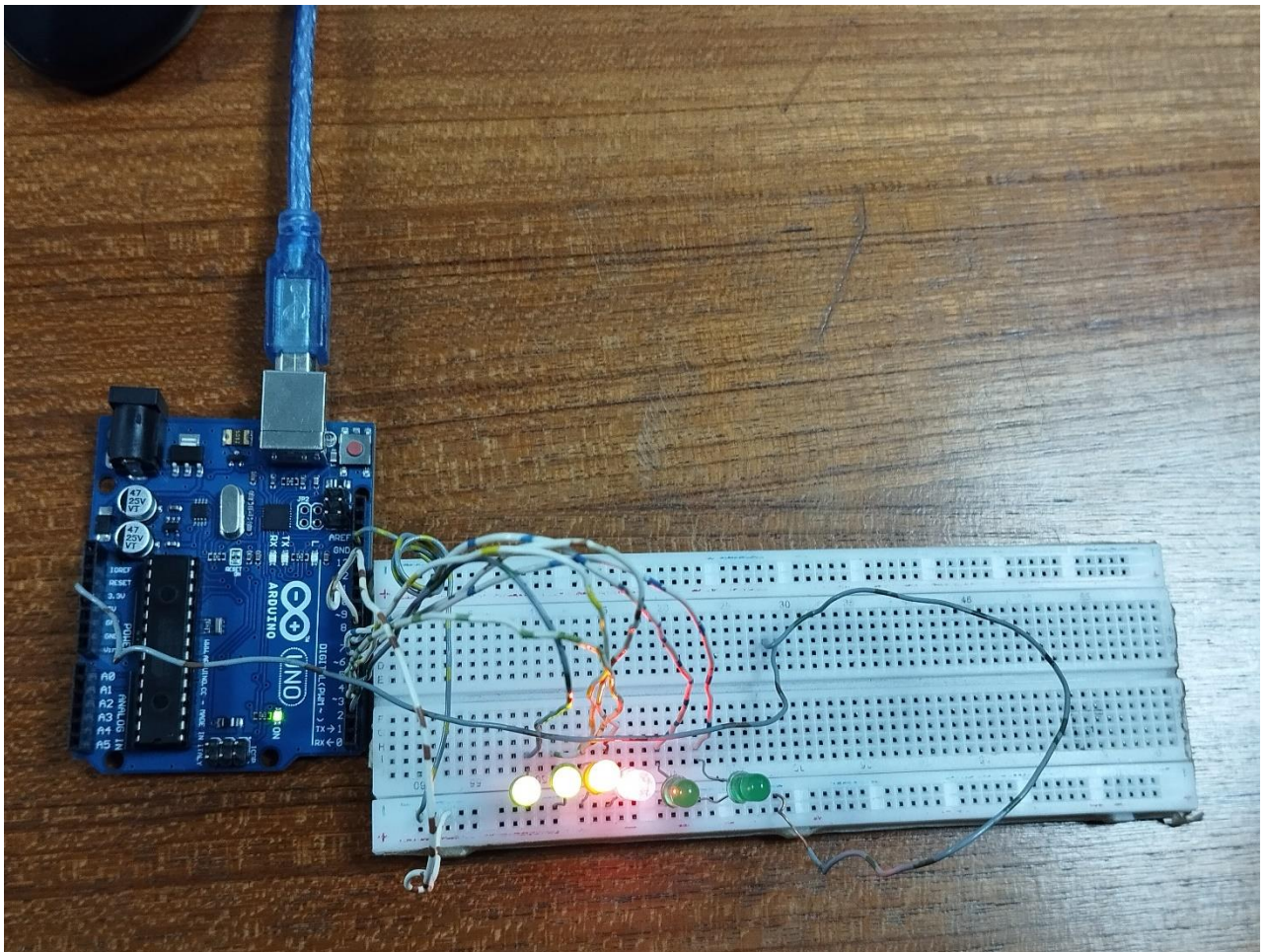
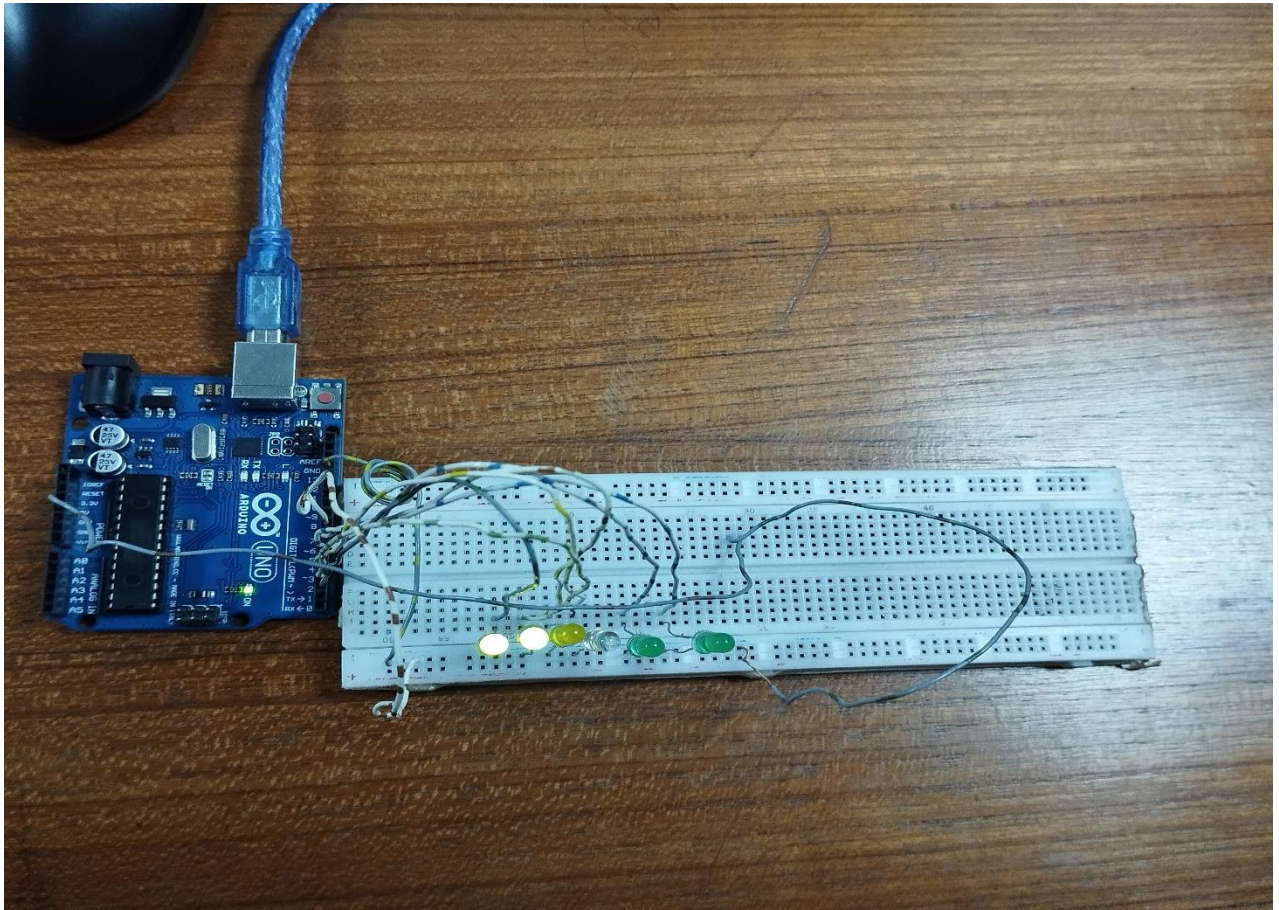
Code implementation:

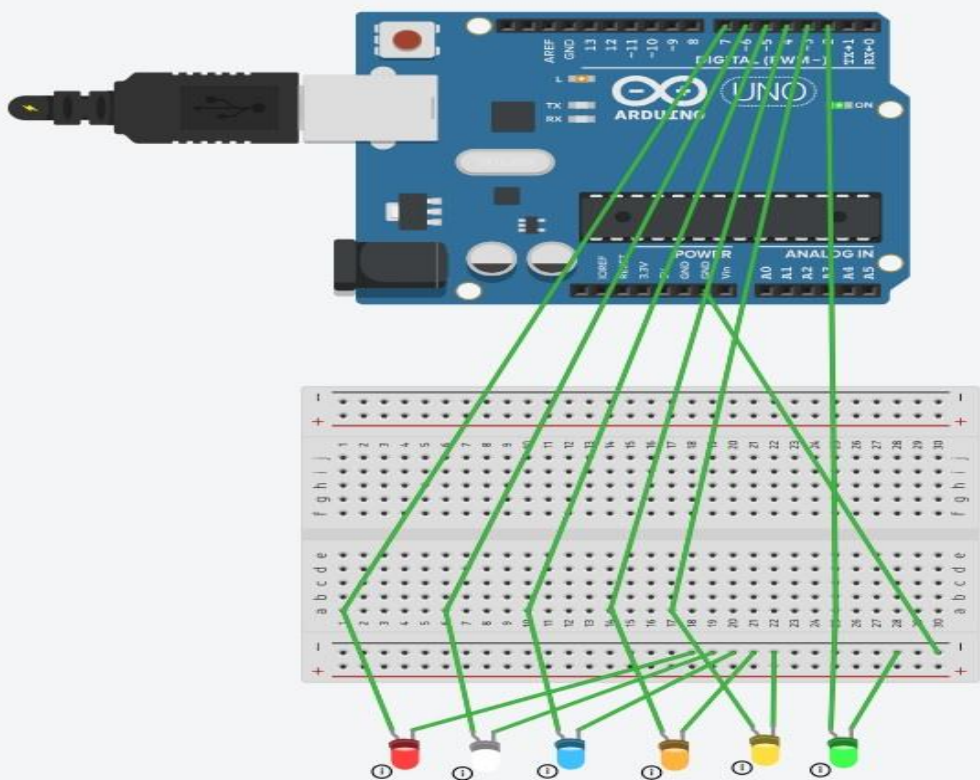
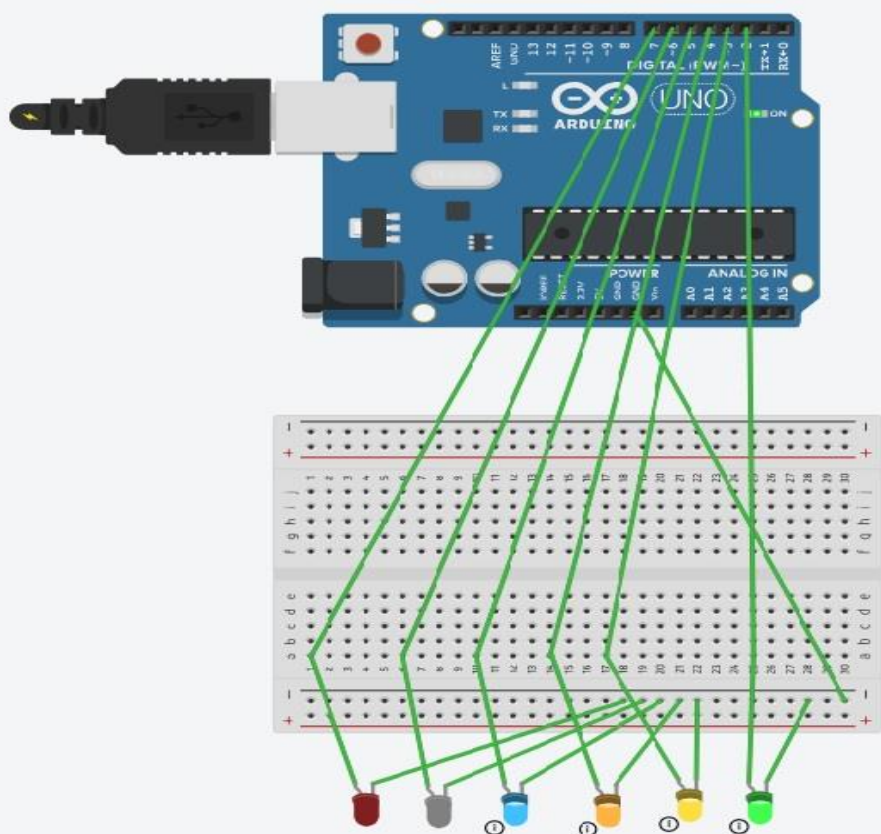
```
const int SwitchPin = 8;
unsigned long PreviousTime = 0;
int SwitchState = 0;
int PrevSwitchState = 0;
int led = 2;
long interval = 60000;

void setup() {
  for (int x = 2; x < 8; x++)
  {
    pinMode(x, OUTPUT);
  }
  pinMode(SwitchPin, INPUT);
}

void loop() {
  unsigned long CurrentTime = millis();
  if (CurrentTime - PreviousTime > interval) {
    PreviousTime = CurrentTime;
    digitalWrite(led, HIGH);
    led++;
    if (led == 7){
    }
  }
  SwitchState = digitalRead(SwitchPin);
  if (SwitchState != PrevSwitchState){
    for (int x = 2 ; x < 8; x++)
    {
      digitalWrite(x, LOW);
    }
    led = 2;
    PreviousTime = CurrentTime;
  }
  PrevSwitchState = SwitchState;
}
```


Hardware Implementation:





Discussion: In our experiment, "Study of a Digital Timer using millis() function of Arduino to avoid problems associated with the delay() function," we used Arduino to build an LED-based digital timer. We overcame the 'delay()' function's constraints by setting the LEDs to flash at predetermined intervals using the 'millis()' function, allowing for more fluid program operation and multitasking. The LEDs flashed in a timer-like pattern while the software was still running. To demonstrate practical use and user interaction, we also included a switch that could be used to reset the timer. This experiment proved how important it is to use the Arduino programming function 'millis()' for exact timing, especially in real-world applications where responsiveness and concurrent operations are crucial. Overall, the digital timer was successfully deployed and matched the goals of the experiment.

References:

- 1) <https://www.arduino.cc/>.
- 2) ATMega328 manual
- 3) <https://www.avrfreaks.net/forum/tut-c-newbies-guide-avr-timers>
- 4) <http://maxembedded.com/2011/06/avr-timers-timer0/>