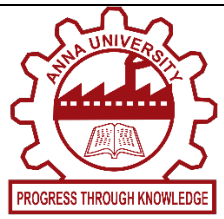

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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PROJECT ABSTRACT

DIGITAL STOPWATCH

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ABSTRACT :-

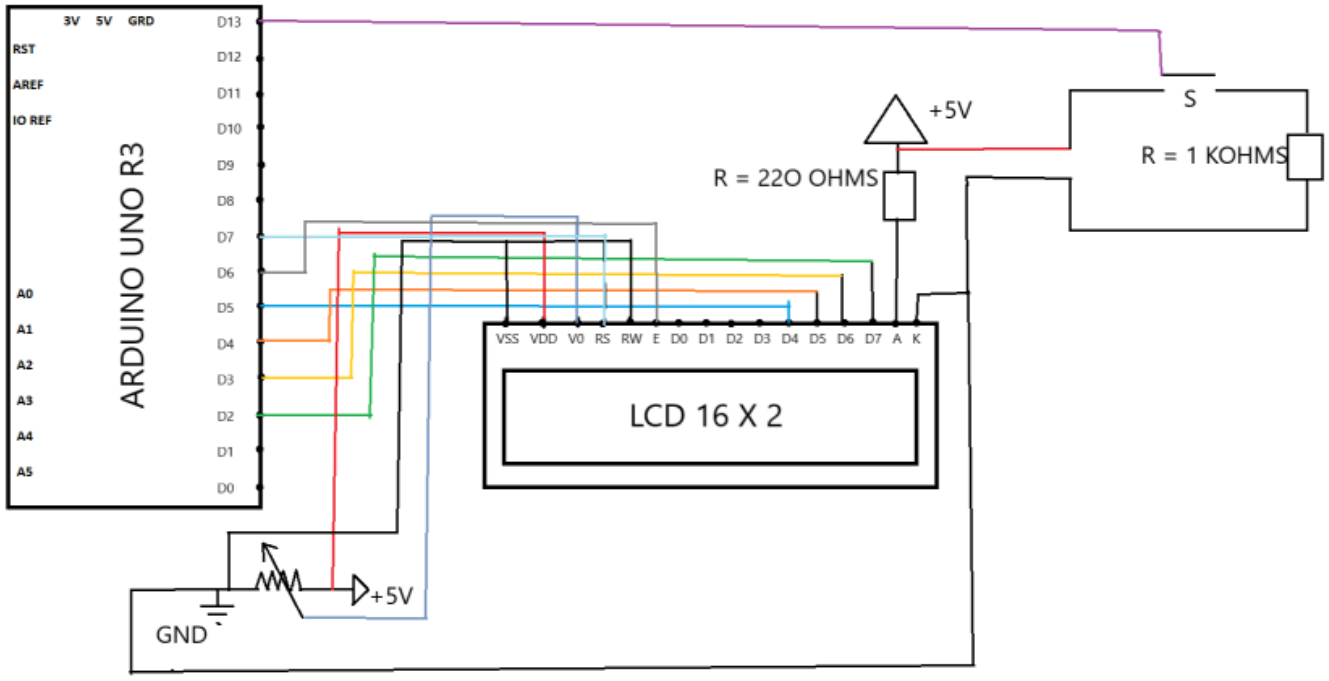
Stopwatches find use as time keeping device in many fields, namely sports. Stopwatches may be analog or digital. Its function is to find out how long it takes an activity. digital stopwatches are much more comon the analog version owing their higher accuracy and ease of use. Here we tried to realize a digital stopwatch of reasonable accuracy and reliability.

This particular stopwatch can count upto 1 minute abd 23:59:59 seconds. It is accurate upto one tenth of a second. The circuit is relativity simple and easy to realize. The heart of the circuit is an a stable mv followed by arduino. The circuit explain explain extensively in the following pages. It uses a LCD 16X2 display to show time.

INTRODUCTION :-

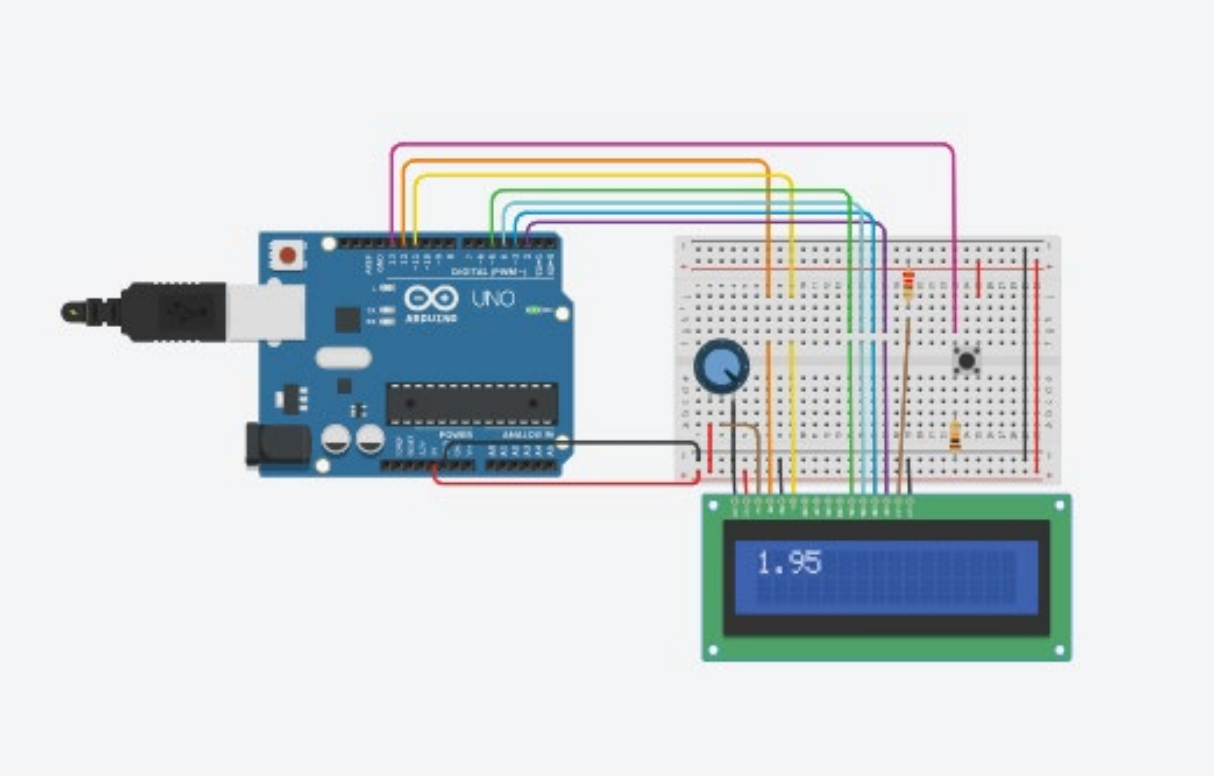
'Stopwatch using Arduino' having two functions start and pause. It counts up to 23:59:59. The start button is used to start the stopwatch, pause button for pause the time. It can resume count by pressing the start button again.

CIRCUIT DIAGRAM :-



DIGITAL STOPWATCH

TINKERCAD :-



https://www.tinkercad.com/things/fXwmA25onKL-copy-of-stopwatch-text/editel

APPARATUS REQUIRED :-

SNO	COMPONENT NAME	RANGE	QUANTITY
1	Arduino Nano R3	-	1
2	Seeed Grove – 16 X 2 LCD	-	1
3	Pushbutton	-	1
4	General purpose Breadboard PCB	-	1
5	Resistor	220 ohms and 10 kohms	2
6	Potentiometer	250 kohms	1
7	Connecting wires	-	As Required

CONNECTIONS :-

Make the connection in the circuit diagram :

1) LCD RS pin to digital pin 12.

2) LCD Enable pin to digital pin 11.

3) LCD D4 pin to digital pin 5.

4) LCD D5 pin to digital pin 4.

5) LCD D6 pin to digital pin 3.

6) LCD D7 pin to digital pin 2.

7) LCD R/W pin to ground.

8) 220 ohms resistor between LCD pin 15 and ground.

9) Potentiometer wiper to LCD VO pin and ends to +5 V and ground of Arduino kit.

10) LCD pin 16 to ground.

EXPLANATION :-

There are total 8 data pins in an LCD for providing 8-bit data input. In this project, we are going to use only 4 of them as we needit to work in a 4-bit mode (Stopwatch). RS pin is the Register Select pin. It selects how and what data is to be displayed. Enable pin enables the LCD to receive data. R/W pin is used to either read or write data onto the LCD. For this project, we have set it to low (ground), so it will perform only read operations. Potentiometer acts as a variable resistor and is used to adjust the brightness of LCD.

WORKING :-

Since in one day there are 24 hours, an hour has 60 minutes and a minute has 60 seconds, Arduino first counts the number of seconds then further turn it into minutes and hours. This is the basic logic behind any stopwatch. You can further develop the code to count the number of days and weeks.

Liquid Crystal LCD (12, 11, 5, 4, 3, 2): This command sets the interfacing of LCD pin RS, EN, D4, D5, D6, D7 to the Arduino pin 12,11,5,4,3,2 respectively.

In void setup function we initialize the serial communication and write from where data is to be displayed in LCD.

void loop()-This function checks the given condition again and again and then gives the output according to whether the condition is satisfying or not.

CODE :-

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

int button = 13;
boolean running = false;
unsigned long startTime;

void setup() {
  lcd.begin(16, 2);
  pinMode(button, INPUT);
}

void loop() {
  if (digitalRead(button) == HIGH) {
    running = true;
    startTime = millis();
    // wait for button to be released
    while (digitalRead(button) == HIGH) {
      delay(100);
    }
  }
  delay(10);
  if (running) {
    lcd.setCursor(0, 0);
    lcd.print((millis() - startTime) / 1000.);
  }
}
```

APPLICATION :-

- This circuit can be used as an indicator at quiz competition.
- Stopwatch is used to measure the speed or duration in a fractions of a second, typically for sporting or athletics event.

LIMITATION :-

- The circuit does not display the actial time, but rather the count of clock pulses.
- This is a theoretical circuit and require may changes.

CONCLUSION :-

Thus the digital stopwatch display in numeric form from 0 to 23 :59:59 seconds in a LCD screen.

REFERENCE :-

- https://create.arduino.cc/projecthub/AzureDragon/stopwatch-using-arduino-52b99e
- https://how2electronics.com/stopwatch-arduino-lcd-start-stop-reset-button/#:~:text=Connect%20jumpers%20wires-,Circuit%3A%20Stopwatch%20Using%20Arduino%20%26%20LCD%20Display,8%20and%209%20of%20Arduino.