Exercise 11_Output temperature to LCD display

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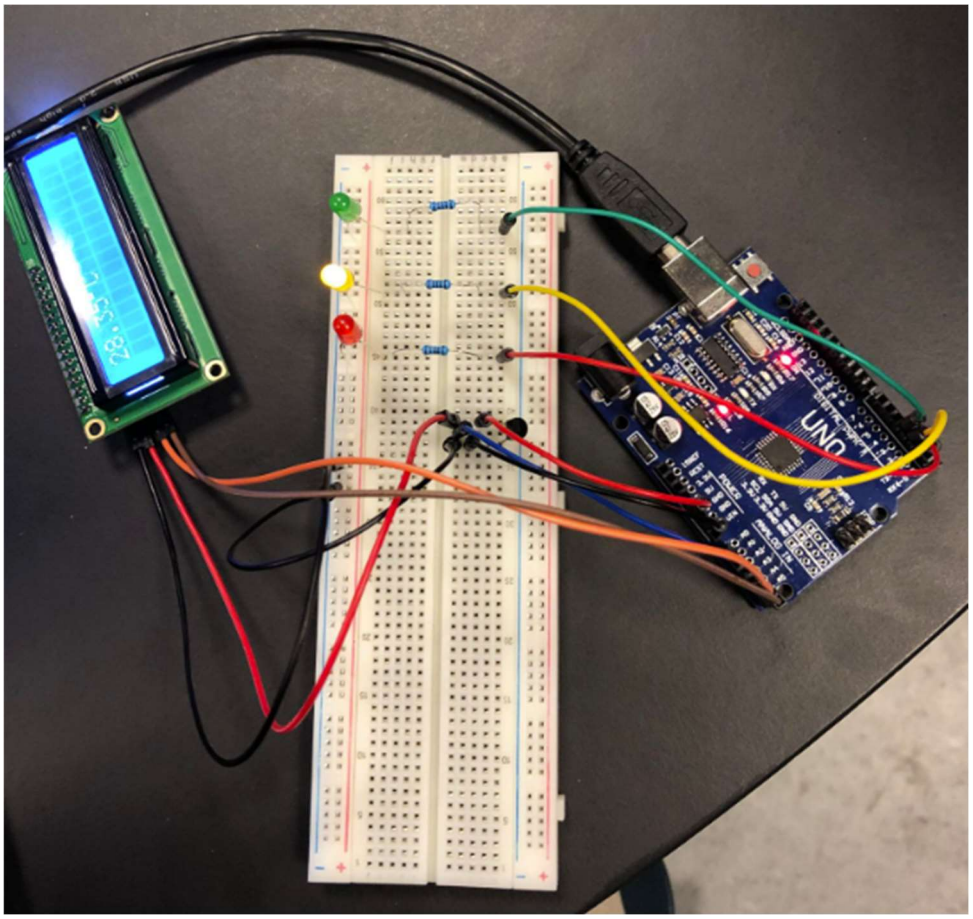
```
#include <LiquidCrystal_I2C.h>

int val = 0;
float voltage = 0;
float celscius = 0;

// the location of the lcd is 0x27
LiquidCrystal_I2C lcd(0x27,  16, 2);

void setup() {
  Serial.begin(9600);
  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);

  //initialize lcd screen
  lcd.init();
  // turn on the backlight
  lcd.backlight();
}

void loop() {
  // the average tempearture of 10 measuments
  for (int i = 0; i <= 9; i++){
    val = val + analogRead(A0);
    Serial.println(val);
    delay(500);
  }
  val = val/10;
  voltage = 5./1023.*val;
  celscius = voltage * 100;

```

```
  // print voltage and degrees
  Serial.println(val);
  Serial.print(voltage);
  Serial.println("V");
  Serial.print(celscius);
  Serial.println("°C");

  // turn on LEDs according to the temperature
  // and writes a message accordingly
  if (celscius < 24){
    digitalWrite(4, HIGH);
    digitalWrite(2, LOW);
    digitalWrite(3, LOW);

    lcd.setCursor(0,1);
    lcd.print("                ");  // clears the second row
  }
  else if (celscius > 30){
    digitalWrite(2, HIGH);
    digitalWrite(3, LOW);
    digitalWrite(4, LOW);
    lcd.setCursor(0,1);
    lcd.print("");

    lcd.setCursor(0,1);
    lcd.print("Warning. HOT!!!");
  }
  else {
    digitalWrite(3, HIGH);
    digitalWrite(2, LOW);
    digitalWrite(4, LOW);
    lcd.setCursor(0,1);
    lcd.print("                ");
  }

  // prints the temperature on the LCD display
  lcd.setCursor(0,0);
  lcd.print(celscius);
  lcd.setCursor(5,0);
  lcd.print(char(223));
  lcd.setCursor(6,0);
  lcd.print("C");

}
```



Questions

- 11a: What is I2C?

I2C stands for the inter-integrated circuit interface which makes it possible for multiple devices to communicate with just two wires.

- 11b: How can you save computational power when printing on the LCD?

The best way to save computational power when printing on the LCD is by minimizing the updates to the display. Only display when a change happens.