Lab Report : Arduino II
Hardware Experiment - 5

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Title of the Experiment: Using Arduino to make certain circuits and perform given tasks.

Brief Description: Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message- and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

Tasks: Below are some of the given tasks that were performed in the lab with the help of an Arduino circuit board.

Task 1: Design the Arduino Circuit to measure the temperature by using temperature sensor (LM35)

Images:
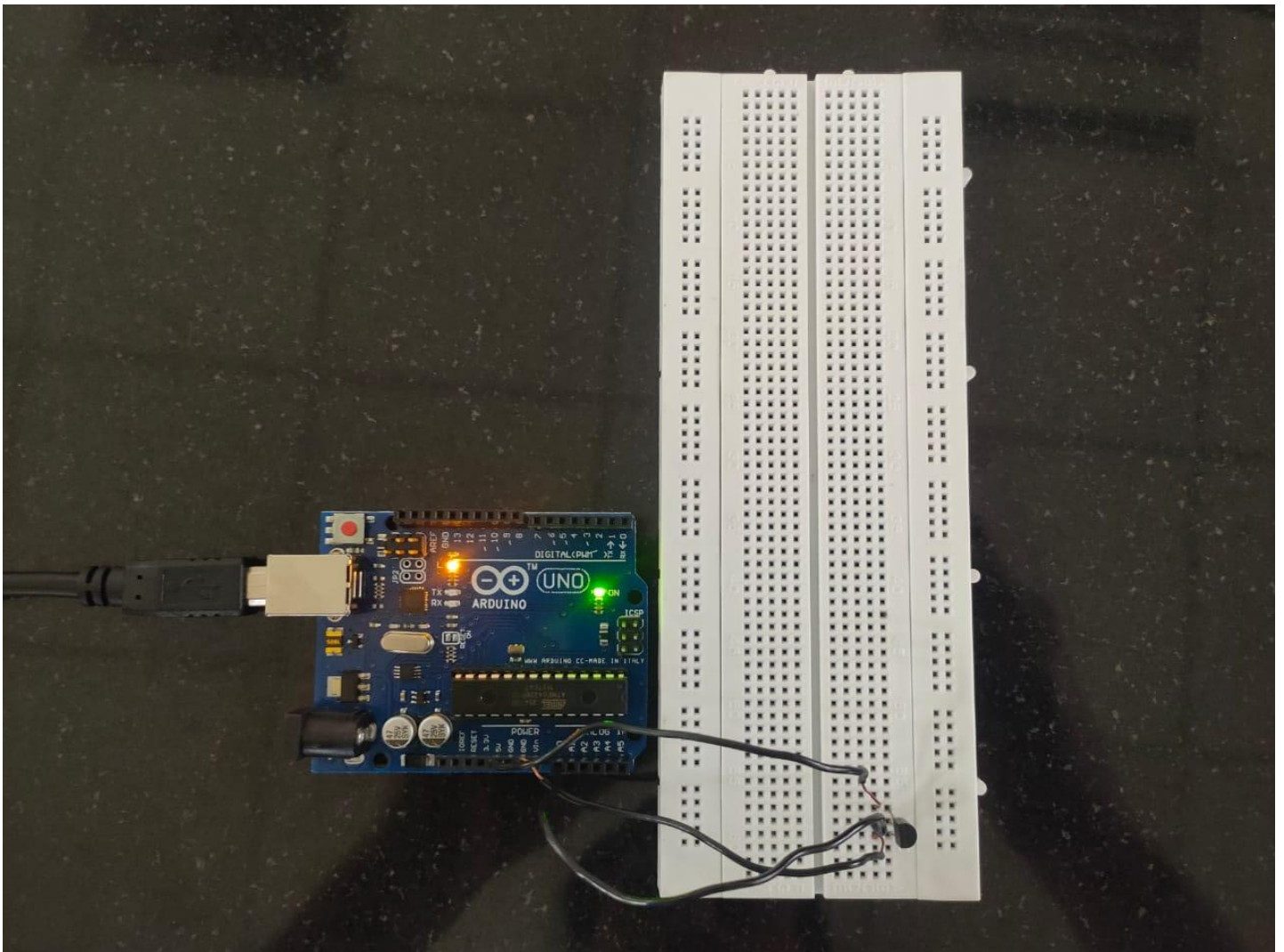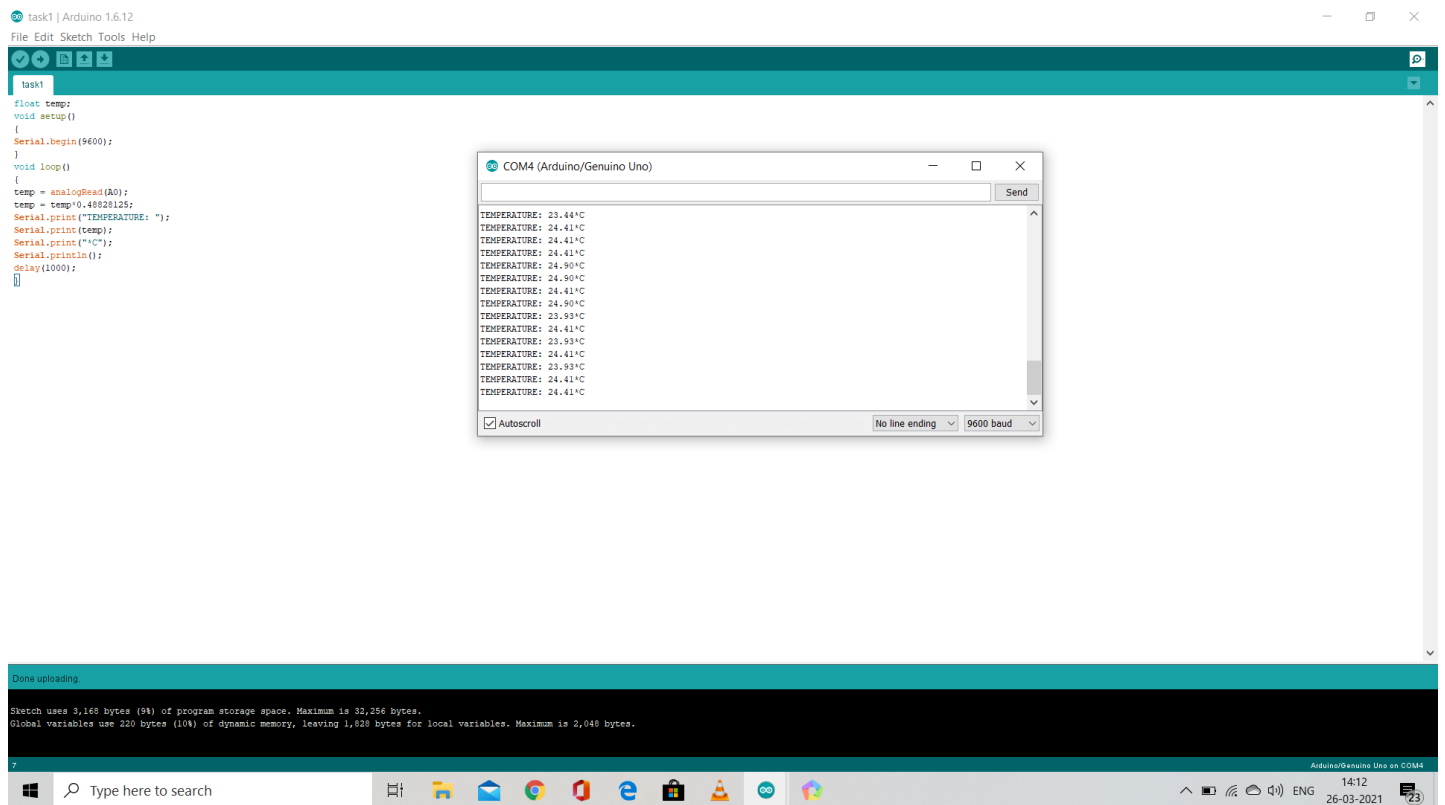
Code:

```
float temp;
void setup()
{
Serial.begin(9600);
}
void loop()
{
temp = analogRead(A0);
temp = temp*0.48828125;
Serial.print("TEMPERATURE: ");
Serial.print(temp);
Serial.print("*C");
Serial.println();
delay(1000);
}
```

Task 2: Design the Arduino Circuit to measure the temperature by using temperature sensor (LM35) such that for temperature > 32 °C red led will glow and for temperature < 32 °C yellow
led will glow.

Images:
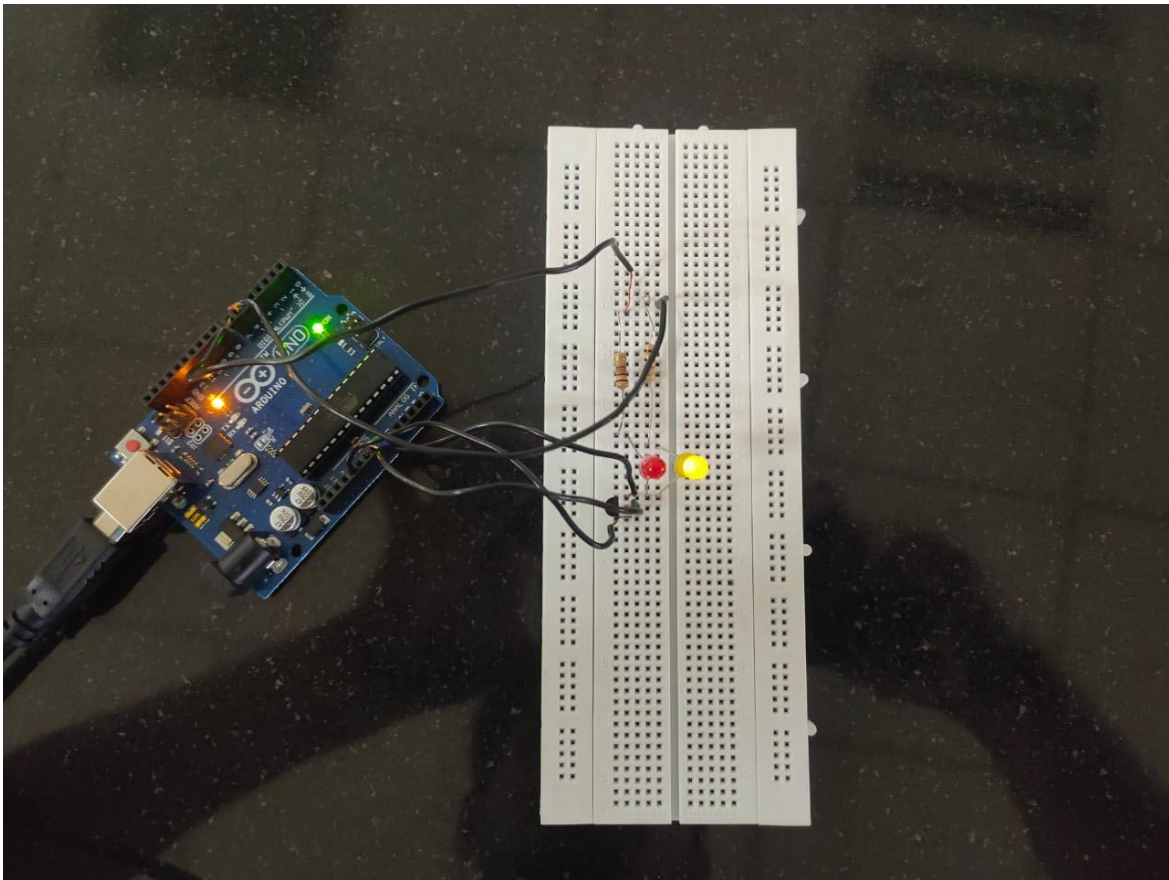

```
#define LM35 A0
#define Red 7
#define yellow 6
float temp;
float value;
void setup()
{
  Serial.begin(9600);
  pinMode(Red,OUTPUT);
  pinMode(yellow,OUTPUT);
}
void loop()
{
  value = analogRead(LM35);
  temp = value*0.48828125;
  Serial.println(temp); // Temperature in celcius
  //Condition
  if(temp > 32)
  {
    digitalWrite(Red,HIGH);
    digitalWrite(yellow,LOW);
  }
  else
  {
    digitalWrite(Red,LOW);
    digitalWrite(yellow,HIGH);
  }
  delay(300);
}
```
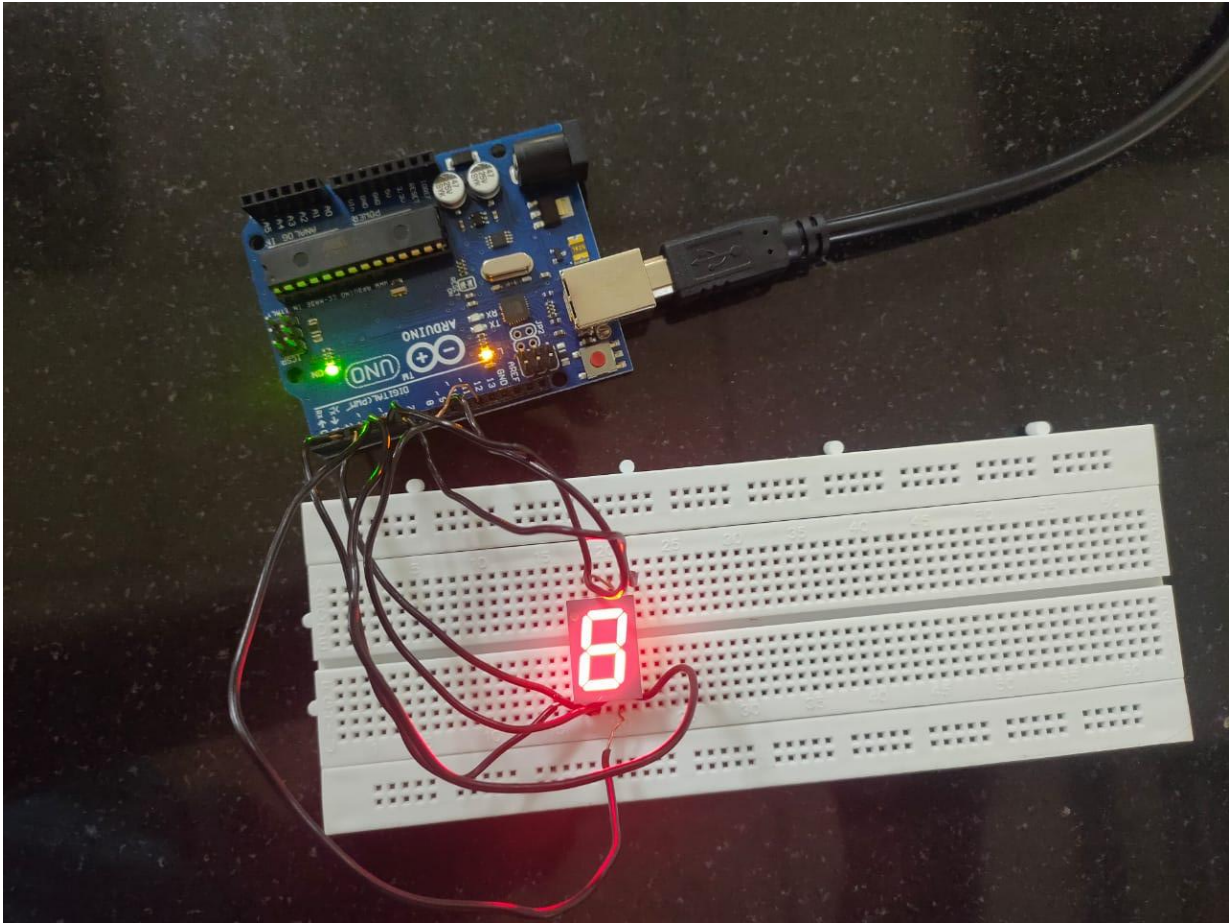
Code:

```
#define LM35 A0
#define Red 7
#define yellow 6
float temp;
float value;
void setup()
{
Serial.begin(9600);
pinMode(Red,OUTPUT);
pinMode(yellow,OUTPUT);
}
void loop()
{
value = analogRead(LM35);
temp = value*0.48828125;
Serial.println(temp); // Temperature in celsius
//Condition
if(temp > 32)
{
digitalWrite(Red,HIGH);
digitalWrite(yellow,LOW);
}
else
{
digitalWrite(Red,LOW);
digitalWrite(yellow,HIGH);
}
delay(300);
}
```

Task 3: Display 0 to 7 on 7 segment display

Images:

Video: The link to the video of the working circuit for task 3 is attached here.

Code:

```
#define A 3
#define B 2
#define C 6
#define D 8
#define E 7
#define F_SEG 4
#define G 5
// Pins driving common anodes
#define CA1 12
#define CA2 13  // Pins for A B C D E F G, in sequence
const int segs[7] = { A, B, C, D, E, F_SEG, G };
// Segments that make each number
const byte numbers[10] = { 0b1000000, 0b1111001, 0b0100100, 0b0110000,
0b0011001,
0b0010010,
0b0000010, 0b1111000, 0b0000000, 0b0010000 };
```

```cpp
void setup() {
pinMode(A, OUTPUT);
pinMode(B, OUTPUT);
pinMode(C, OUTPUT);
pinMode(D, OUTPUT);
pinMode(E, OUTPUT);
pinMode(F_SEG, OUTPUT);
pinMode(G, OUTPUT);
pinMode(CA1, OUTPUT);
pinMode(CA2, OUTPUT);
}
void loop() {
for (int digit1=0; digit1 < 10; digit1++) {
for (int digit2=0; digit2 < 10; digit2++) {
unsigned long startTime = millis();
for (unsigned long elapsed=0; elapsed < 600; elapsed = millis() -
startTime) {
lightDigit1(numbers[digit1]);
delay(5);
lightDigit2(numbers[digit2]);
delay(5);
}
}
}
}
void lightDigit1(byte number) {
digitalWrite(CA1, LOW);
```
```cpp
digitalWrite(CA2, HIGH);
lightSegments(number);
}
void lightDigit2(byte number) {
digitalWrite(CA1, HIGH);
digitalWrite(CA2, LOW);
lightSegments(number);
}
void lightSegments(byte number) {
for (int i = 0; i < 7; i++) {
int bit = bitRead(number, i);
digitalWrite(segs[i], bit);
}
}
```

Task 4: Design the Arduino Circuit to measure the temperature by using a temperature sensor (LM35) and display it on a seven segment display (2 digits).

Images:
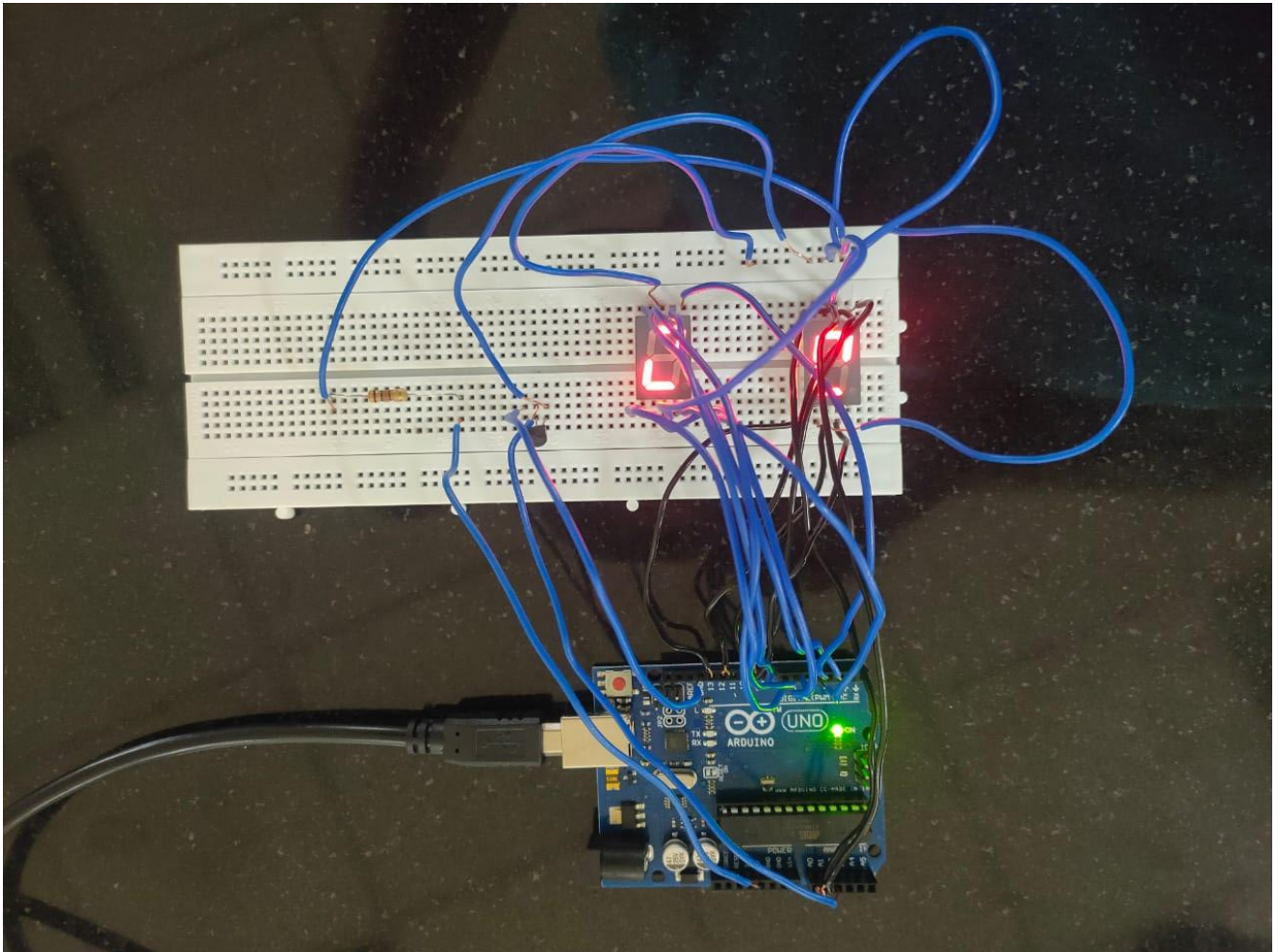
Code:

```
int temp;
int tempPin = A2;
int x,y;
int bcd_array[10][7] = { { 0,0,0,0,0,0,1 }, // 0
{ 1,0,0,1,1,1,1 }, // 1
{ 0,0,1,0,0,1,0 }, // 2
{ 0,0,0,0,1,1,0 }, // 3
{ 1,0,0,1,1,0,0 }, // 4
{ 0,1,0,0,1,0,0 }, // 5
{ 0,1,0,0,0,0,0 }, // 6
{ 0,0,0,1,1,1,1 }, // 7
{ 0,0,0,0,0,0,0 }, // 8
{ 0,0,0,1,1,0,0 }}; // 9

void BCD0(int);
void BCD1(int);
```

```
void setup()
{
pinMode(2, OUTPUT);
pinMode(3, OUTPUT);
pinMode(4, OUTPUT);
pinMode(5, OUTPUT);
pinMode(6, OUTPUT);
pinMode(7, OUTPUT);
pinMode(8, OUTPUT);
pinMode(A2, INPUT);
pinMode(9, OUTPUT);
pinMode(10, OUTPUT);
pinMode(11, OUTPUT);
pinMode(12, OUTPUT);
pinMode(13, OUTPUT);
pinMode(14, OUTPUT);
pinMode(15, OUTPUT);
}

void loop()

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{
temp = analogRead(tempPin);
temp = temp * 0.48828125;
x = (temp/10);
y = (temp -((temp / 10) * 10));
delay(1000);
BCD0(x);
BCD1(y);
}
void BCD0(int number)
{
int pin= 2;
for (int j=0; j < 7; j++) {
digitalWrite(pin, bcd_array[number][j]);
pin++;
}
}

void BCD1(int number)
{
int pin= 9;
```

```
for (int j=0; j < 7; j++) {
digitalWrite(pin, bcd_array[number][j]);
pin++;
}
}
```