Embedded Systems Lab

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Q1. Interface two 7-segment display with Arduino Uno board. Implement a) odd counter

b) even counter

Display the values in the seven segment display.

Aim:

To interface two 7-segment display with Arduino Uno board by implementing odd counter and even counter and displaying the values in the seven segment display.

Link: https://www.tinkercad.com/things/k5WfFFrjNf5

Code:

*unsigned* const *int* A = 13;

*unsigned* const *int* B = 12;

*unsigned* const *int* C = 11;

*unsigned* const *int* D = 10;

*unsigned* const *int* E = 9;

*unsigned* const *int* F = 8;

*unsigned* const *int* G = 7;

*unsigned* const *int* H = 6;

*unsigned* const *int* btn = 4;

*void* setup(*void*)

{

  pinMode(A, OUTPUT);

  pinMode(B, OUTPUT);

  pinMode(C, OUTPUT);

  pinMode(D, OUTPUT);

  pinMode(E, OUTPUT);

  pinMode(F, OUTPUT);

  pinMode(G, OUTPUT);

  pinMode(H, OUTPUT);

  pinMode(btn, INPUT);

}

*int* pins[] = {A,B,C,D,E,F,G,H};

*void* zero(*void*) {

  digitalWrite(A, LOW);

  digitalWrite(B, HIGH);

  digitalWrite(C, HIGH);

  digitalWrite(D, HIGH);

  digitalWrite(E, HIGH);

  digitalWrite(F, HIGH);

  digitalWrite(G, HIGH);

  digitalWrite(H, LOW);

}

*void* one(*void*) {

  digitalWrite(A, LOW);

  digitalWrite(B, LOW);

  digitalWrite(C, LOW);

  digitalWrite(D, HIGH);

  digitalWrite(E, LOW);

  digitalWrite(F, LOW);

  digitalWrite(G, HIGH);

  digitalWrite(H, LOW);

}

*void* two(*void*) {

  digitalWrite(A, HIGH);

  digitalWrite(B, LOW);

  digitalWrite(C, HIGH);

  digitalWrite(D, HIGH);

  digitalWrite(E, HIGH);

  digitalWrite(F, HIGH);

  digitalWrite(G, LOW);

  digitalWrite(H, LOW);

}

*void* three(*void*) {

  digitalWrite(A, HIGH);

  digitalWrite(B, LOW);

  digitalWrite(C, HIGH);

  digitalWrite(D, HIGH);

  digitalWrite(E, LOW);

  digitalWrite(F, HIGH);

  digitalWrite(G, HIGH);

  digitalWrite(H, LOW);

}

*void* four(*void*) {

  digitalWrite(A, HIGH);

  digitalWrite(B, HIGH);

  digitalWrite(C, LOW);

  digitalWrite(D, HIGH);

  digitalWrite(E, LOW);

  digitalWrite(F, LOW);

  digitalWrite(G, HIGH);

  digitalWrite(H, LOW);

}

*void* five(*void*) {

  digitalWrite(A, HIGH);

  digitalWrite(B, HIGH);

  digitalWrite(C, HIGH);

  digitalWrite(D, LOW);

  digitalWrite(E, LOW);

  digitalWrite(F, HIGH);

  digitalWrite(G, HIGH);

  digitalWrite(H, LOW);

}

*void* six(*void*) {

  digitalWrite(A, HIGH);

  digitalWrite(B, HIGH);

  digitalWrite(C, HIGH);

  digitalWrite(D, LOW);

  digitalWrite(E, HIGH);

  digitalWrite(F, HIGH);

  digitalWrite(G, HIGH);

  digitalWrite(H, LOW);

}

*void* seven(*void*) {

  digitalWrite(A, LOW);

  digitalWrite(B, LOW);

  digitalWrite(C, HIGH);

  digitalWrite(D, HIGH);

  digitalWrite(E, LOW);

  digitalWrite(F, LOW);

  digitalWrite(G, HIGH);

  digitalWrite(H, LOW);

}

*void* eight(*void*) {

  digitalWrite(A, HIGH);

  digitalWrite(B, HIGH);

  digitalWrite(C, HIGH);

  digitalWrite(D, HIGH);

  digitalWrite(E, HIGH);

  digitalWrite(F, HIGH);

  digitalWrite(G, HIGH);

  digitalWrite(H, LOW);

}

*void* nine(*void*) {

  digitalWrite(A, HIGH);

  digitalWrite(B, HIGH);

  digitalWrite(C, HIGH);

  digitalWrite(D, HIGH);

  digitalWrite(E, LOW);

  digitalWrite(F, HIGH);

  digitalWrite(G, HIGH);

  digitalWrite(H, LOW);

}

*void* (\*nums[])() ={zero,one,two,three, four, five,six,seven,eight,nine};

*// Start*

*void* loop(*void*)

{

*if*(digitalRead(btn)==HIGH){

*for*(*int* i=0;i<10;i+=2){

      nums[i]();

      delay(1000);

    }

  }*else*{

*for*(*int* i=1;i<10;i+=2){

      nums[i]();

      delay(1000);

    }

  }

}

Output:

Diagram, schematic

Description automatically generated

Diagram, schematic

Description automatically generated

Q2. Interface the ambient light sensor with Arduino Uno board. Check the light value from the sensor, and switch on/off the bulb (based on the threshold value).

Aim: To interface the ambient light sensor with Arduino Uno board. To check the light value from the sensor, and switch on/off the bulb (based on the threshold value).

Link: https://www.tinkercad.com/things/63Otg3iarr1

Code:

*int* LED = 12;

*int* MQ2pin = A0;

*void* setup() {

  Serial.begin(9600);

}

*void* loop() {

*float* sensorValue;

  sensorValue = analogRead(MQ2pin); *// read analog input pin 0*

*if*(sensorValue >= 10){

    digitalWrite(LED,HIGH);

    Serial.println("\nSensor Value: ");

    Serial.print(sensorValue);

    Serial.println("\nDANGER\n");

  }

*else*{

    digitalWrite(LED,LOW);

    Serial.println("\nSensor Value: ");

    Serial.print(sensorValue);

  }

  delay(1000);

}

*float* getsensorValue(*int* pin){

*return* (analogRead(pin));

}

Output:

Diagram, schematic

Description automatically generated

Diagram, schematic

Description automatically generated

Q3. Interface the temperature and gas sensor with Arduino Uno board. Check the temperature and the gas value, if the limit is beyond the threshold, switch on the bulb and make alarm using buzzer.

Aim: To interface the temperature and gas sensor with Arduino Uno board. To check the temperature and the gas value, if the limit is beyond the threshold, switch on the bulb and make alarm using buzzer.

Link: https://www.tinkercad.com/things/4MS7bQ1jXbW

Code:

*int* LED = 12;

*int* gas = A0;

*int* tmppin= A2;

*int* piezo = 13;

*void* setup() {

  Serial.begin(9600);

  pinMode(LED, OUTPUT);

  pinMode(piezo, OUTPUT);

  pinMode(gas,INPUT);

  pinMode(tmppin,INPUT);

}

*void* loop() {

*float* sensorValue, tempSensor;

  sensorValue = analogRead(gas); *// read analog input pin 0*

  tempSensor= analogRead(tmppin);

*bool* smoke= sensorValue >= 300;

*bool* temp= tempSensor >100;

*if*(smoke&&temp){

    digitalWrite(LED,HIGH);

    digitalWrite(piezo, HIGH);

    Serial.println("\nSmoke Sensor Value: ");

    Serial.print(sensorValue);

    Serial.println("\nTemp Sensor Value: ");

    Serial.print(tempSensor);

    Serial.println(" \nDANGER\n");

  }

*else*{

    digitalWrite(LED,LOW);

    digitalWrite(piezo, LOW);

    Serial.println("Smoke Sensor Value: ");

    Serial.print(sensorValue);

    Serial.println("\nTemp Sensor Value: ");

    Serial.print(tempSensor);

  }

  delay(1000);

}

*float* getsensorValue(*int* pin){

*return* (analogRead(pin));

}

Output:

Diagram, schematic

Description automatically generated

Diagram, schematic

Description automatically generated