

ASSIGNMENT 4

DISTANCE DETECTION USING ULTRASONIC SENSOR

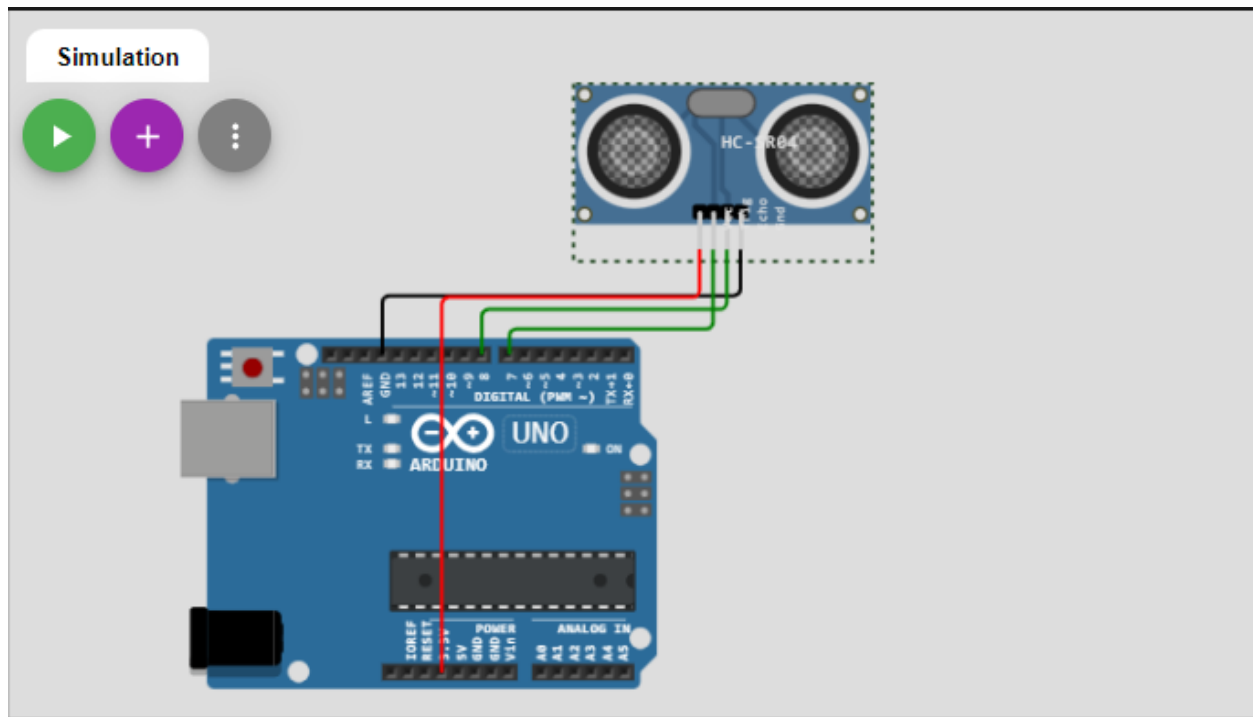
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REGISTER NUMBER	771019106002
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MARK	2 MARKS

QUESTION:

Write code and connections in wokwi for ultrasonic sensor. Whenever distance is less than 100 cms send "alert" to ibm cloud and display in device recent events.

SOLUTION :

CIRCUIT :



CODE:

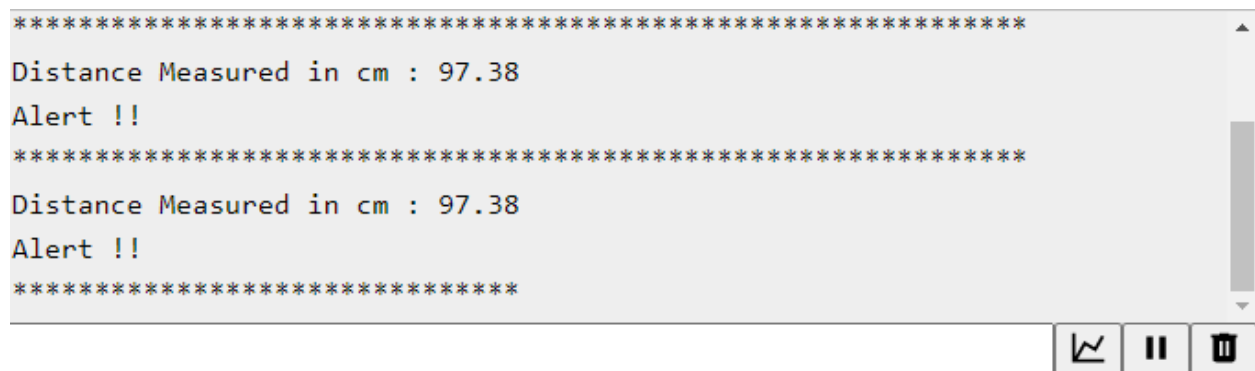
```
// ARDUINO PINS (TRIGGER PIN, ECHO PIN)
const int TRIG_PIN = 7;
const int ECHO_PIN = 8;
// Anything over 400 cm (23200 us pulse) is "out of range"
const unsigned int max_dist = 23200;
void setup() {
  // The Trigger pin will tell the sensor to range find
  pinMode(TRIG_PIN, OUTPUT);
  digitalWrite(TRIG_PIN, LOW);
  //Set Echo pin as input to measure the time duration of pulse returning back from the distance
  sensor
  pinMode(ECHO_PIN, INPUT);
  // We'll use the serial monitor to view the sensor output
  Serial.begin(9600);
}
void loop() {
  unsigned long t1;
  unsigned long t2;
  unsigned long pulse_width;
  float cm;
  float inches;
  // Hold the trigger pin high for at least 10 us
  digitalWrite(TRIG_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN, LOW);
  // Wait for pulse on echo pin
  while ( digitalRead(ECHO_PIN) == 0 );
  // Measure how long the echo pin was held high (pulse width)
  // Note: the micros() counter will overflow after ~70 min
  t1 = micros();
  while ( digitalRead(ECHO_PIN) == 1);
  t2 = micros();
  pulse_width = t2 - t1;
  // Calculate distance in centimeters and inches. The constants
  // are found in the datasheet, and calculated from the assumed speed
  // of sound in air at sea level (~340 m/s).
  cm = pulse_width / 58.0;
  inches = pulse_width / 148.0;
  // Print out results
  if ( pulse_width > max_dist ) {
```

```

Serial.println("Out of range");
} else
{ Serial.println("*****")
; Serial.print("Distance Measured in cm : ");
Serial.println(cm);
if(cm<100){
// while(true){
Serial.println("Alert !!");
// }
}
Serial.print("*****");
}
// Wait at least 1000ms before next measurement
delay(1000);
}

```

OUTPUT:



```

*****
Distance Measured in cm : 97.38
Alert !!
*****
Distance Measured in cm : 97.38
Alert !!
*****

```

The screenshot shows a serial monitor window with a light gray background. It displays two identical blocks of output. Each block starts with a line of 25 asterisks, followed by the text "Distance Measured in cm : 97.38" where "Distance" is blue, "Measured" is red, and "in cm" is green. This is followed by "Alert !!". Another line of 25 asterisks follows. The bottom of the window features a toolbar with three icons: a line graph, a pause symbol, and a trash can. A horizontal line is visible below the toolbar.

DESIGN:

The screenshot shows the Wokwi IDE interface. On the left, the sketch.ino file is open, displaying an Arduino sketch for an ultrasonic sensor. The sketch includes comments and code for pin configuration, setup, and a loop that measures distance and triggers an alert. On the right, the simulation window shows a virtual Arduino Uno board connected to an ultrasonic sensor module. Below the simulation, the serial monitor displays the output of the sketch, showing distance measurements and alert messages.

```
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5 const unsigned int max_dist = 23200;
6 void setup() {
7   // The Trigger pin will tell the sensor to range find
8   pinMode(TRIG_PIN, OUTPUT);
9   digitalWrite(TRIG_PIN, LOW);
10  //Set Echo pin as input to measure the time duration of pulse returning back f
11  pinMode(ECHO_PIN, INPUT);
12  // We'll use the serial monitor to view the sensor output
13  Serial.begin(9600);
14 }
15 void loop() {
16   unsigned long t1;
17   unsigned long t2;
18   unsigned long pulse_width;
19   float cm;
20   float inches;
21   // Hold the trigger pin high for at least 10 us
22   digitalWrite(TRIG_PIN, HIGH);
23   delayMicroseconds(10);
24   digitalWrite(TRIG_PIN, LOW);
25   // Wait for pulse on echo pin
```

Simulation Output:

```
*****
Distance Measured in cm : 97.38
Alert !!
*****
Distance Measured in cm : 97.38
Alert !!
*****
```

IBM CLOUD OUTPUT :

NEAR:

The screenshot shows the IBM Watson IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. The main content area displays a table of devices, with one device selected and its details expanded. The 'Recent Events' tab shows a list of events with columns for Event, Value, Format, and Last Received.

Event	Value	Format	Last Received
Data	{"Distance Measured in cm":7,"Alert !!":0}	json	a few seconds ago
Data	{"Distance Measured in cm":79,"Alert !!":0}	json	a few seconds ago
Data	{"Distance Measured in cm":100,"Alert !!":0}	json	a few seconds ago
Data	{"Distance Measured in cm":4,"Alert !!":0}	json	a few seconds ago
Data	{"Distance Measured in cm":63,"Alert !!":0}	json	a few seconds ago

1 Simulation running

FAR:

The screenshot displays the IBM Watson IoT Platform interface. At the top, the header shows 'IBM Watson IoT Platform' and a user profile with email '711019106002@smartinternz.com' and ID 'pt1k0'. A sidebar on the left contains navigation icons. The main content area has tabs for 'Browse', 'Action', 'Device Types', and 'Interfaces'. A table lists devices, with 'ASSIGN4' selected. Below the table, a panel for 'ASSIGN4' shows tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is active, displaying a message: 'The recent events listed show the live stream of data that is coming and going from this device.' Below this is a table of events:

Event	Value	Format	Last Received
Data	{"Distance Measured in cm":146}	json	a few seconds ago
Data	{"Distance Measured in cm":410}	json	a few seconds ago
Data	{"Distance Measured in cm":110}	json	a few seconds ago
Data	{"Distance Measured in cm":392}	json	a few seconds ago
Data	{"Distance Measured in cm":138}	json	a few seconds ago

At the bottom right, a status box indicates '1 Simulation running'.

SIMULATION LINK:

<https://wokwi.com/projects/347241261861700178>