

Q) Design a circuit to measure distance in cm and mm using ultrasonic sensor & 16x2LCD display. Also display warning message on LCD when distance is less than 20cm.

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

const int trigPin = 9;
const int echoPin = 8;

void setup() {

    pinMode(trigPin,OUTPUT);
    pinMode(echoPin,INPUT);
    lcd.begin(16, 2);

}

long microsecondsToCentimeters(long microseconds) {

    return microseconds / 29 / 2;

}

long microsecondsToMillimeter(long microseconds) {

    return microseconds / 29 / 2 * 10;

}

void loop() {
```

```
long duration, cm, millimeter;
```

```
digitalWrite(trigPin, LOW);
```

```
delayMicroseconds(2);
```

```
digitalWrite(trigPin, HIGH);
```

```
delayMicroseconds(10);
```

```
digitalWrite(trigPin, LOW);
```

```
duration = pulseIn(echoPin, HIGH);
```

```
cm = microsecondsToCentimeters(duration);
```

```
millimeter = microsecondsToMillimeter(duration);
```

```
lcd.setCursor(0,0);
```

```
lcd.print(cm);
```

```
lcd.print("cm, ");
```

```
lcd.print(millimeter);
```

```
lcd.print("mm");
```

```
delay(100);
```

```
if (cm < 20)
```

```
{
```

```
    lcd.setCursor(0,1);
```

```
    lcd.print("WARNING");
```

```
}
```

```
else  
{  
  
    lcd.clear();  
  
}  
  
}
```

Q1) What is the max range (distance) that Ultrasonic Sensor can detect?

ANSWER:

Ultrasonic sensor can detect up to 20 meters.

Q2) What environmental conditions affect an ultrasonic sensor?

ANSWER:

Increase in temperature effect ultrasonic sensor.

Q3) Name some projects where ultrasonic sensor can be used.

ANSWER:

1. Collision Avoiding Robot.
2. Smart Walking Cane.
3. GPS Guided Mobile Robot.