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Reg No. - 17BCE0267

Slot : F1 + TF1

Laser-Length

OVERVIEW

Devices to find the distance between point A and B already exist, but they involve placing the device on point A and then measuring the distance. What we hope to achieve is to eliminate the need to move. We aim to make a device that can take measurements of objects and send them over directly to your mobile device.

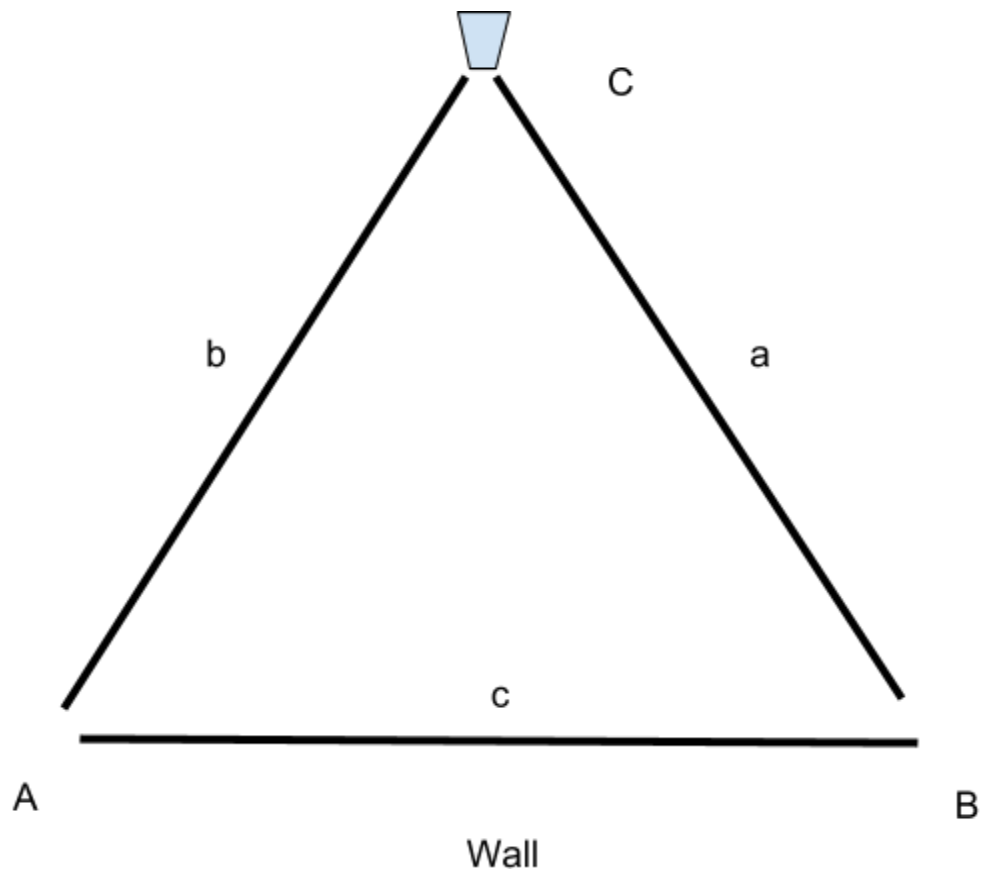
GOALS

1. Make a device to measure lengths seamlessly.
2. Make a mobile app that can receive lengths from the above device and can show basic shapes along with measurements taken by the device.

SENSORS AND TECHNOLOGIES -

1. Laser Distance Sensor
 2. Arduino Nano Pro Mini
 3. Magnetometer - HMC5883L
 4. Bluetooth Module
 5. Android Mobile App
- .

Mathematics :

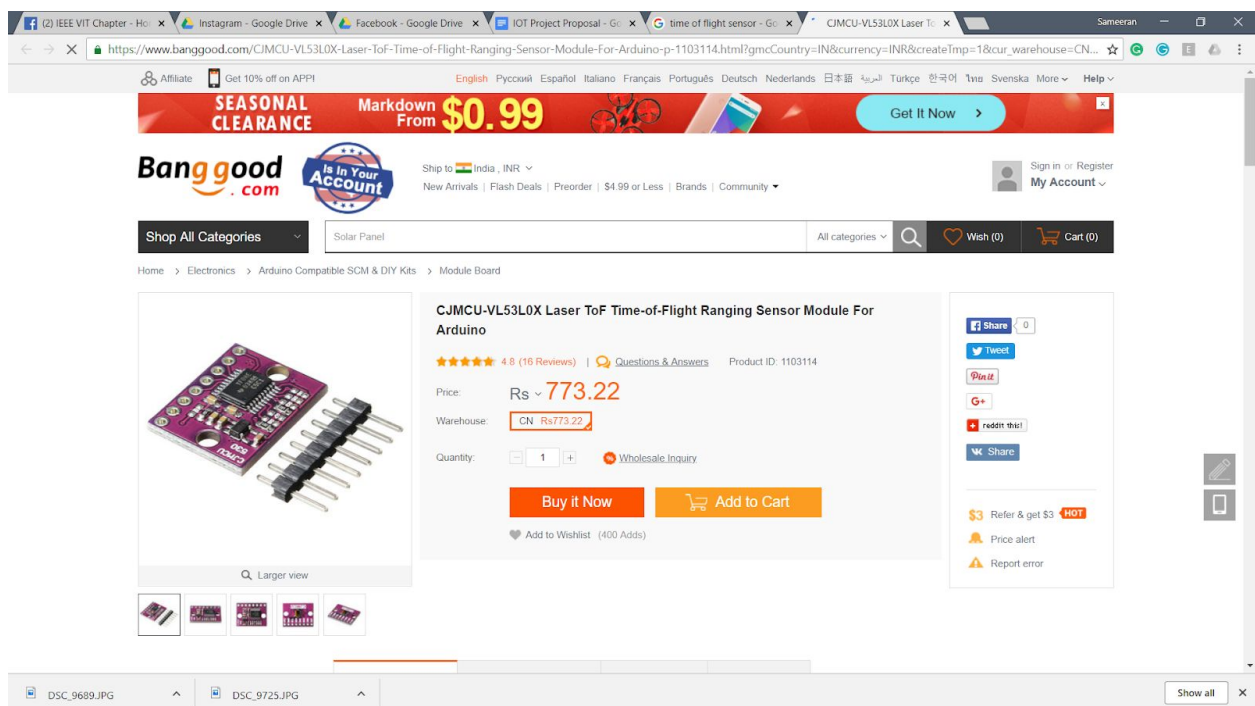


Formula :

$$a^2 = b^2 + c^2 - 2 \cdot b \cdot c \cdot \cos(A)$$

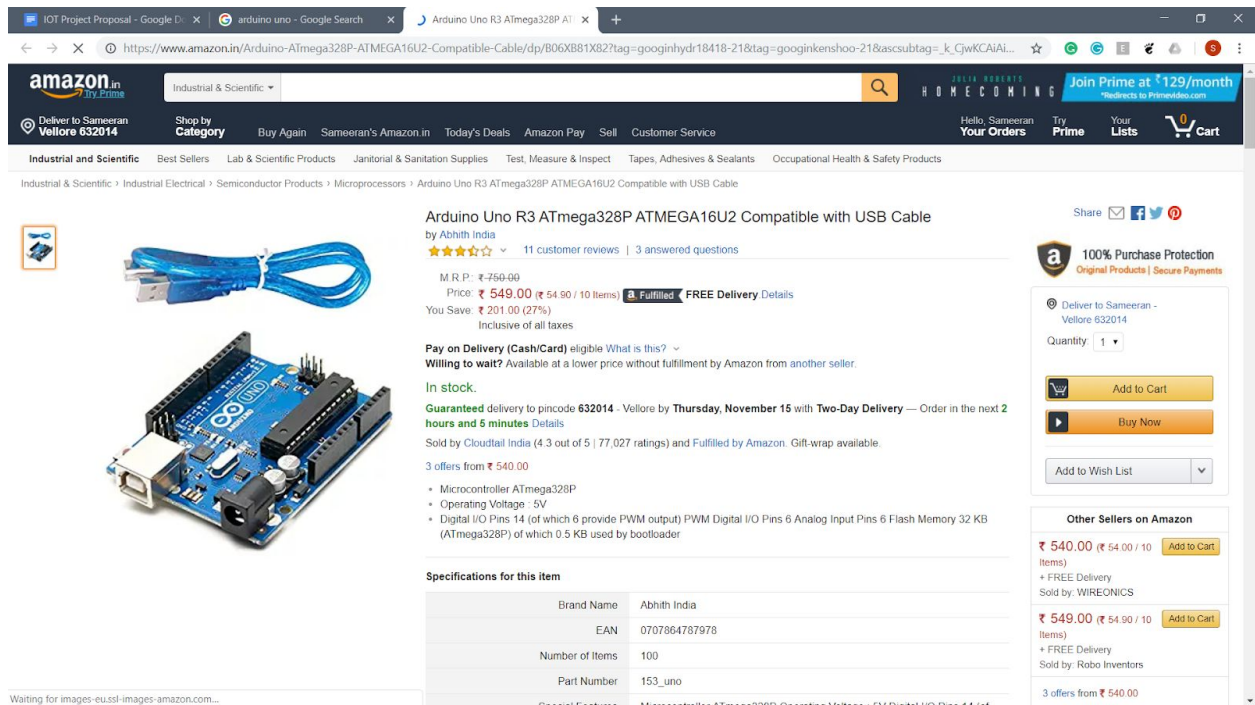
Component Specifications :

1. Laser Distance Sensor (Time Of Flight Sensor)



https://www.banggood.com/CJMCU-VL53L0X-Laser-ToF-Time-of-Flight-Ranging-Sensor-Module-For-Arduino-p-1103114.html?gmcCountry=IN¤cy=INR&createTmp=1&cur_warehouse=CN&utm_source=googleshopping&utm_medium=cpc_elc&utm_content=2zou&utm_campaign=pla-all2-brand-in-pc&gclid=Cj0KCQjwof3cBRD9ARIsAP8x70NWUbRAsQ2eLWY2dj6zjBVI7MCWjnFYvGDhLwEecZRDNBF-pRI-e4AaAoTJEAJw_wcB

2. Arduino Uno



The screenshot displays the Amazon India product page for the Arduino Uno R3 ATmega328P ATMEGA16U2 Compatible with USB Cable. The page includes the Amazon India logo, a search bar, and a navigation menu. The product is listed by Abhith India and is currently in stock. The price is ₹549.00, with a 27% discount from the MRP of ₹750.00. The page also shows the product specifications, including the microcontroller, operating voltage, and digital I/O pins. The product is sold by WIREONICS and Robo Inventors, both of whom offer free delivery. The page also features a '100% Purchase Protection' badge and a 'Join Prime at ₹129/month' offer.

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Arduino Uno R3 ATmega328P ATMEGA16U2 Compatible with USB Cable

by Abhith India

11 customer reviews | 3 answered questions

M.R.P.: ₹750.00

Price: ₹549.00 (₹54.90 / 10 Items) **8. Fulfilled** **FREE Delivery Details**

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- Operating Voltage - 5V
- Digital I/O Pins 14 (of which 6 provide PWM output) PWM Digital I/O Pins 6 Analog Input Pins 6 Flash Memory 32 KB (ATmega328P) of which 0.5 KB used by bootloader

Specifications for this item

Brand Name	Abhith India
EAN	0707864787978
Number of Items	100
Part Number	153_uno
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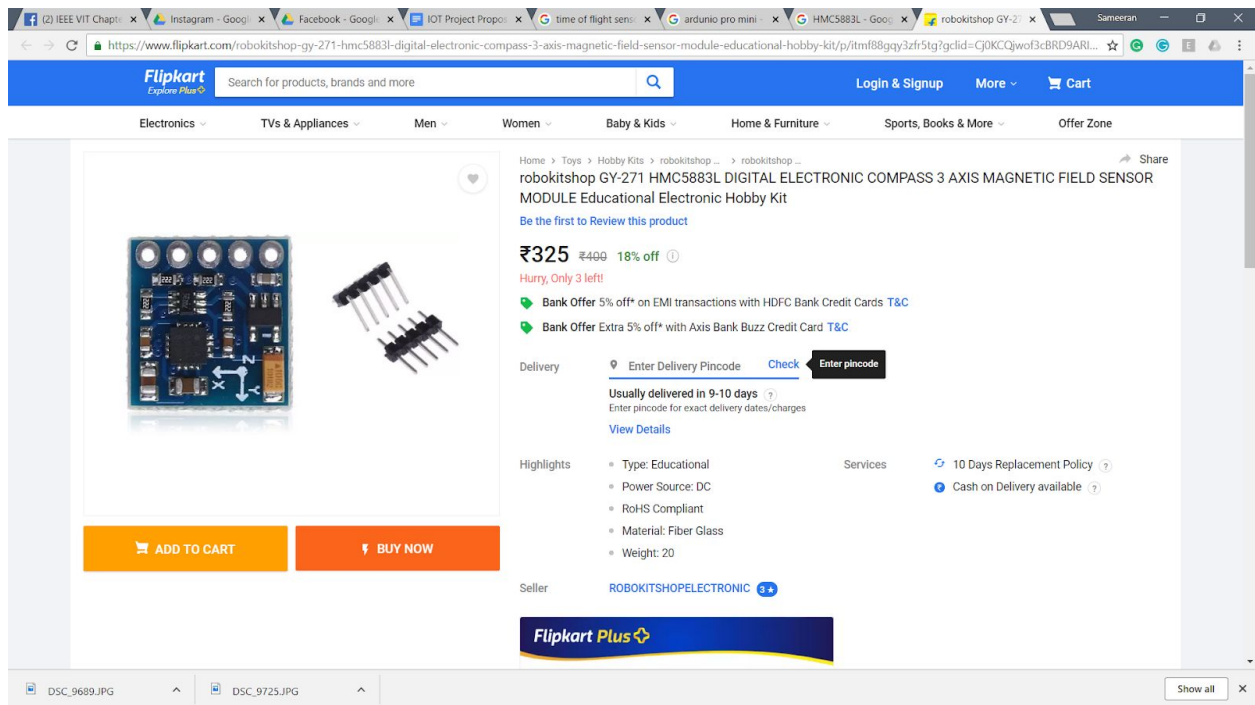
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https://www.amazon.in/Arduino-ATmega328P-ATMEGA16U2-Compatible-Cable/dp/B06XB81X82?tag=googinhydr18418-21&tag=googinkenshoo-21&ascsubtag=_k_CjwKCAiAiarfBRASEiwAw1tYv914h4AkAcMzZvPtPxf3ia3jHuvyAsTbQU_gzDxgN4cAn0hsZhpo9BoCX-gQAvD_BwE_k_&gclid=CjwKCAiAiarfBRASEiwAw1tYv914h4AkAcMzZvPtPxf3ia3jHuvyAsTbQU_gzDxgN4cAn0hsZhpo9BoCX-gQAvD_BwE

3. Magnetometer (HMC5883L)



https://www.flipkart.com/robokitshop-gy-271-hmc5883l-digital-electronic-compass-3-axis-magnetic-field-sensor-module-educational-hobby-kit/p/itm88gqy3zfr5tg?gclid=Cj0KCQjwof3cBRD9ARIsAP8x70MwtF-J5OiXdenPGH4p85D5VwdLqaD-CmNOWPUwjP9Pb5bZKYaFEw4aAoD0EALw_wcB&pid=EHKF8795CCGPXPS7&lid=LSTEHKF8795CCGPXPS7ZFXQOL&marketplace=FLIPKART&cmid=content_electronic-hobby-kit_8965229628_gmc_pla&tqi=sem.1.G.11214002.g.search.,272265565160.1o6...c.....&s_kwcid=AL!739!3!272265565160!!!g!297659526158!&ef_id=Wz_gmgAAAFs8JhCq:20180917135540:s

Code:

```
Mix_Try_2 | Arduino 1.8.7 (Windows Store 1.8.15.0)
File Edit Sketch Tools Help

Mx_Try_2$

#include <QMC5883L.h>

QMC5883L compass;

#include <Wire.h>
#include <VL53LOX.h>

VL53LOX sensor;

// Uncomment this line to use long range mode. This
// increases the sensitivity of the sensor and extends its
// potential range, but increases the likelihood of getting
// an inaccurate reading because of reflections from objects
// other than the intended target. It works best in dark
// conditions.

// #define LONG_RANGE

// Uncomment ONE of these two lines to get
// - higher speed at the cost of lower accuracy OR
// - higher accuracy at the cost of lower speed

// #define HIGH_SPEED
#define HIGH_ACCURACY
char a;
```

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```
Mix_Try_2 | Arduino 1.8.7 (Windows Store 1.8.15.0)
File Edit Sketch Tools Help

Mix_Try_2 $

void setup()
{
    Serial.begin(9600);
    Wire.begin();

    sensor.init();
    sensor.setTimeout(500);

    #if defined LONG_RANGE
    // lower the return signal rate limit (default is 0.25 MCPs)
    sensor.setSignalRateLimit(0.1);
    // increase laser pulse periods (defaults are 14 and 10 PCLKs)
    sensor.setVcselPulsePeriod(VL53L0X::VcselPeriodPreRange, 18);
    sensor.setVcselPulsePeriod(VL53L0X::VcselPeriodFinalRange, 14);
    #endif

    #if defined HIGH_SPEED
    // reduce timing budget to 20 ms (default is about 33 ms)
    sensor.setMeasurementTimingBudget(20000);
    #elif defined HIGH_ACCURACY
    // increase timing budget to 200 ms
    sensor.setMeasurementTimingBudget(200000);
    #endif

    compass.init();
    compass.setSamplingRate(50);

}

float TOF() // Returns the distance to the wall

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```

```
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Mix_Try_2 $

}

float TOF() // Returns the distance to the wall
{
    Serial.print("The Length is : ");
    Serial.println(sensor.readRangeSingleMillimeters());
    return(sensor.readRangeSingleMillimeters());

}

int QMC() // Returns the orientation in degrees
{
    int heading = compass.readHeading();
    if (heading == 0) {
        /* Still calibrating, so measure but don't print */
    } else {
        Serial.print("The Compass Reading is : ");
        Serial.println(compass.readHeading());
        return(compass.readHeading());
    }
}

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```

```
Mix_Try_2 | Arduino 1.8.7 (Windows Store 1.8.15.0)
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Mix_Try_2$

void loop()
{
  float T1=0,T2=0,C1=0,C2=0;

  Serial.println("Point to the first edge and enter 1");
  while (Serial.available() == 0)
  {
  }
  if (Serial.available()) // Wait till an input is detected
  {
    a = Serial.read();
  }

  if (a == '1') // if input is '1' then continue
  {
    T1 = TOF(); // Enter the Distance and angle to the first wall
    C1 = QMC();
    a = '0';
    delay(1000);
  }

  if (T1 != 0)
  {
    Serial.println("Point to the second edge and enter 1");
    while (T2 == 0)
    {
    }

    if (Serial.available()) // Wait till an input is detected
    {
      a = Serial.read();
    }

    if (a == '1') // if input is '1' then continue
    {
    }
  }
}
```

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```
Mix_Try_2 | Arduino 1.8.7 (Windows Store 1.8.15.0)
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Mix_Try_2$

if (Serial.available()) // Wait till an input is detected
{
  a = Serial.read();
}

if (a == '1') // if input is '1' then continue
{
  T2 = TOF(); // Enter the Distance and angle to the second wall
  C2 = QMC();
  a = '0';
  delay(1000);
}

if (T2 != 0)
{
  int angle, temp1, temp2;
  float answer;
  angle = abs(C1 - C2);
  if (angle > 180) // Calculating the shortest angle between the two given degrees
  {
    if (C1 > C2)
    {
      temp1 = C1;
      temp2 = C2;
      Serial.print("C1 = ");
      Serial.println(temp1);
      Serial.print("C2 = ");
      Serial.println(temp2);
    }
    else
    {
      temp1 = C2;
    }
  }
}
```

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```
Mix_Try_2 | Arduino 1.8.7 (Windows Store 1.8.15.0)
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Mix_Try_2$
temp1=C1;
temp2=C2;
Serial.print("C1 = :");
Serial.println(temp1);
Serial.print("C2 = :");
Serial.println(temp2);
}
else
{
temp1=C2;
temp2=C1;
Serial.print("C1 = :");
Serial.println(temp2);
Serial.print("C2 = :");
Serial.println(temp1);
}
temp1=360-temp1;

angle=abs(temp1+temp2);

}

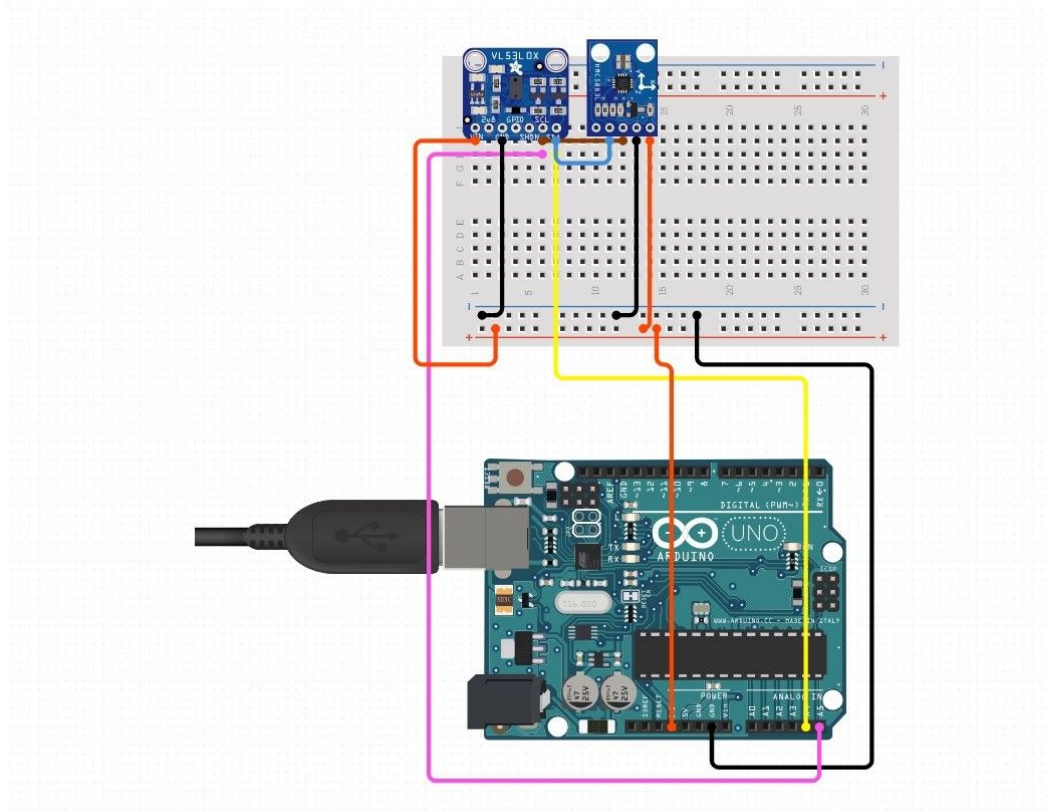
Serial.print("The angle is : ");
Serial.println(angle);
Serial.print("T1 = :");
Serial.println(T1);
Serial.print("T2 = :");
Serial.println(T2);
answer=sqrt((T1*T1)+(T2*T2)- 2*T1*T2*cos(angle)); // Equation to calculate the length of the wall using Cosine Rule
Serial.print("The Length of the wall is: ");
Serial.println(answer);

}

}

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```

Wiring:



Future :

This project has humongous implications in fields ranging from architecture and designing to sensitive measurements fields like atomic sciences and healthcare.

Unlike its competitors which require the device to be placed on one end of the surface to be measured, this device is completely contact-free.

The sensors used in this prototype are not industry grade and may not provide very accurate measurements, but it is definitely enough to provide a proof of concept.

With an upgrade to the sensors used, wireless transmission to mobile devices and a decrease in size, this project can definitely have a huge impact on the current market of IOT powered Smart Tools.