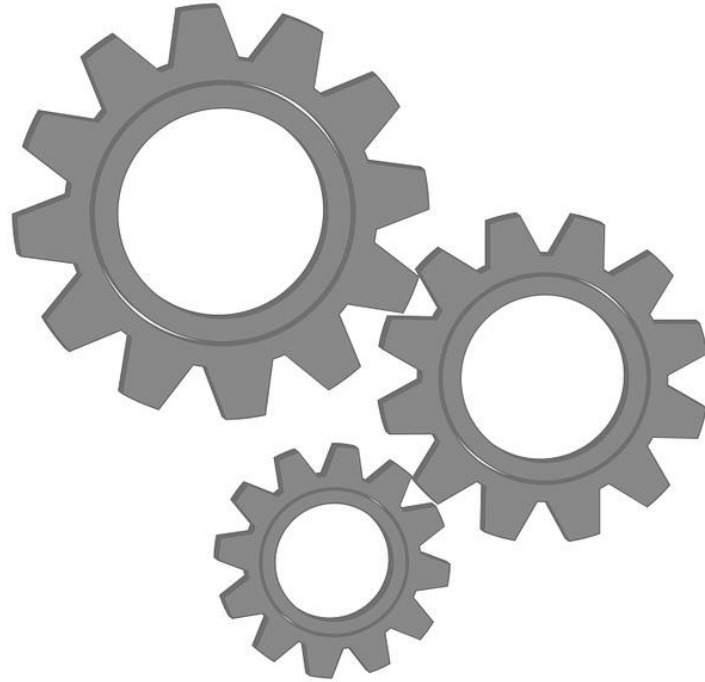


Awesome Fitness Kiosk

**Team 4**

# Functional Summary



# Fitness Kiosk

- Display potential health risks owing to the user's current lifestyle.
- Suggest exercise plan and nutrition plan depending on BMI index.
- Keep track of the user's physical health.
- Sensors present on the kiosk will give other useful information to the user.

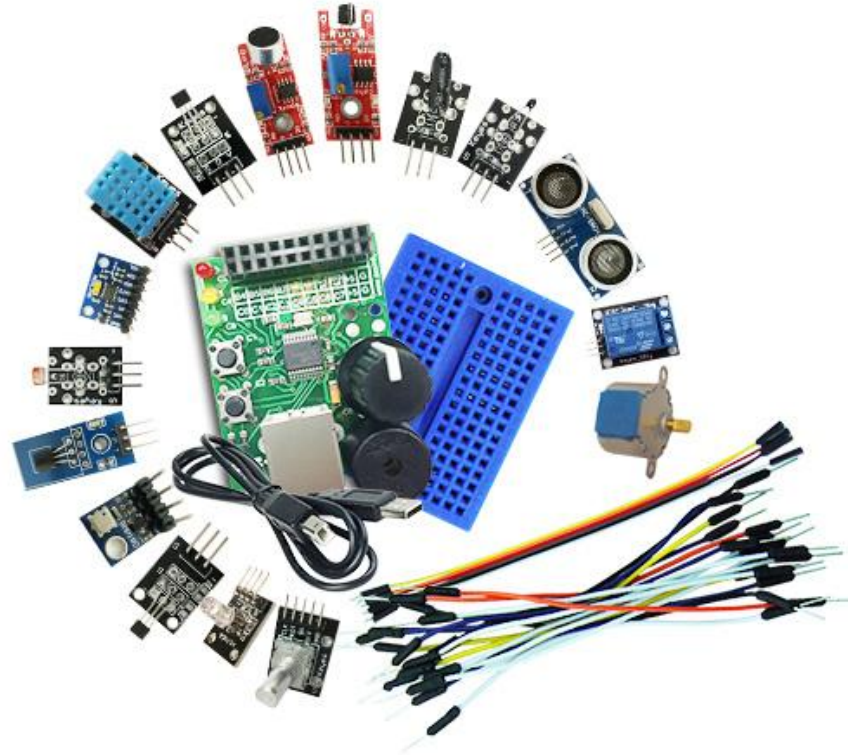
# Mobile and Web Client for the Fitness Kiosk

- Various information taken from the user will be displayed here.
- Possible health issues the user might suffer from will displayed here.
- Personalized workout and nutrition plan will be displayed to the user.

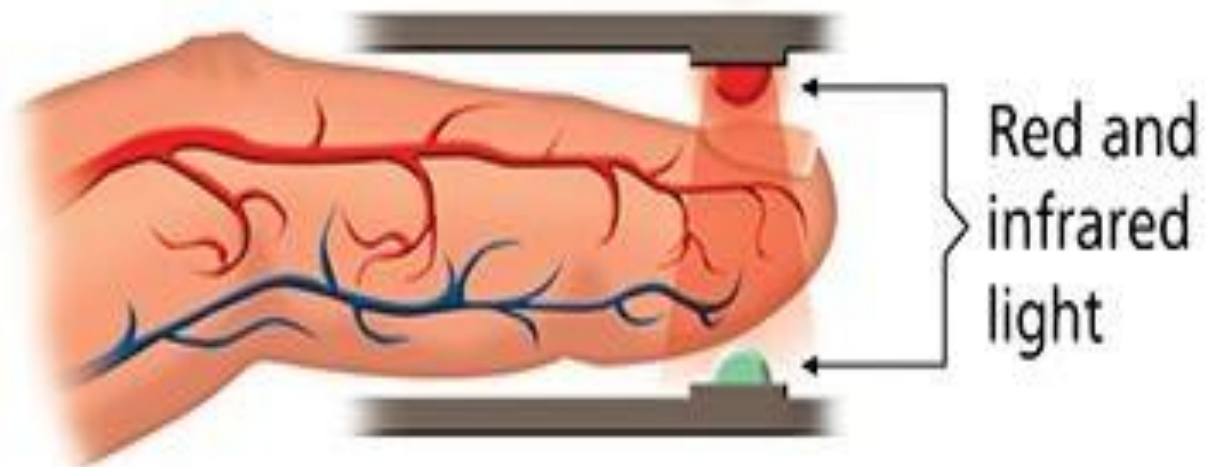
# Working of the Kiosk

- The user enters the kiosk.
- The user enters user information and authentication details.
- Height, weight, pulse, oxygen saturation level and body temperature.
- BMI is calculated.
- Personalized workout and nutrition plan is displayed on the HMI.
- All the information is then also sent to the mobile and web client for ease of access.

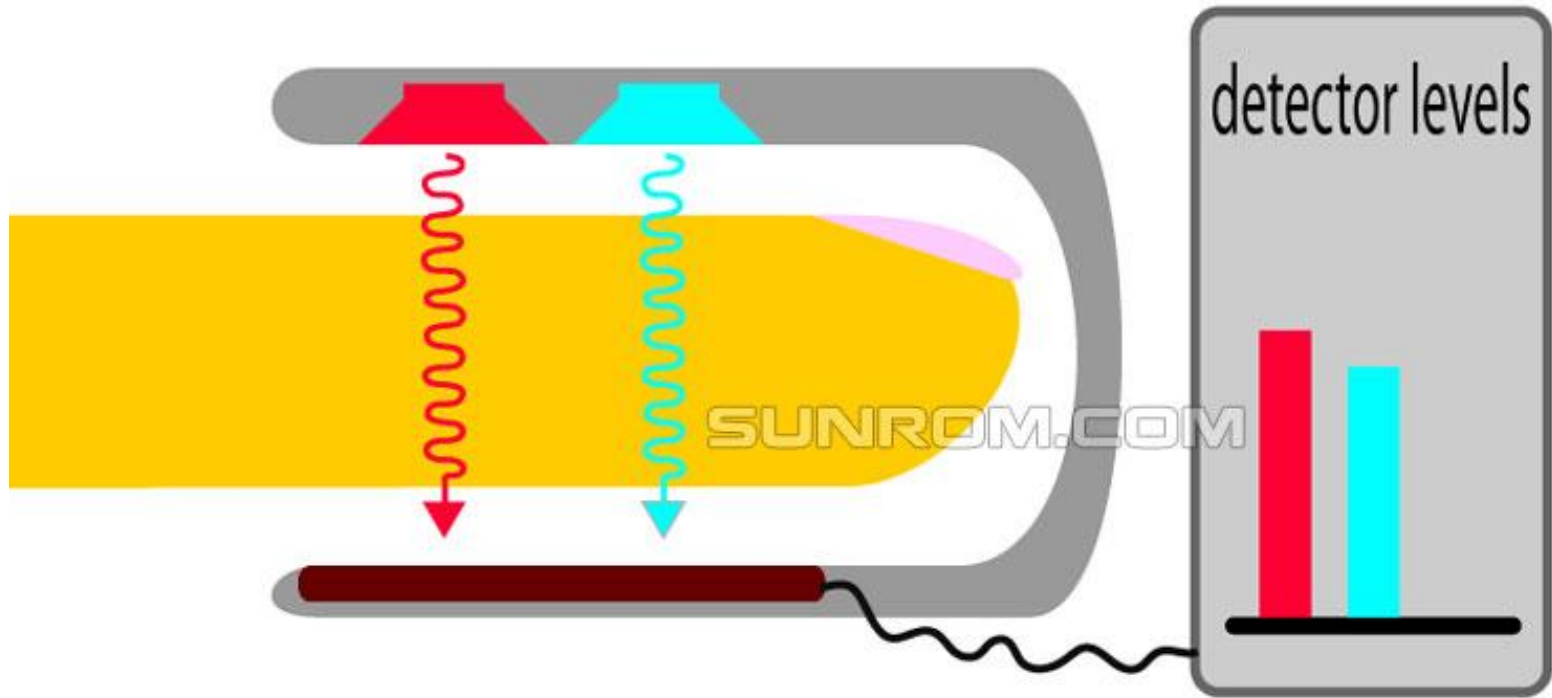
# Sensor Description



# SPO2 sensor



# SPO2 Sensor





# SPO2 Sensor

- SPO2 is an indirect and noninvasive method of measuring oxygen saturation in blood.
- SpO2 is measured at the periphery, usually a finger, and is one measure of the health of the cardiovascular and respiratory systems
- A variety of factors can affect the accuracy of SPO2 measurement, including skin conditions, pigment, wounds, scar tissue, tattoos, nail polish, hypothermia, anemia, medication, light interference, and movement.

# Working

- The device consists of a red and an infrared light source, photo detectors, and a probe to transmit light through a translucent, pulsating arterial bed, typically a fingertip or earlobe. Oxygenated hemoglobin (O<sub>2</sub>Hb) and deoxygenated hemoglobin (HHb) absorb red and infrared light differently. The percentage of saturation of hemoglobin in arterial blood can be calculated by measuring light absorption changes caused by arterial blood flow pulsations.
- SPO<sub>2</sub> is measured using a sensor, usually attached to the patient's finger. There are two methods of SpO<sub>2</sub> technology: transmissive and reflective.

# Two types of SPO2 Technology

- There are two methods of SpO2 technology: transmissive and reflective, the transmissive method being the more commonly used.
- Transmissive technology transmits red and infrared light through the finger to a photo detector.
- In case of Reflective Technology, it has the transmitter and receiver in the same plane. Reflective SPO2 sensors can be placed on other areas of the anatomy than the finger, such as the forehead.

# Fingerprint Sensor (R307) -TTL UART

Optical fingerprint scanners are the oldest method of capturing and comparing fingerprints. As the name suggests, this technique relies on capturing an optical image, essentially a photograph, and using algorithms to detect unique patterns on the surface, such as ridges or unique marks, by analysing the lightest and darkest areas of the image. This module can operate successfully under 1mm of glass and with wet fingers, something that messes with capacitive alternatives.

## Features:

Storage capacity: 1000 pieces

Search time: <1.0 seconds

Working current: 50mA

Security Level: 5

Fingerprint image input time: <0.3 seconds

Matching mode: 1: 1 and 1:N

## An optical sensor.

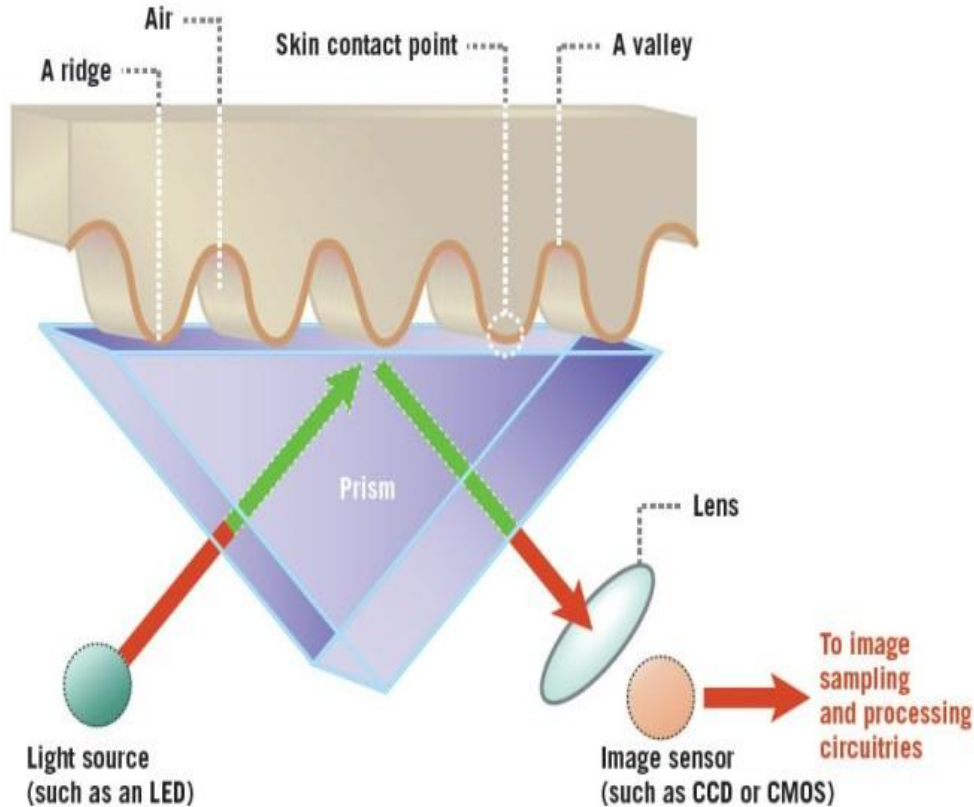


Figure 2

## Working environment:

- Temperature:  $-20^{\circ}\text{C}$  -  $+40^{\circ}\text{C}$
- Relative humidity: 40% RH-85% RH (no condensation)

## Working

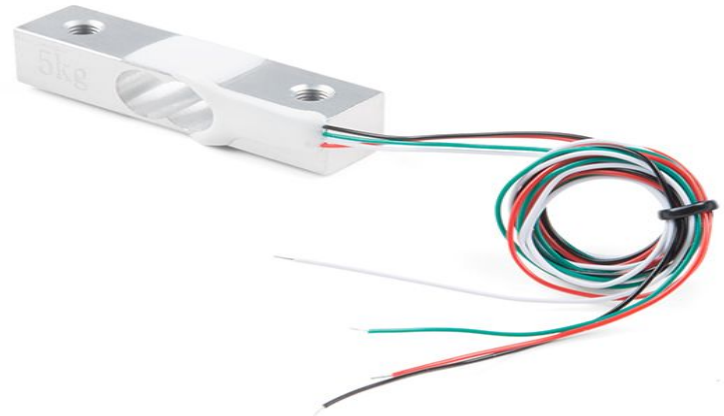
A CCD is simply an array of light-sensitive diodes called photosites, which generate an electrical signal in response to light photons. The scanner has its own light source, typically an array of [light-emitting diodes](#), to illuminate the ridges of the finger. Before comparing the print to stored data, the scanner processor makes sure the CCD has captured a clear image. It checks the average pixel darkness, or the overall values in a small sample, and rejects the scan if the overall image is too dark or too light. If the image is rejected, the scanner adjusts the exposure time to let in more or less light, and then tries the scan again.

# Load Cell (Strain Gauge)

Load cell is a transducer which convert force into electrical signal

Load cell is a electromechanical device used to measure force , torque and pressure.

It works based on wheatstone bridge  
principle



# Types of Load Cell

## 1. Mechanical type

- Hydraulic
- Pneumatic

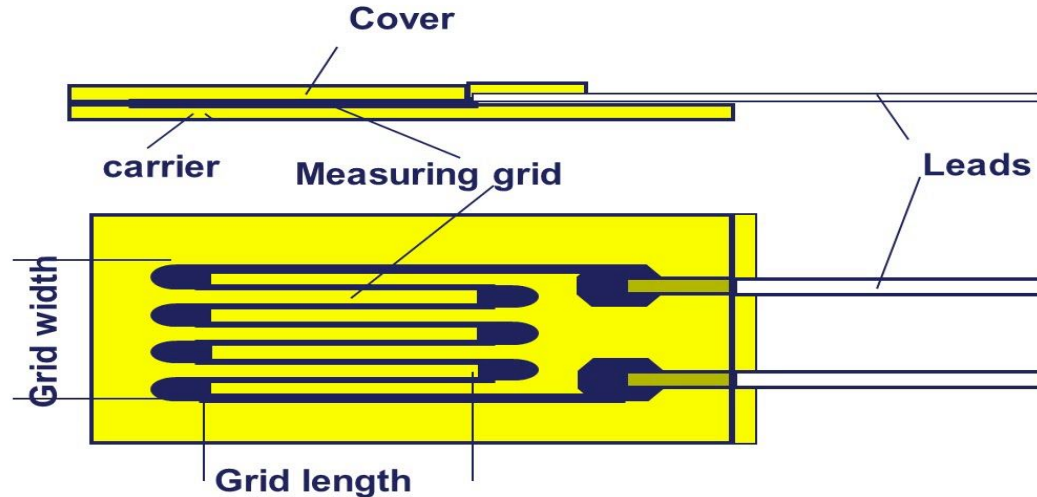
## 2. Electrical type

- Resistance based
- Capacitance based
- Inductive based

# Strain Gauge

It is used to measure strain of an object and convert the load acting into electric signal.

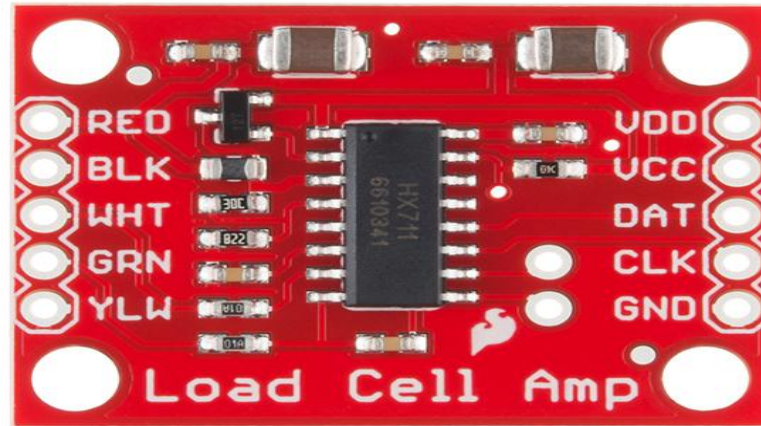
Strain Gauge Manufacturing Process



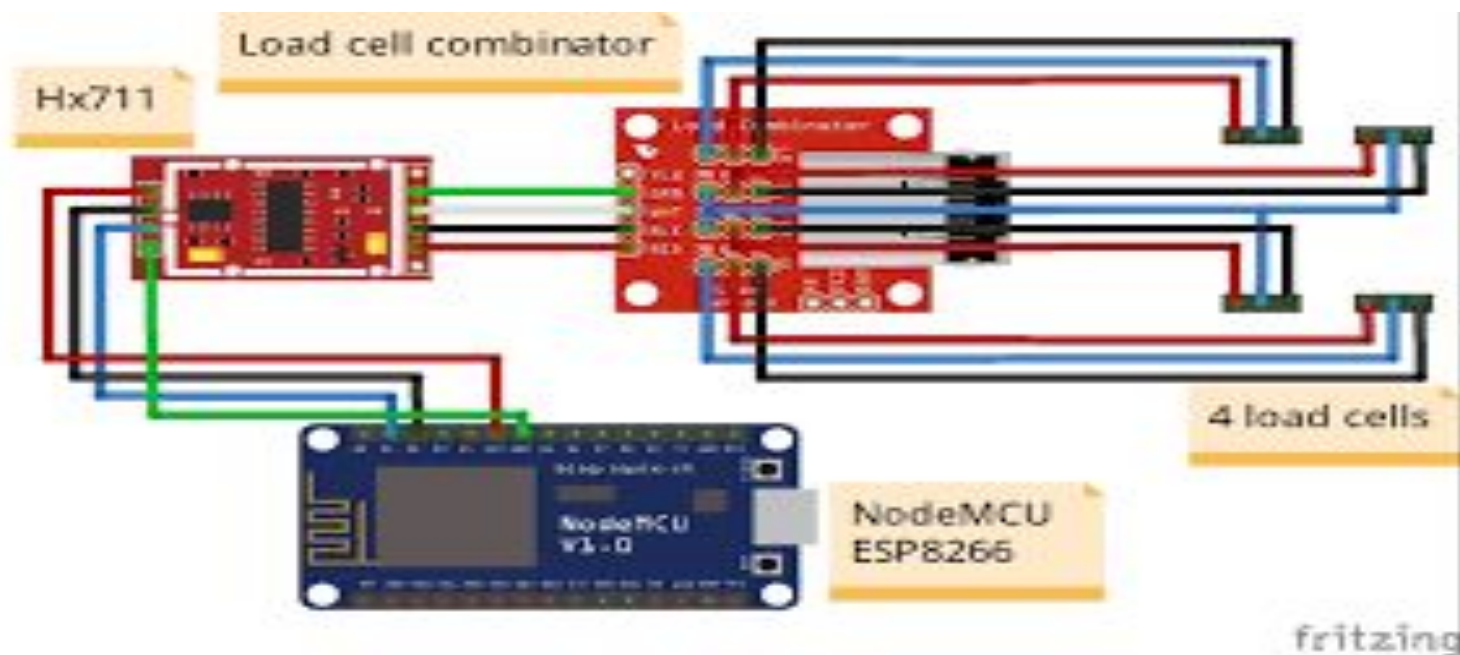


# Load Cell Amplification

Load cell Amplification hx711 act as an interface between load cell and esp8266



# Connection

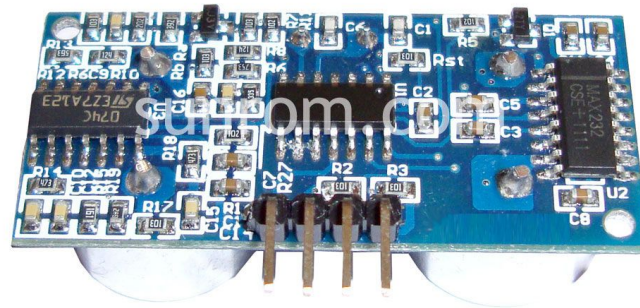


# Types of Strain Gauge

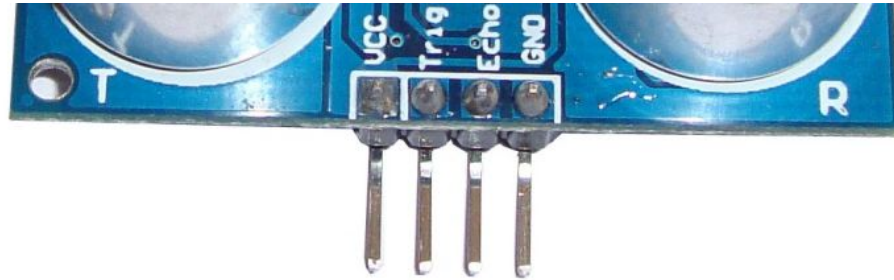


# Ultrasonic Distance Sensor

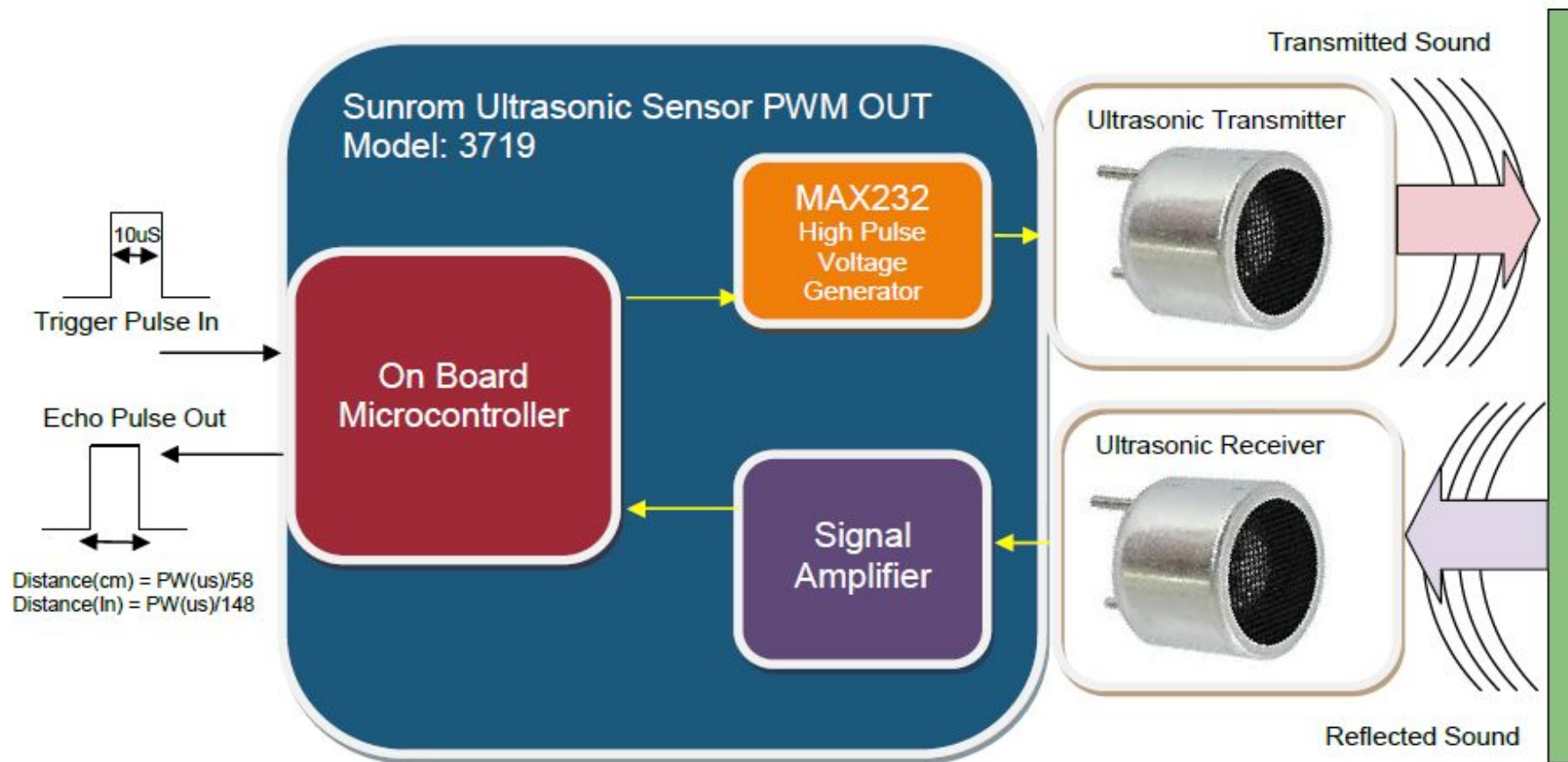
UltraSonic Distance Sensor is used in applications that require you to perform measurements between moving or stationary objects. It provides range from very short (2 cm) to long-range (5 m) for applications in detection and ranging. The sensor provides precise and stable non-contact distance measurements from about 2 cm to 5 meters with very high accuracy



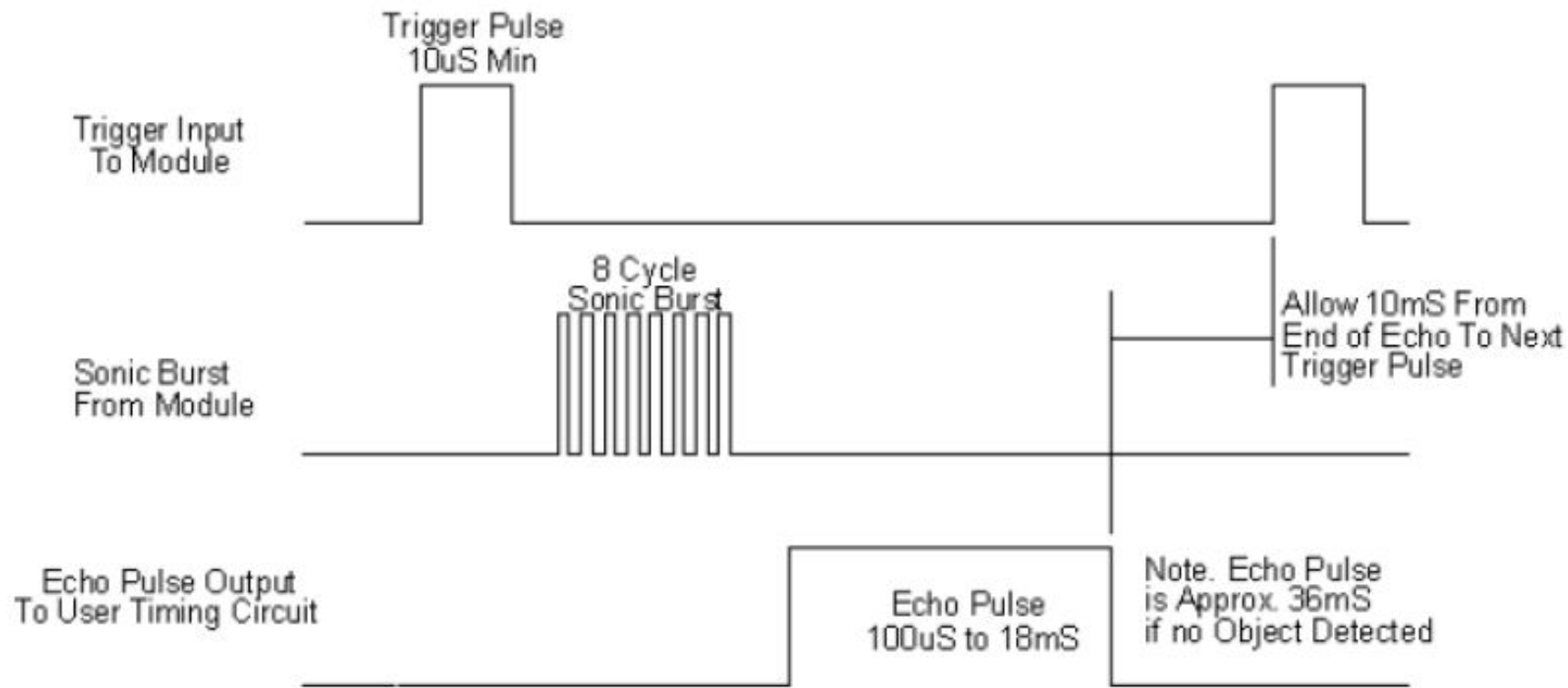
The ultrasonic sensor can easily be interfaced to microcontrollers where the triggering and measurement can be done using two I/O pin. The sensor transmits an ultrasonic wave and produces an output pulse that corresponds to the time required for the burst echo to return to the sensor. By measuring the echo pulse width, the distance to target can easily be calculated.



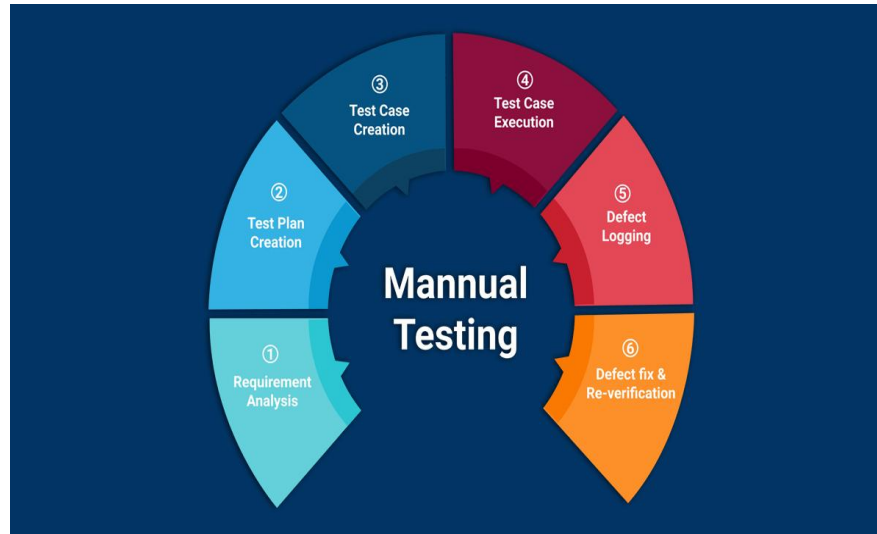
# Working



# Timing Diagram



# Testing





# Field Testing

- Our system will log all the events to provide clarity to the end users.
- Repetitive manual testing to ensure the accuracy of data.
- We'll test the data collected in the presence of a medical professional.
- Also, the whole apparatus will be debugged after performing trials.

# Unit Testing for Web and Mobile Client

- For the mobile client we will write unit, widget and integration tests
- JSUnit tests will be written for the web app.

THANK YOU