

SEM IV

Sensors and Actuators PBL

SMART JAR

**Kitchen inventory
and alert sensor**



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INTRODUCTION

As our daily routines become increasingly busy, we often find ourselves putting off grocery shopping, which in turn affects our ability to access fresh ingredients and maintain a healthy diet. Unfortunately, when we delay our shopping, we tend to forget adding necessary items to our list. Therefore, why should we compromise and settle for a ketchup-less sandwich?

The Smart Kitchen Inventory Management solution is a very effective and practical solution created to simplify the management of kitchen, medication, and restaurant inventory. This system has capabilities that allow users to properly monitor and track their inventory levels in real-time. Users are kept up to date on their current inventory status via timely notifications, resulting in a more efficient inventory management procedure.

APPLICATIONS

Pantry
Organization

Medicine
Inventory
Monitoring

Restaurant
Ingredient
Management

Laboratory
Supply
Tracking

Retail Shelf
Management

PRIOR ART

Neo by Ske labs: Neo is a smart jar that brings the kitchen into the connected world. It's built with sensors and Bluetooth connectivity. Configure it once and it remembers what you have and how much of it. It is connected to an app that also sends recipes based on what you have readily available. It can also adjust the proportions to any number of people. It also keeps track of calories, protein, carbs and fat. Neo keeps track of best before dates so you never have to compromise on freshness. Engineered with BPA free plastic making it food safe.

Ovie Smarter Ware: Ovie offers a range of smart food storage containers that utilize smart tags and a mobile app to help users track food freshness and reduce waste. The smart tags attach to the containers and change color to indicate the freshness status of the stored food. The mobile app provides reminders and recommendations based on the contents of the containers.

Silo: Silo is a smart vacuum storage system designed to prolong the freshness of stored food. It includes smart containers equipped with vacuum sealing technology and integrated sensors. The system monitors the freshness of the food, tracks inventory, and sends notifications to the user's mobile device.

COMPONENTS

- MQTT: MQTT is a lightweight publish-subscribe-based messaging protocol. MQTT is widely used in IoT (Internet of Things) embedded applications, where every sensor is connected to a server and we have access to control them over the internet.
- Node MCU: NodeMCU is an open-source IoT platform. It is a firmware which runs on ESP8266 Wi-Fi SoC from Espressif Systems. It has onboard wi-fi available through which IoT applications become easy to build.

ULTRASONIC SENSOR

Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception using Ultrasonic waves.

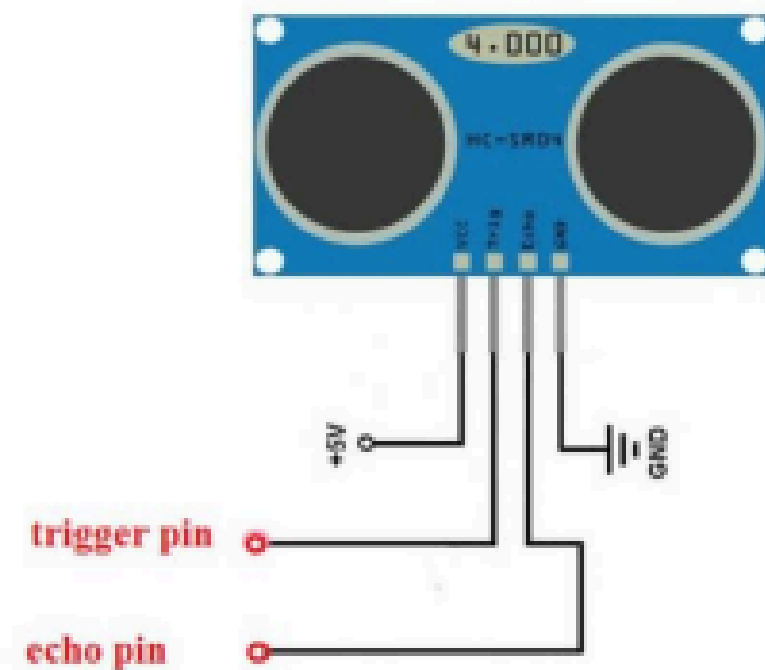
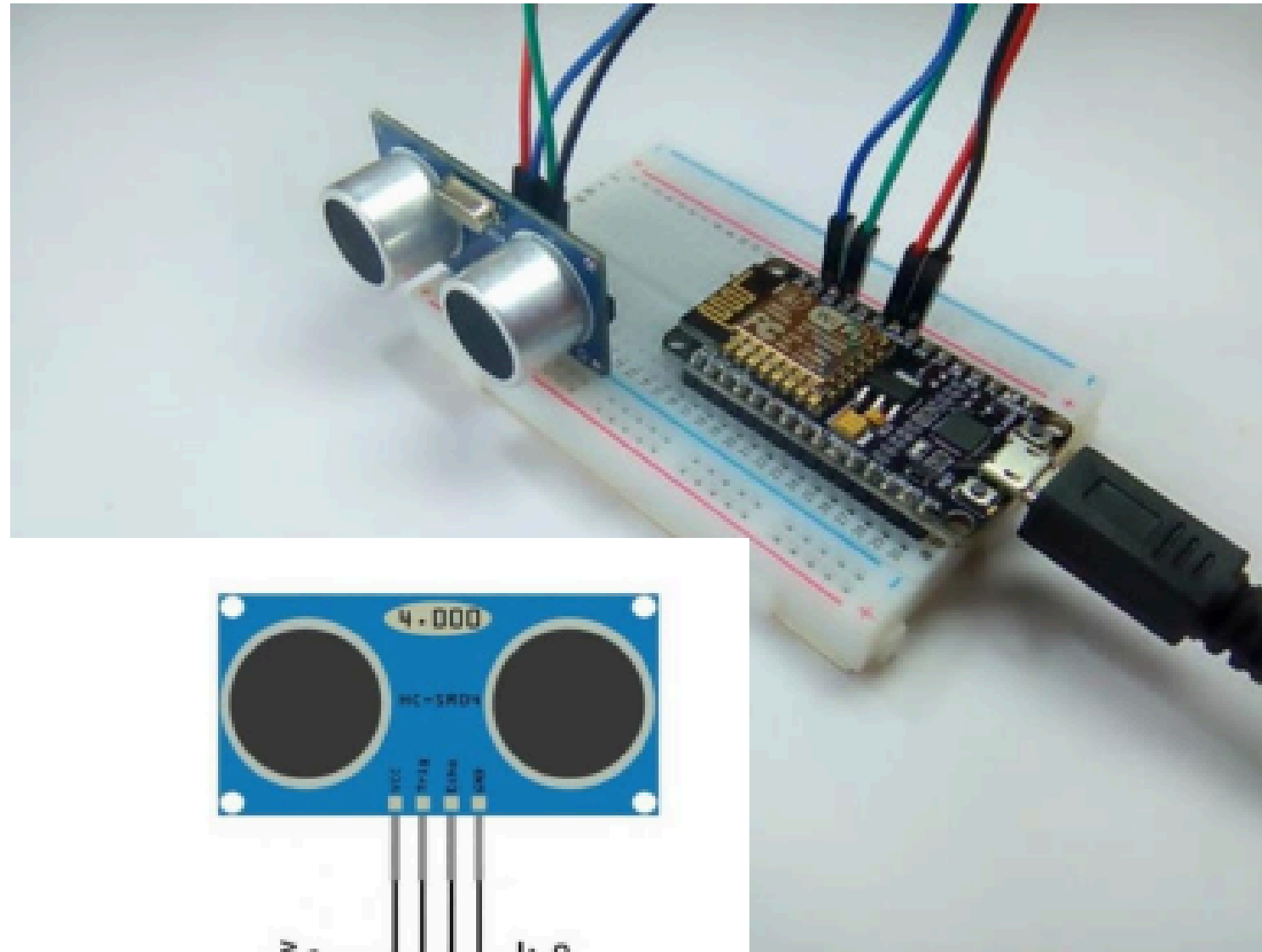
An Ultrasonic sensor is a device that can measure the distance of an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and waits for that sound wave to bounce back. By recording the time taken between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sensor and the object.

SPECIFICATION of HC-SR04

- Power supply : 5v DC
- Ranging distance : 2cm – 500 cm
- Ultrasonic Frequency : 40k Hz



INTERFACE READY



CIRCUIT CONNECTIONS

The **circuit connections** are made as follows:

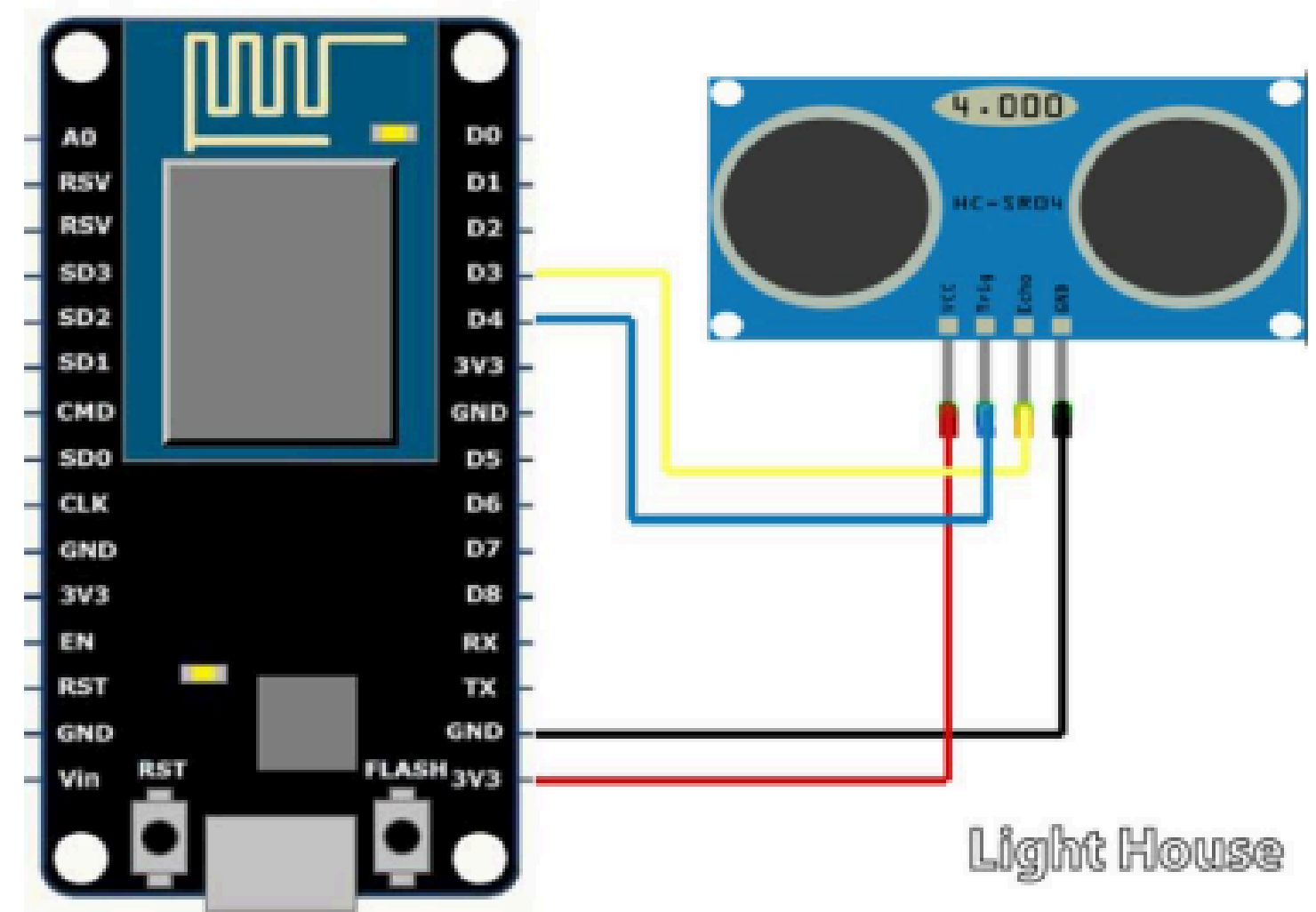
The HC-SR04 sensor attach to the Breadboard

The sensor **Vcc** is connected to the NodeMCU **+3.3v**

The sensor **GND** is connected to the NodeMCU **GND**

The sensor **Trigger Pin** is connected to the NodeMCU Digital I/O **D4**

The sensor **Echo Pin** is connected to the NodeMCU Digital I/O **D3**



THINK SPEAK

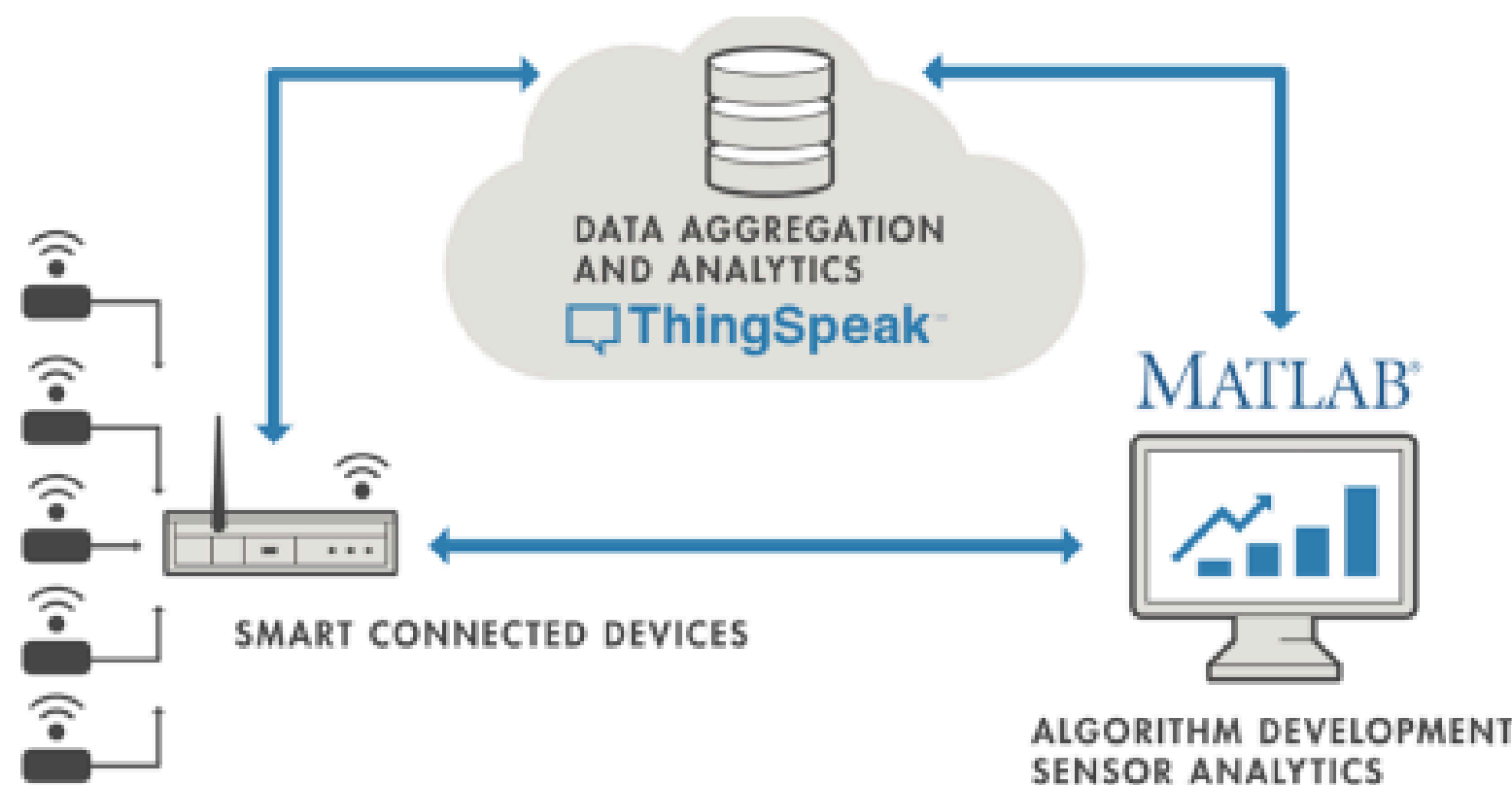
ThingSpeak allows you to aggregate, visualize and analyze live data streams in the cloud. Some of the key capabilities of ThingSpeak include the ability to:

- Visualize your sensor data in real-time.

Aggregate data on-demand from third-party sources.

Use the power of MATLAB to make sense of your IoT data.

Run your IoT analytics automatically based on schedules or events.



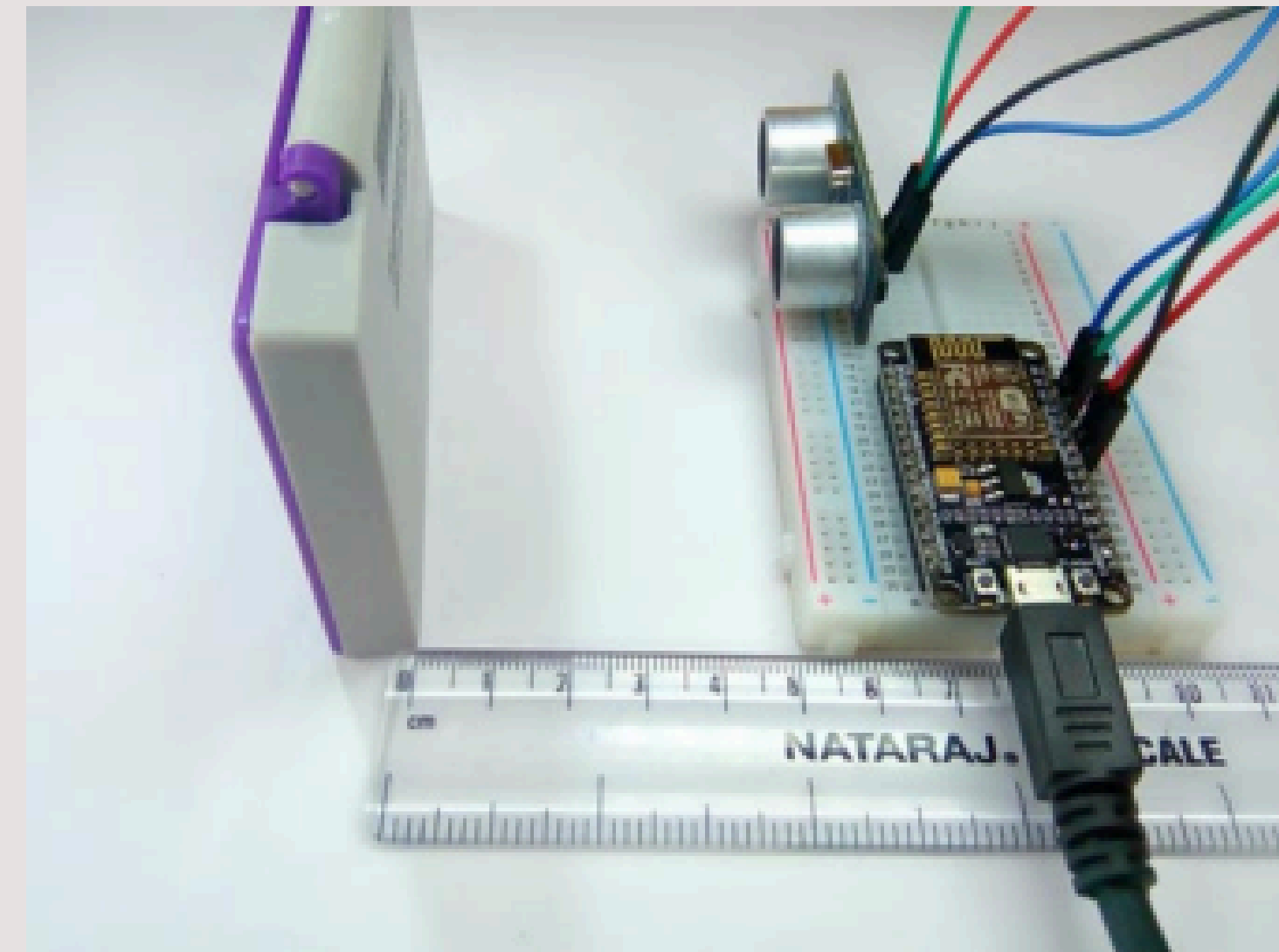
FORMULA USED

$$D = 1/2 \times T \times C$$

where D is the distance, T is the time between the Emission and Reception, and C is the sonic speed.

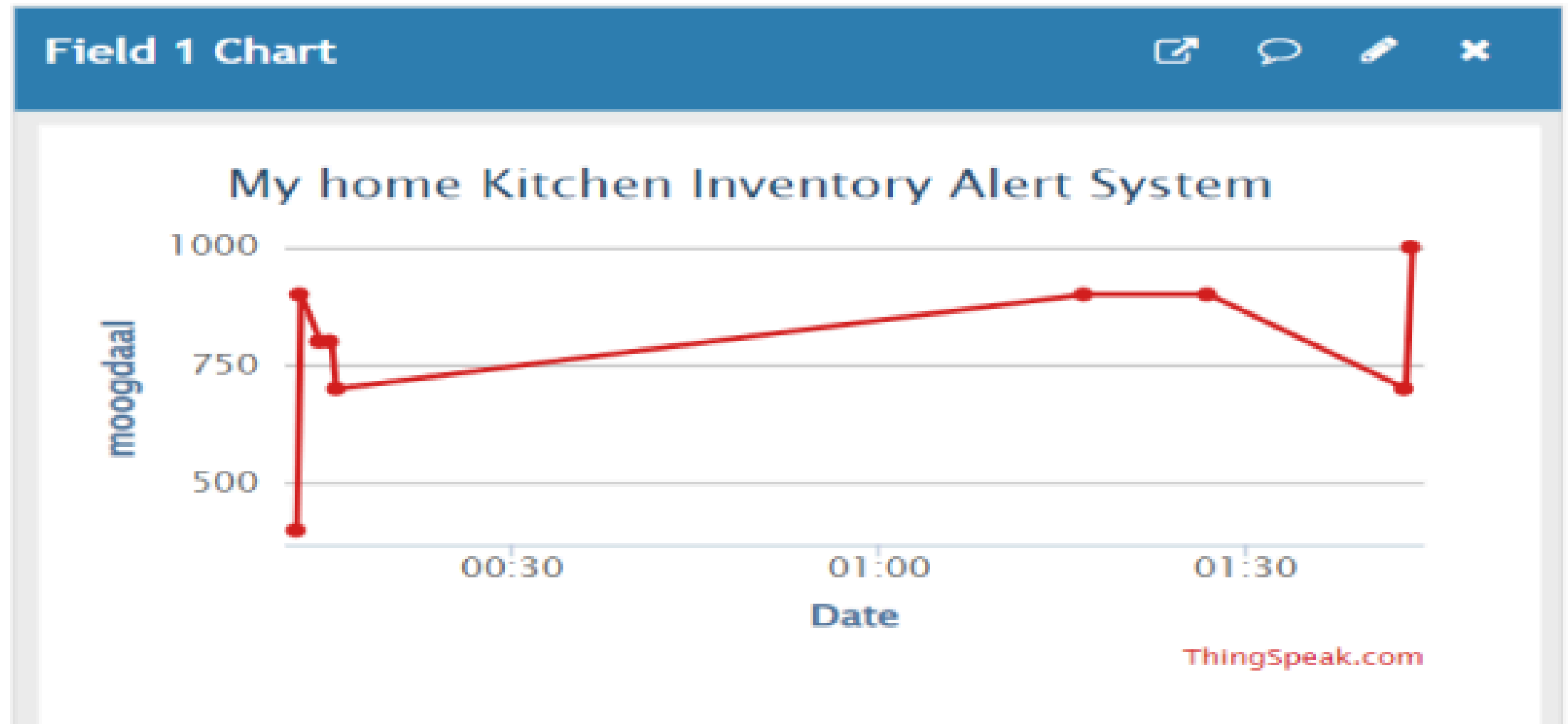
(The value is multiplied by 1/2 because T is the time for go-and-return distance.)

WORKING: The module sends out a burst of sound waves, at the same time it applies voltage to the echo pin. The module receives the reflection back from the sound waves and removes voltage from the echo pin. On the base of the distance a pulse is generated in the ultrasonic sensor to send the data to NodeMCU or any other micro-controller.



DEMONSTRATION RESULTS

Internet of Things (IoT) describes an emerging trend where a large number of embedded devices (things) are connected to the Internet. These connected devices communicate with people and other things and often provide sensor data to cloud storage and cloud computing resources where the data is processed and analyzed to gain important insights. Cheap cloud computing power and increased device connectivity is enabling this trend.



Thank you

