

# IOT BASED FOOD INVENTORY TRACKING SYSTEM FOR DOMESTIC AND COMMERCIAL KITCHENS

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## ABSTRACT

A major part in effective kitchen management is inventory control. Keeping tabs on the kitchen management leads to more informed planning and decision-making. With technology taking a large step and everything around us becoming automated, people prefer to monitor and perform their daily activities by using the smart devices they carry everywhere rather than manually recording and monitoring things. Maintaining and recording tracing of everyday common inventory is becoming one of the major problems in various sectors. Filling the vessels at the very accurate time and also making sure that the products don't expire has become a major concern. People with daily jobs and restaurants find it a difficult task to keep track because it requires human mediation at the particular time. Through this, it is quite a simple task to keep an eye on potential problems related to waste and burglary. Included in this paper, we are proposing a IOT (Internet of Things) based food inventory tracking system, which will ensure real time monitoring of the kitchen inventory and handle in appropriately. The day collected can be analysed in real time to understand the frequent consumption of the used utilities and also understand the usage patterns. There are also various provisions to check the real time status, history of utilisation through an application. System will contain a Microcontroller, wireless Module and load cell, MQTT broker, and a hybrid system through which real time inventory records are taken out. The following understandable idea is wireless and dependable for both domestic and commercial purposes.

## INTRODUCTION

Kitchen inventory management becomes more advantageous for more informed planning, decision-making and luxury of individuals. Every day the people expect new devices and new technologies to simplify their daily life. The innovators are always making sure to find new things to satisfy the people but the process is still finding the end. Now a days, kitchen automation has developed into modern and precise to monitor the fields. In the 21st century, Internet connectivity has developed the need for many applications and today it has turn into a part of many enterprises, industrial, consumer products to provide access to information. However, these devices are still primary things when we talk about monitoring through such apps and interfaces .With the advancement in Internet technology, and wireless sensing network (WSN), a new way

in the era of pervasiveness being realized. Enormous increase in number of people using the internet and modifying the work on the internet technology has enabled networking of the every day used objects. This system will find a wide application in areas where physical presence is not possible. System will offer a complete cost efficient, powerful and user-friendly way of real-time monitoring and remote control of kitchen.

## LITERATURE SURVEY

### **Smart Home Monitoring And Controlling System Using Android Phone.**

In this project, we are describing a zigbee module and android based kitchen monitoring system for security, safety and healthcare for humans. The flexibility of system makes it possible to implement in various areas. The paper will introduce a smart-home kitchen system which could make efficient household appliances remotely and realize realtime monitoring of home security status through mobile phone[1]. A Desktop PC is used to observe the following parameters in the given system.

### **Smart Kitchen Cabinet For Smart Home.**

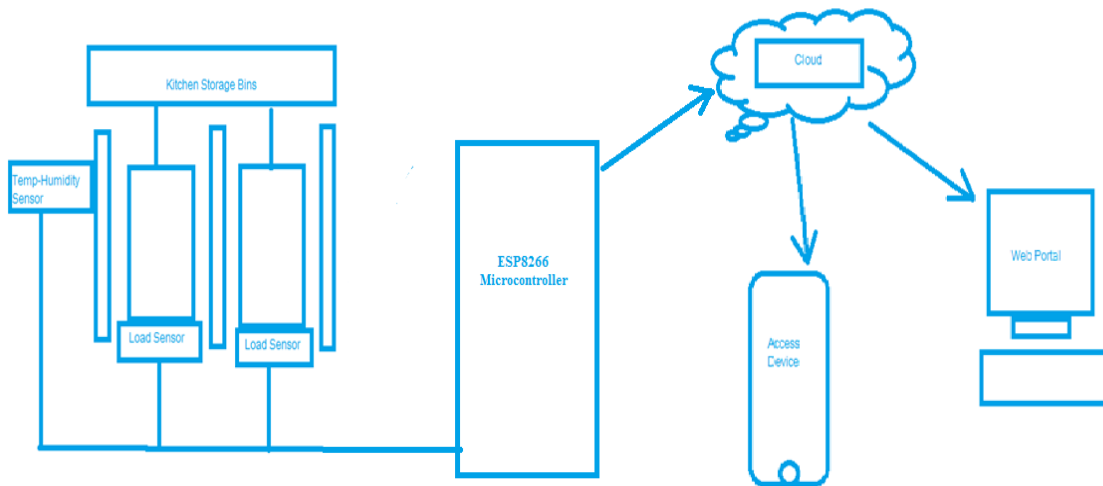
Android Phone is main focus as compared to personal computer as it is portable and handy to use[1]. This paper describes a conceptual design of a smart kitchen cabinet. This system sees grocery item identification, inventory organization of grocery items and automatic generation of shopping list. smart kitchen cabinet makes sure that there are two different sections each leveraging two sensing mechanisms: weight counting section which consist of fixed size cabinet having a RFID tag defining container size with product description RFID tag reader, and ultrasonic level sensor for understanding the level of contents in the container. RFID tag reader, and weight sensor meaning all the contents on that shelf[2]. The embedded sensor will measure the weights of the level of the items which in updated to the database whenever grocery items are placed or taken out for cooking.

### **IoT based Grocery Monitoring System.**

When the item search the predefined threshold level, the system generates the automated shopping list[6]. IoT based Grocery Monitoring System. This paper provides an insight of the development of an IoT based prototype to observed the grocery levels at homes, supermarket and commercial kitchens. A compatible and a cost saving wireless sensing network will be implemented. Understand this paper as a platform for research in the food and hotel industry, this implementation can be used to observe the food using patterns in the kitchens. Using this prototype as a start, real time applications can be developed for managing our current inventory effectively with its implementation in food and online industry[2].

## SYSTEM ARCHITECTURE

In this IoT platform based project, wireless communication is used. Here, NodeMCU (ESP8266) is made to communicate with cloud. There are mainly 2 types of groceries item. One is countable and another is uncountable. For measuring countable groceries item, we used load cell. Load cell measures the weight. For measuring uncountable groceries item like spices, rice, pulses, tea leaf, sugar, salt etc., we used load base sensor for measure the levels of the groceries item kept in the compartment. A website is used for monitoring the Smart Inventory from anywhere anytime. A mobile version for this website is also use from anywhere by using cloud. The purpose of the website is show accurate data of the sensor throughout cloud and in which show monthly statistics about inventory.



**Fig.System Architecure**

For this, website is built for monitoring the Smart Inventory from anywhere anytime. A easy version of this website for mobile will also be developed. From this website user can monitor item and order groceries from anywhere. User can also see the order data history and order status whether the order is accepted or not. System can generating a statistical report of how much inventory has been used. If the groceries from inventory are equal or less than 10% then user will be notified. User can also add or remove cabinets and change compartments' name.

### COMPONENT USED

#### 1. Microcontroller

At ESP 8266

The ESP-8266 is a effective Wi-Fi microchip ,with a full transmission control protocol stack and microcontroll capability machine ,This small module will permit microcontrollers to connect to a Wi-Fi network and make a simple connection using command. The ESP-8266 WiFi Module is a self understanding System On Chip with an put on a TCP/IP protocol stack that can give any microcontroller the access to user Wi-Fi network.

#### 2. Load Sensor

It converts a force as a pressure into an electrical signal. In the given project load sensor used for sensing the bins load and those load transfer to the cloud with the help of microcontroller.

#### 3. LCD Display

LCD is display used for various type of project and other electronic equipments.It is also known as Liquid Crystal Display.Supply voltage of LCD is 5V.It is nothing but output screen For electrical and complex projects.It contain messages and instruction about respective operation.

#### 4. Cloud

In this project we are used Amazon AWS cloud for real time operation.Cloud use for storing the real time bins values and perform operation on it values for show monthly groceries statistics,and send message the administrator or owner if bins levels are cros the border line.

### MATHMATICAL MODEL

$S = \{ I, O, F, \text{Success}, \text{Failure} \}$

$S = \text{System}$ ,  $I = \text{Input}$ ,  $O = \text{Output}$ ,  $\text{Success} = \text{Success case}$ ,  $\text{Failure} = \text{Failure Case}$ .

$I = \{ I_1, I_2, I_3 \}$

$I_1 = \text{Load cell-1}$ ,  $I_2 = \text{Load cell-2}$ ,  $I_3 = \text{Load cell-3}$ .

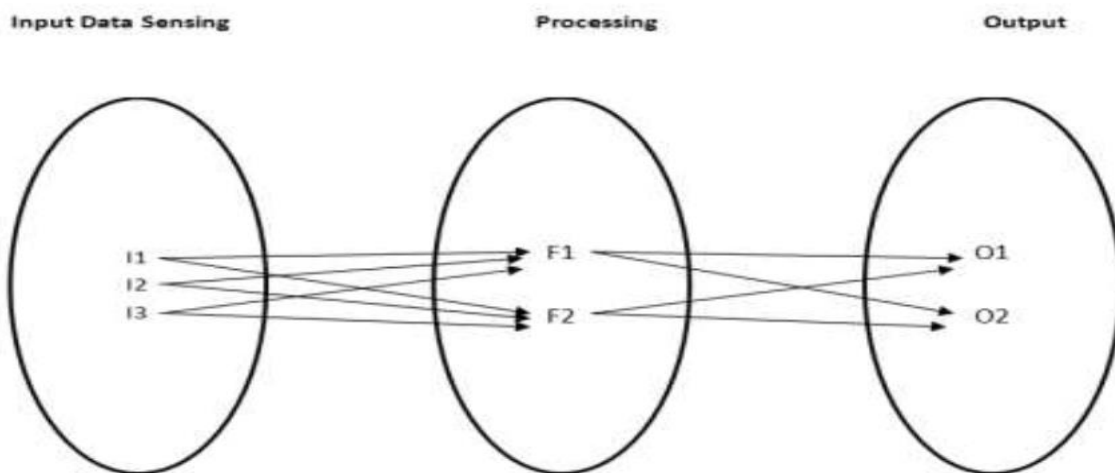
**O = {O1, O2, O3}**

O1=Weight-1, O2=Weight-2, O3=Weight-3.

**F = {F1, F2}**

F1= Calculate Weight. F2= Use KNN to find containers with Minimum Stock. Success Case= System Showing accurate reading of Weight.

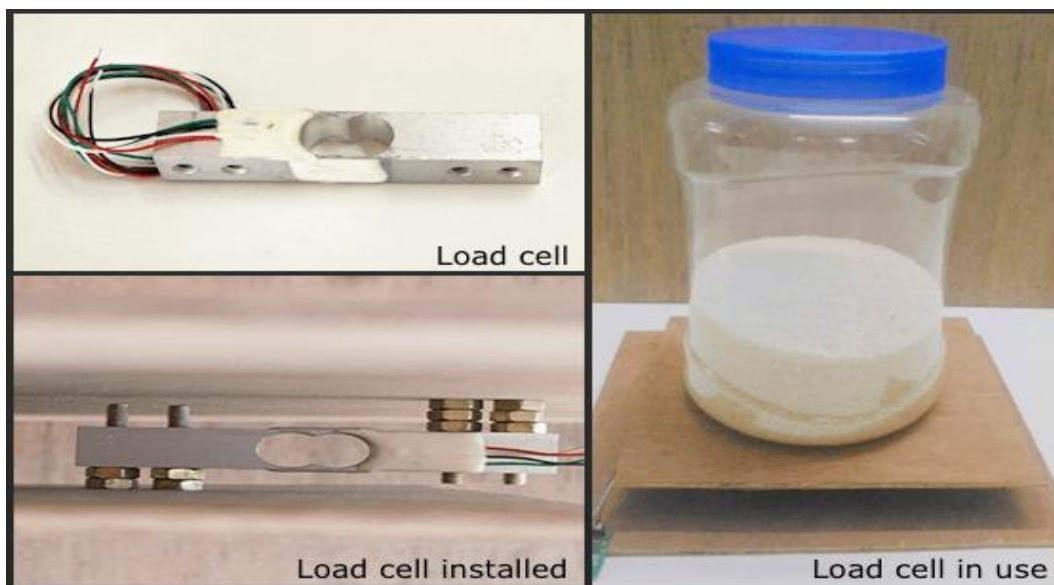
Failure Case =System Showing wrong reading of Weight.



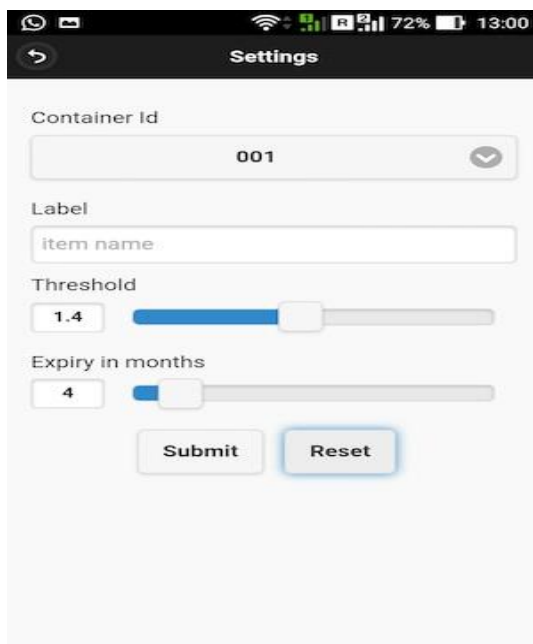
**Fig.Venn Diagram**

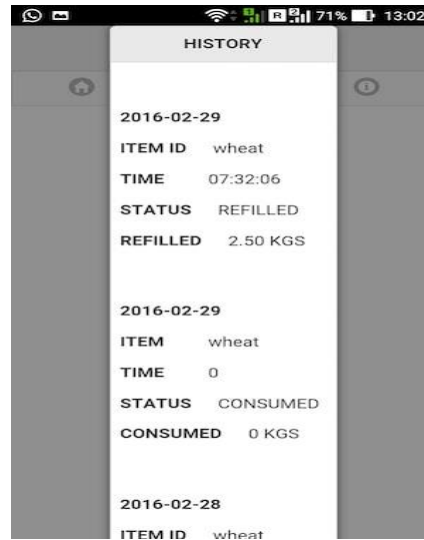
**IMPLIMENTATION**

The hardware is powered by a mixture of loadcell,display and ESP8266 microcontroller. For under the weight of kitchen storage containers, load cells are used. In order to produce the wanted strain for determining the container's weight , the load cell needs to be put in between two flat surfaces (such as plywood) with the help of the two pointed holes on each side of it. Once put on, the flat surface can act as a measuring tape for the weight of a storage container then these data is send to cloud using MQTT and HTTP protocol. then Mobile / Web Application is used to understand the Kitchen inventory.



OUTCOME





## CONCLUSION

This application can make us understand how easily a person can make use IoT devices to eliminate human intervention and make use of automated processes. For a restaurant or large hotel, this creates huge difference .A further improvement of this application will enable automatic placing of orders with suppliers when inventory level goes down a critical level. The hopes for improvement are never-ending and with cloud state of the art-data warehousing and the easily available messaging infrastructure of MQTT, making of such solutions is secure, fast and increase the products scalability.

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