A Project Report
On
IoT based SMART INVENTORY MANAGEMENT SYSTEM

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TABLE OF CONTENTS

ABSTRACT

With the development of enterprises and the constant demands of the product diversity, traditional warehouse management models cannot meet that, due to its heavy workload and low efficiency. This paper presents a new type of intelligent warehouse management system - Smart Warehouse Management System based on the IOT and expounded the principles and structure of it. This system has great advantages compared with the traditional mode, and we expect good prospects for its development.

By implementing the inventory management based on IOT, we eliminate the unnecessary manpower and make it automated between the measurement and order placement stages, thereby improving the efficiency of inventory management. The idea utilizes the ultrasonic transducer and a processing device with capability to connect to the Internet, to measure the inventory and send a mail using IFTTT to the supplier and/or to the company personnel for order placement, as well as display the present stock availability on a Web page hosted by Thingsspeak.com.

1. CHAPTER I: INTRODUCTION

IoT-based inventory management lays a solid foundation for the digitalization of the manufacturing ecosystems and offers both process and business benefits, including:

- **Automation of inventory tracking and reporting**

With RFID and IIoT, inventory managers do not need to spend time on manual tracking and reporting. Each item is tracked and the data about it is recorded to a big data warehouse automatically. Automated asset tracking and reporting save up to 18 hours of working time per month and reduces the probability of human error.

- **Constant visibility into the inventory items' quantity, location, and movements**

An IoT-based inventory management solution gives manufacturers precise visibility into the flow of raw materials and components, work-in-progress and finished goods by providing real-time updates about the status, location, and movement of the items, so that inventory managers see when an individual inventory item enters or leaves a particular location.

- **Inventory optimization**

The better inventory managers know their stock, the more likely they are to have the right items in the right place at the right time. With the real-time data about the quantity and the location of the inventory items, manufacturers can lower the amount of inventory on hand while meeting the needs of the customers at the end of the supply chain.

- **Identifying bottlenecks in the operations**

With the real-time data about the location and the quantity of the inventory items, manufacturers can reveal bottlenecks in the manufacturing process and pinpoint machines with lower utilization rates. For instance, if part of the inventory tends to pile up in front of a machine, a manufacturer assumes that the machine is underutilized and needs to be seen to.

- **Lead time optimization**

By providing inventory managers with the data about the amount of available inventory and machine learning-driven demand forecasts, solutions based on IIoT allow manufacturers to reduce lead times.

2. CHAPTER II: OVERVIEW OF THE PROJECT

2.1 DEFINITION IOT BASED SMART FARMING SYSTEM

A typical inventory management system available in the market is built around software, which monitors the stocks. The inventory details are updated by the workers of the industry by various methods. One such method includes an Ultrasonic sensor. Such type of Inventory management system is suitable for industries dealing with packaged cartons. By establishing a shared inventory for vivid departments of the enterprise, it allowed them to timely and efficiently maintain and control their inventory

2.2 COMPONENTS AND MODULES

In this section, various components and Modules being used for IoT based SMART INVENTORY MANAGEMENT SYSTEM development is discussed:

2.2.1 NodeMcu ESP8266-12e Wi-Fi development board

NodeMcu is an open source IOT platform with a deployed ESP8266-12e Wi-Fi module in it. It supports a USB micro port for programming the NodeMcu. The em-18 module is interfaced with the NodeMcu ESp8266, the data from the em-18 RFID reader is sent to the NodeMcu. It works on an operating voltage of 5 V, but the ESP8266-12e module requires 3.3 V for that purpose all the required circuitry for the voltage conversion are held in the NodeMcu board. The NodeMcu can be programmed with the Arduino IDE and the AT commands can be easily integrated which makes coding simpler. The NodeMcu can be programmed in two modes, STA mode, AP mode. For simplicity, the NodeMcu is programmed in the STA mode.

2.2.2 HC-SR04 Ultrasonic Sensor

HC-SR04 Ultrasonic (US) sensor is a 4-pin module, whose pin names are Vcc, Trigger, Echo and Ground, respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. HC-SR04 distance sensor is commonly used with both microcontroller and microprocessor platforms like Arduino, ARM, PIC, Raspberry Pie etc.

Power the Sensor using a regulated +5V through the Vcc and Ground pins of the sensor. The current consumed by the sensor is less than 15mA and hence can be directly powered by the on board 5V pins (If available). The Trigger and the Echo pins are both I/O pins and hence they can be connected to I/O pins of the microcontroller.

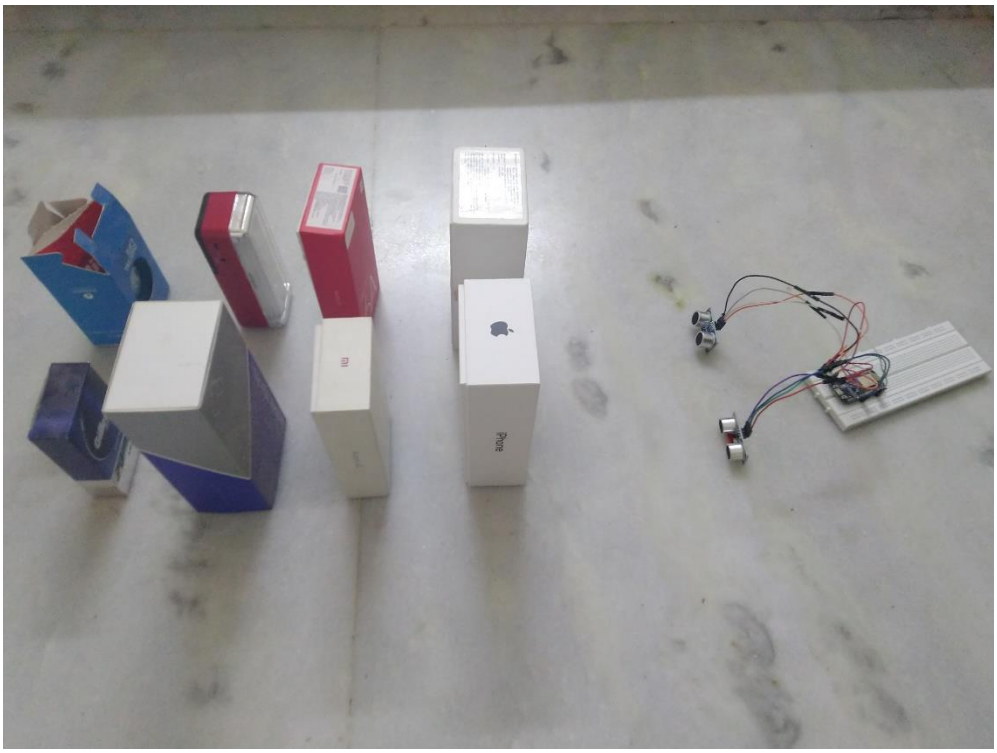
2.2.3 Breadboard

A **Breadboard** is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used for slicing bread. A modern solderless breadboard socket consists of a perforated block of plastic with numerous tin-plated phosphor bronze or nickel silver alloy spring clips under the perforations. The clips are often called *tie points* or *contact points*. The number of tie points is often given in the specification of the breadboard.

The spacing between the clips (lead pitch) is typically 0.1 inches (2.54 mm). Integrated circuits (ICs) in dual in-line packages (DIPs) can be inserted to straddle the centerline of the block. Interconnecting wires and the leads of discrete components (such as capacitors, resistors, and inductors) can be inserted into the remaining free holes to complete the circuit. Where ICs are not used, discrete components and connecting wires may use any of the holes. Typically, the spring clips are rated for 1 ampere at 5 volts and 0.333 amperes at 15 volts (5 watts). The edge of the board has male and female dovetail notches so boards can be clipped together to form a large breadboard.

2.3 CIRCUIT DESCRIPTION & WORKING PRINCIPLE

In this circuit there is an ESP8266 Wi-Fi module connected with 2 ultrasonic sensors. The working principle is based on storing data from sensors with the help of ESP8266 Wi-Fi Module. The Wi-Fi module gives update of data through “Thingspeak”. The Thingspeak link is https://thingspeak.com/channels/1222918/private_show where the channel name is Inventory.



Overall circuit layout

3. CHAPTER-III: ALGORITHMS & FLOWCHART & OUTPUT GRAPHS

3.1 ALGORITHM

THE ALGORITHM OF OVERALL PROCESS: -

STEP 1: START THE PROCESS

STEP 2: CONNECT TO WIFI

STEP 3: READ THE DISTANCE OF THE CARTON FROM THE SENSOR

STEP 4: GET THE DISTANCE; USE A FORMULA TO FIND NO. OF CARTONS AND THEN SEND DATA TO THINGSPEAK API

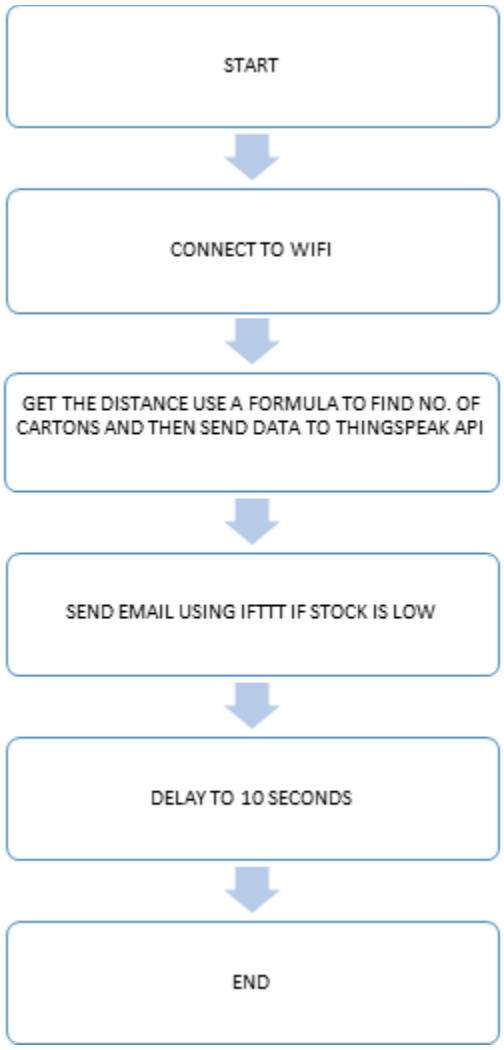
STEP 5: SEND EMAIL USING IFTTT IF STOCK IS LOW

STEP 6: DELAY TO 10 SECONDS

STEP 7: REPEAT STEP 4, 5 & 6 UNTIL THE PROCESS END

STEP 8: END

3.2 FLOWCHART



3.3 OUTPUT GRAPH

No. of cartons of ice cream

No. of cartons of chocolate

4. CHAPTER-IV: CONCLUSION & FUTURE SCOPE

4.1 CONCLUSION

Intelligent warehouse information management system based on the IOT get a lot of information of different goods through the use of advanced sensor technology, and on the basis of Internet and cloud computing technologies, achieves intelligent processing and control of the goods in in/out of storage and cargo handling process, improving the efficiency of warehouse management and reduce the error rate for enterprises. Also reduces costs and the workload of staff. More and more enterprises will adopt it to get greater assistance for the socio-economic and rapid development of enterprises.

4.2 FUTURE SCOPE

Further growth in the coming years will be possible thanks to new sensors, more computing power, and reliable mobile connectivity. Finally, the **IoT** market will grow because existing IT devices will need to be linked to the **IoT**. Growth in traditional connected IT devices is admittedly moderate—about 2 percent per year

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