

SMART CONTAINER USING ULTRASONIC SENSOR

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Abstract : Smart container for store objects is a iot-ready container. It is able to keep track of stocks stored inside and notify when stocks are low. Based on the amount of the content, container will check if the container will get empty soon or not. If the amount of content has reduced from certain threshold, then the container will send a notification to your smart phone notifying that the content has reduced and that content can be found and purchased in some desired shops/website as per user specify. Node MCU is an open source IOT platform having WiFi ESP8266 module which is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. Database is stored at a web server. To notify the user there will be an application installed in the user's mobile phone. Using that mobile application user will be able to order the content. Smart container and android application will communicate through web server.

Keywords– *Smart Container, Ultrasonic Sensor, NodeMCU ESP8266.*

I. INTRODUCTION

The entire world is evolving with new technologies and IoT is the current trend. Not all, but those who are aware of it, are looking forward to home automation using IoT. The Internet of Things refers to the use of intelligent connected devices and systems to leverage data gathered by embedding sensors and actuators in machines and other physical objects. The IoT creates an intelligent, invisible network fabric that can be sensed, controlled and programmed. IoT-enabled products employ embedded technology that allows them to communicate, directly or indirectly, with each other or the Internet [1]. You might have heard about Smart Refrigerator which can automatically order food items which are running low in refrigerator, so inspiring from that we are building a Smart Container using NodeMCU [2] an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC(System On Chip), and hardware which is based on the ESP-12 module. This Smart Container can give you its status when the content in the container is empty by sending a notification to the android application. When the android application receives the notification, it searches that content in the shopping website and provides a ready information for user to order that particular item. Initially, the content is set with the threshold value of the content. When the content reaches beyond the threshold value then the notification will be sent to the android application. The smart container connected through IoT makes it very convenient for you to have all the orders just through your phone when the content becomes empty. For doing we need a database that is stored at a web server. Several system investigations have been have already designed and several studies are also done. **TYPE STYLE AND FONTS**

II. PROBLEM STATEMENT

Shopping these days has become a job. The client needs to continuously monitor groceries at home and also has the work of managing coupons, maintaining shopping lists, standing in restraint out queues, reading the fine print on food cans, and even needs to find out within which rack and row he or she may notice that item. A big proportion of the grocery shoppers would thus have an interest in an additional convenient, quicker grocery shopping option. Now a day's life for everyone has become so hectic and time consuming, at such time we require a smart system at our kitchen also. To put on records and observing all the grocery at home is difficult. Most of the time we remain in wrong belief that we have enough grocery in our kitchen but we have to face empty bottles at the time of emergency when the requirement is must that gives us inconvenience. And to avoid this, some time we buy more than enough grocery & store it at our home for many days, which is also an inconvenience can cause damage to grocery. Both this situations are problems. System that can give continuous level measurement and can notify us about low level of content is required to avoid these problems.

III. LITERATURE REVIEW

2.1 Smart Home Monitoring And Controlling System Using Android Phone.

In this project, it describes a zigbee module and android based home monitoring system for security, safety and healthcare for human. This system is flexible and can be implemented in many research areas. This paper introduces a smart home system which could surprise household appliances remotely and realize real-time monitoring of home security status through mobile phone. The personal computer is used to monitor the various parameters in the proposed system. Android Phone is main advantage compared to personal computer for using any place.

2.2 Smart Kitchen Cabinet For Smart Home. This paper describes a conceptual design of a smart kitchen cabinet.

This system incorporates grocery item identification, inventory management of grocery items and automatic generation of shopping list. The smart kitchen cabinet consist of two different sections each leveraging two sensing mechanisms: weight sensing section consist of fixed size container having RFID tag defining container size with product description RFID tag reader, and ultrasonic level sensor for measuring the level of contents in the container. RFID tag reader, and weight sensor meaning all the contents on that shelf. The embedded sensor measure the weight or the level of the items which in updated to the database whenever grocery items are placed or taken out for cooking. When the items reach the predefined threshold level, the system generates the automated shopping list. International Research Journal of Engineering and Technology

2.3 Design & Implementation Of Kitchen Monitoring System By Using Wireless Sensor Network.

The design and development of a smart monitoring and controlling system for kitchen environment in real time has been reported. The system detects kitchen parameters each as room temperature, fire detection, motion detection has been developed. The system can detects the status of kitchen and send alert message via network automatically. If the conditions get abnormal, the concerned authority can controls the system though this mobile phone by sending proper decision in user GSM. Users can monition and control. The system offers low cost, complete powerful and users friendly way of real-time monitoring and remote control of kitchen.

2.4 Wireless Sensor Network Based Smart Home :

Sensor Selection, Development And Monitoring This paper details the installation and configuration of unobtrusive sensors in an elderly person's house - a smart home in the making – in small city in New Zealand. The novelty of thin project is that instead of setting up an artificial test bed of sensor within the University premises. The sensors have been installed in a subject's home so that data can be collected in a real, not artificial environment. The applications are not limited to solely monitoring but can be extended to behavioral recognition. The methods of collecting data efficiently and have to led to novel applications for indoor wireless sensor networks. In this project, the technological development provides and increase human beings safety and comfort directly and indirectly. For this purpose developing technologies directly affects the life standards by means of smart home systems design. It is possible to classify smart home systems into two as local and remote. A smart home automation system design was carried out by using Delta DVP28SV model PLC i.e. programmable logic controller. A smart home system can be controlled in the two different ways either by any internet-connected device on an operator panel assembled on PLC, control of the ventilation, lighting and security units in the smart home were carried out. Unusual circumstances occurred in security units have been reported to the user with sms.

IV. PROPOSED STUDY

This study has modification and improvements over the nearby studies basically in its architecture. Architecture is an integrated components of communication nodes and cloud storage database. The improvements: Limitations on previous study are resolved here among of them,

- 1) Instead of using Raspberry Pi we are using NodeMCU which makes a huge difference in size. NodeMCU is an open source IOT platform having WiFi ESP8266 module which is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network.
- 2) Instead of using emails and web browser for notifying the user about container's status, the use of android application makes it easy and personalized to use and manage smart container.
- 3) This project involves use of WiFi which receive the password from the user's mobile phone. In order to receive password from the user NodeMCU first becomes a access point and displays a list of available networks around the smart container, user will select a network and will provide a valid password of that network for NodeMCU to connect to that network being a client.
- 4) When the android application receives the notification, it searches that content in the shopping website and provides a ready information for user to order that particular item. Initially, the content is set with the threshold value of the content. When the content reaches beyond the threshold value then the notification will be sent to the android application. In this project the components are: Power supply Power supply to the NodeMCU is given through a cell. NodeMCU NodeMCU is an open source LUA based firmware developed for ESP8266 wifi chip. By exploring functionality with ESP8266 chip, NodeMCU firmware comes with ESP8266 Development board/kit. The ESP8266 is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol. For more information about ESP8266, you can refer ESP8266 WiFi Module. A web server is a system that delivers content or services to end users over the internet. We are storing user's and container information in a database in a web server. Android Application Android application makes it easy and personalized to use and manage smart container. To notify the android application installed in the user's mobile phone. Using that mobile application user will be able to order the content from its nearest or desired shop/store. Smart container and android application will communicate through web server. For user in order

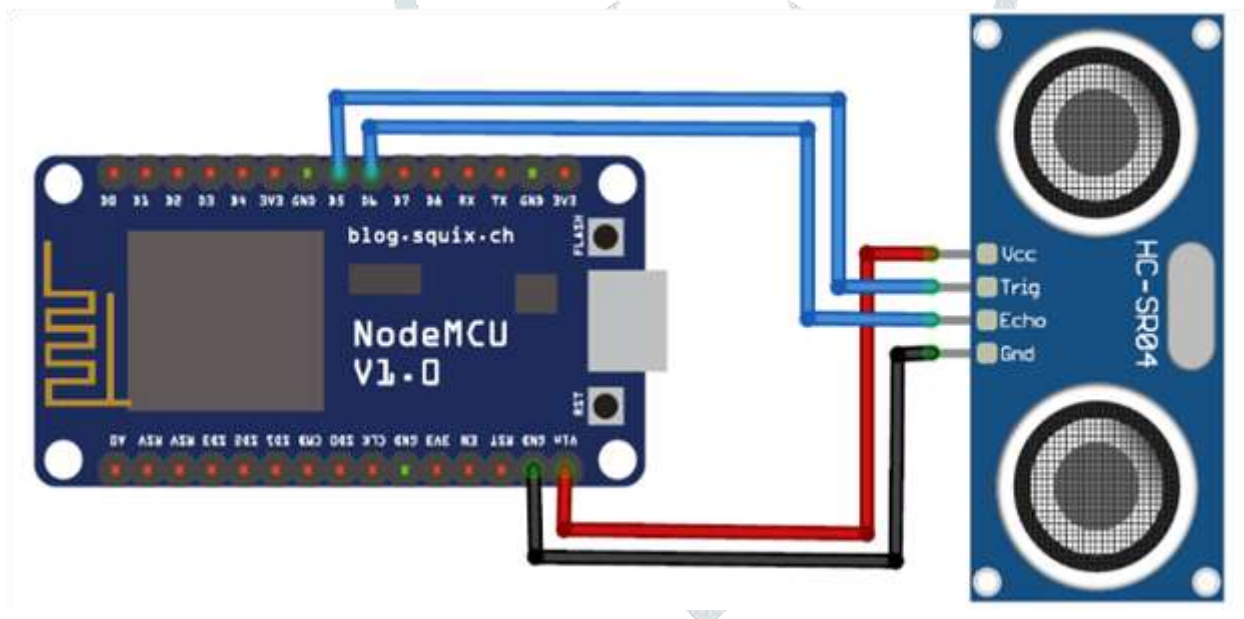
to use smart container first user has to install android application then user has to enter all the required information and customize. User has to give container id and a specific name to the container so that when a container becomes empty then user can be notified using the name. When the user receives a notification about container status the ready information to order the empty item will be available from shopping website. User can place the order whenever required.

V. IMPLEMENTATION

Once the user has the smart container user has to register themselves using android application where they have to enter all the required information. Registration is important because without the registration user won't be able to use and manage Smart containers. User has to give container id and a specific name, here the name should be given based on the content that we are storing in the container so that when a container becomes empty then user can be notified using the content name stored in that smart container. When the user receives a notification about container status the browsed information to order the item will be available from a shopping website, user can place the order whenever required. When the content of the smart container will reduce to a threshold value then the NodeMCU will send a container's id, which intern inform the webserver that the container is going to be empty. After this webserver will process the container's id to find the user to which the container belongs. Webserver will generate a notification about the container's status on the user's mobile phone through android application. On clicking on the notification or going to the cart in the android application, user will see the options to buy the items from online shopping websites.

Components:

- Ultrasonic sensor
- An empty jar (plastic or transparent is recommended)
- Breadboard
- ESP8266 (WiFi module)
- Jumper wires (~15 - 20)
- Program loading cable
- Resistors (2K) - 2 Nos



ADVANTAGES

1. Automation in monitoring and controlling.
2. Less manual effort.
3. Less complexity.
4. Less maintenance.

APPLICATIONS

1. Integration of security services.
2. Food processing units.
3. Home and hotel kitchens.

VI. SYSTEM ARCHITECTURE

1) Ultrasonic sensors: An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back. Round-trip means that the

sound wave traveled 2 times the distance to the object before it was detected by the sensor; it includes the 'trip' from the sonar sensor to the object AND the 'trip' from the object to the Ultrasonic sensor (after the sound wave bounced off the object).

2) Node MCU: This paper requires a Node MCU which allows connecting things easily. Its Features includes Interactive, Programmable, Low cost, Simple, Smart, WI-FI enabled, Open source

3) Android app :These futuristic canisters are built with sensors that monitor what's been put inside of them, as well as the nutrients that particular food or liquid contains. The data then syncs with Smart Canister's app to provide nutritional information, freshness dates, and best of all, recipes based on the ingredients you have on hand. The invention isn't just for those looking to monitor their eating habits. The jars can communicate with your online grocery cart, indicating when you are running low on your favourite foods, thus preventing you from having a last-minute cooking emergency

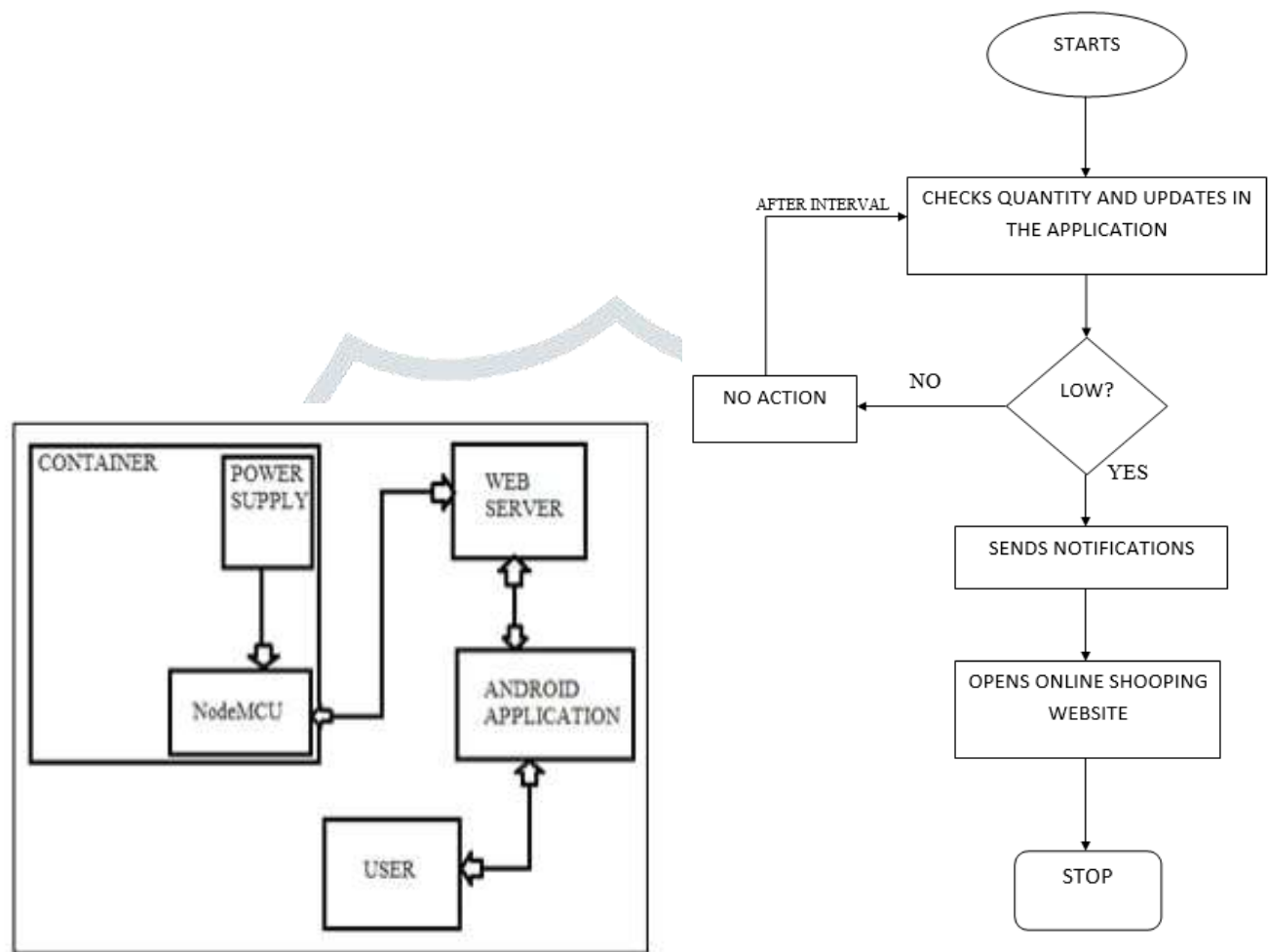
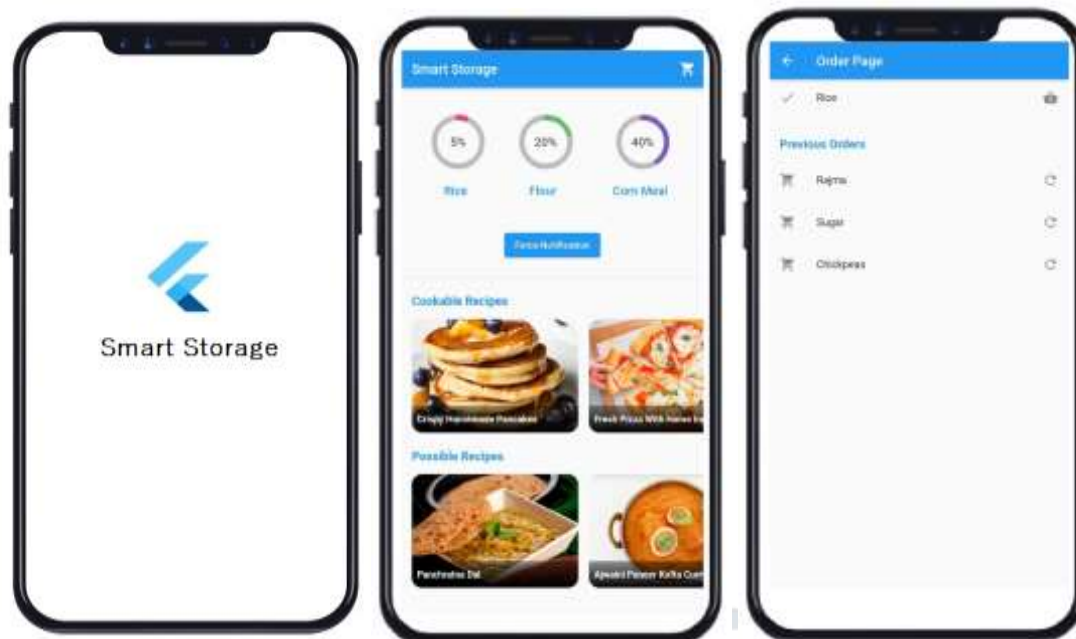


Fig. 1: Smart Container System Architecture

VII. SCREENSHOTS



VII. CONCLUSION & FUTURE ENHANCEMENT

The remarkable conclusion of this paper is attempt to improve the use of containers or smart container which is iot-ready. The implementation is totally designed in a form suitable to handle whoever user is using a smart container through a smart phone. It is able to keep track of stocks stored inside and notify when stocks are low. Based on the amount of the content, container will check if the container will get empty soon or not. If the amount of content has reduced from certain threshold, then the container will send a notification to your smart phone notifying that the content has reduced and that content can be found and purchased in some desired shops/website as per user specify. NodeMCU is an open source IOT platform having WiFi ESP8266 module which is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. Database is stored at a web server. To notify the user there will be an application installed in the user's mobile phone. Using that mobile application user will be able to order the content from its nearest or desired shop/store. Smart container and android application will communicate through web server. Whatever technologies, tools and techniques are an up-to-date in conducting this research that enabling to support the quality aspects of feature visualization and predictive models and also easily understandable quantity. In this project the user get notification only when content of the container goes below the threshold value notifying the container is empty. In the future work, a module can be added where user can check the status of the container whenever user requires and also get notification when the container is full.

VIII. REFERENCES

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