

Smart Container

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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. 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.

Key words: ESP8266 WiFi module, NodeMCU

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. In a similar project of smart container using Raspberry Pi with

email alert and web monitoring [3] a wooden base with the Load cell is attached for stability, with the help of nuts and bolt. Here, we have created a web server, which provides a way to send the weight value of the container from Raspberry Pi to network using Flask in a web browser. Flask allows us to run our python scripts through a webpage and we can send & receive data from Raspberry Pi to web browser and vice versa. Flask is a microframework for Python.

II. 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:

A. Power supply

Power supply to the NodeMCU is given through a cell.

B. 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.

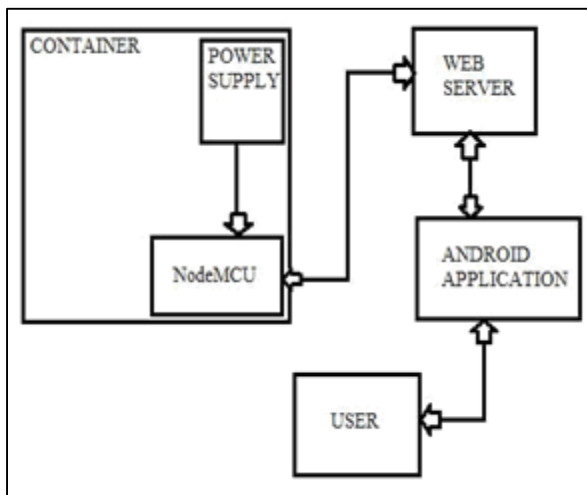


Fig. 1: Smart Container System Architecture

C. Web Server

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.

D. 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.

III. 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.

IV. 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.

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