International Journal of Engineering & Technology, 7 (4.6) (2018) 358-362

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Iot Based Smart Jar For Connected Devices Using Machinelearning

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Abstract

The smart jar enables us to keep track of the medicines stocks with the help of an android app easily accessible anywhere with a simple internet connection. The jar contains an ultra-sonic sound waves emitter and sensor which uses the reflected ultra-sonic waves to find out what level the jar is filled to and how much empty space remains in jar yet to be filled. This sensor is also connected to the internet and interfaced with the application so that as soon as the level of content in the jar changes the data is updated to us in the application without any delay. This helps us in monitoring the stocks and prepare for restocking from anywhere,additionally it also provides important data such as the expiry date and the manufactured data of the content in the jar. .

Keywords: *smart jar, Internet of things, Pharmacy,medicines Microcontroller.*

1. Introduction

A Pharmacy is a very important place where the natureeffect manufacture and distribution of medicine ‹testing ‹development in a pharmacy is finding One of the difficulties faced.takes place Usually these automated systems are .the items to be out of stock but it will be more useful to the ‹designed to work with the home The .society if it is implemented in other places like pharmacy utomation is not yet applied to pharmacy is one ideal place where a Smart jar .but the place which needsmore concentration ‹the extent .is an intelligent appliance that can be used for interactive services Node ‹It is an embedded system which consist of LCD ‹Ultrasonic distance sensor ‹8266ESP ‹Microcontroller unit board ‹Android app and Arduino Integrated development environment The features of this smart jar .Android Studio software are used whenever a medicine's -automatic shopping list preparation are The expiry .o the mobile appit will indicate t ‹quantity goes low .date of the medicine will be indicated in the mobile app
This section comprises of detailed and working description of the is the jar with ultrasonic moduleThe 4ScO-The Hc .system el of the contents ultrasonic sensor is used to determine the lev It analyses the surroundings and decides the .inside the jar parameter with the threshold and pass it to the device as if it has any difference in the received data and this analyzing of y for regular determining the difference must be done regularl The user can interact with the system through LCD .updates display which has a button that initializes the rolling display of expiry date ‹This display consist of name of the item .information e regarding the which also sends notification to the user's mobil Each time the level of the tablet in the container is verified .level it can initiate the pharmacist to buy the ‹so that when it is less needed medicine by sending it to the user as notification by the microcontroller node The .app developed using Xml and java MCU is used which is compact in size.

2 PREVIOUS WORKS

2.1 LITERATURE SURVEY

Richard M. Voyles and Jaewook Bae [1] presented 'Smart Tupperware : An Example of Bluetooth Wireless Sensor Networks for Human Assistive Mechatronic Systems'. Using personal digital assistant, the status of the foodstuff in the kitchen is determined automatically by reforming the shopping list of the user. Sensors and Processors are used to calculate the parameters like the characteristics of the contents, weight and the quantity kept in the Jar. The containers used to recondition the status of the content and informs the base station, a personal system without wired medium. The properties and characteristics are maintained as a database and the base station has a web page to update the details of each container. This automated method is used to avoid the human errors created during the process not to get interrupted. By using Wi-Fi, the container status having the content synchronizing with the database will be updated in the user's personal digital assistant. For measurement a bar code scan can be used for further ease of use.

Karuppiah Pal Amutha, Chidambaram Sethukkarasi, Raja Pitchiah [2] described about the 'Smart Kitchen Cabinet for Aware Home'. This paper presents the design and development of a "Smart Kitchen Cabinet" which identifies the grocery items in the kitchen store. The weight of an item is measured in the Kitchen Cabinet is augmented with sensors which is refreshed in the database whenever ingredients are kept or removed out for cooking. Radiofrequency identification (RFID) tag is used for

locating and tracking the particular place with the Jar for the kitchen. The analysis and optimization for the Jars with RFID tags and antennas are made for comparing the performance and the outputs are discussed. The system also generates automated shopping list when an item reaches the defined threshold level, which is based on requirement and consumption pattern of family members.

Manali Chaudhari, Prof. Srinu Dharavath presented 'Study of Smart Sensors and their Applications'. This paper gives the brief idea about the basic structure, standards, applications and some recent developments in smart sensor technology in different fields. Smart sensors as compared to the sensors can sense along with special purpose computing devices which are connected in sensor networks. Critical devices can be monitored as well as managed remotely by using wireless sensor networks which yields better performance of system with better decision making abilities and better control. The new advances in wireless technologies are emerging in varies fields like supply chain logistics, monitoring of systems, data collection and application controls. The main purpose of smart sensor networks is to reduce human intervention and management control in different systems. Wireless devices including actuators, sensors and gauges can now be monitored wirelessly.

Akbar Satria, Muhammad Luthfi Priadi, Lili Ayu Wulandhari and Widodo Budiharto [4] presented 'The Framework of Home Remote Automation System Based on Smartphone'. The purpose of this paper is to make a mobile application on a Smartphone device so that the user can control electronic devices and to see the amount of flow that has been used in the amount of dollars, so the problem is the difficulty in saving electricity can be resolved. Lot of questionnaire are used to analyze the feedback from the people and design updates are done accordingly. Literature survey , various observations and questionnaires with various ideas from the customers are used to design the hardware in united modeling language(UML) and to apply in the testing and designing of the codes for the communication between the operating systems and android. Thus the Consumption of electricity is reduced with various optimization methodology to control the home appliances using mobile phones, which takes the technology to the higher level for the next generation .

2.2 Existing work

Radiofrequency identification (RFID) tag is used for locating and tracking the particular place with existing container for the kitchen. The Performance and the result analysis is done with the RFID tags and antennas for the container with different ingredients are verified. The main disadvantage of existing system is the tag size is large due to bulky antenna coils and it has limited capability to read multiple tags simultaneously. This does not function when it is surrounded by heavy water or metal content and it is more cost effective. The existing system has built-in load sensors that weigh its contents and indicates only when it is empty. This gives the nutrition details about the content in the jar. As the system is operated via Bluetooth only limited number of systems can be connected at time. Weight of the content is not determined exactly. Betterment and upgrading of the details must be done about the item in the container if changed. RFID is not constant for all the ingredients which are present in different containers. The performance of the jar must be analyzed separately in an iterative manner for better performance. Accuracy need to be more concentrated by using precise sensors for measurement.

3. SED WORKPROPO

Micro-controller is used to read data, write data, transmit and receive data. It consists of an inbuilt chip ESP8266.

Wi-Fi hotspot which is cloud connected, everything happens inside the android cloud. Cloud used in smart jar is local server [intranet] because to use when the net is unavailable. LCD is used to display the content of items which is present . inside the JarTwo Ultrasonic sensor are used to transmit the waves and other sensor receives the waves. The Proposed work is shown in the Fig3.1.

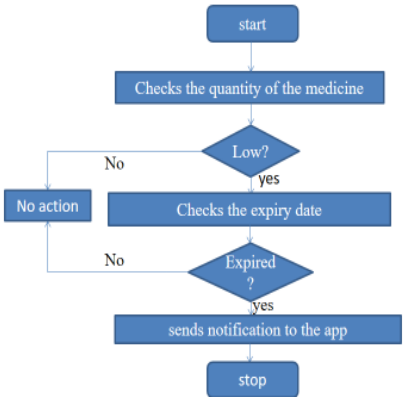

Fig 3.1: Flow chart for proposed work

3.1 WORKING PRINCIPLE

Ultrasonic module says the percentage content present inside the smart jar. The display shows the name of the tablet, expiry date and micro controller is used for the display purpose. The Microcontroller process the data and send to the cloud using ESP8266 shown in Fig 3.2. The cloud contains some specialized program which prints our data in the form of pie chart (level). The display in the app is made using tabular column which mentions the name, the date of expiry and level of item present inside the jar. The android app is usually made using arduino studio and we have used xml and java programming to design the board. The arduino board is based on embedded c language and html coding to get the data using node Microcontroller unit. The ultrasonic sensor is used to transmit and receive the signal. The indication will be shown when the obstacle is not present, because the receiver will receive the sound waves within a short duration of time. If an obstacle is present, the signal will be received with a delay of time and it is applicable to a shorter distance.

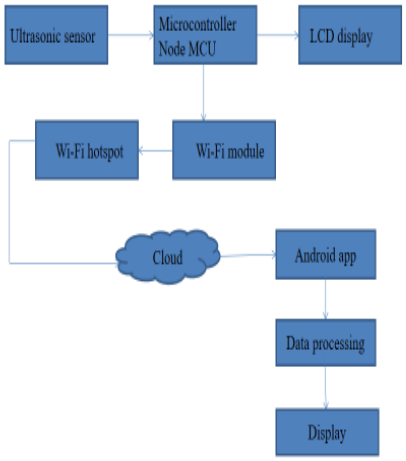

Fig 3.2: Block Diagram

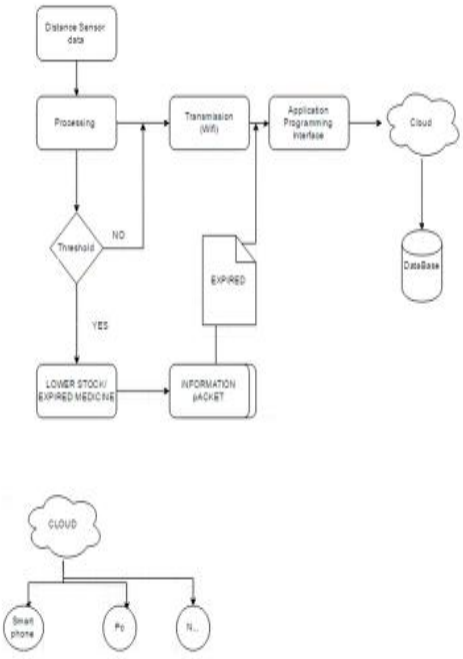

Fig 3.3: On demand Computing

3.2 PROCESSORS

The Node Microcontroller unit is used with ESP8266 module.There are 6 extra GPIOs. All of them can be programmed as PWM, I2C, 1-wire, except for GPIO16 (D0) as because it can support only to read and write and even it does not support interrupts.. Theadvantages of Node Microcontroller unit platform relative to the Arduino are low cost, integrated support for WIFI network, reduced size of the board, low energy consumption.The disadvantages are to learn a new language and integrated development environment, reduced pin out, scarce documentation.

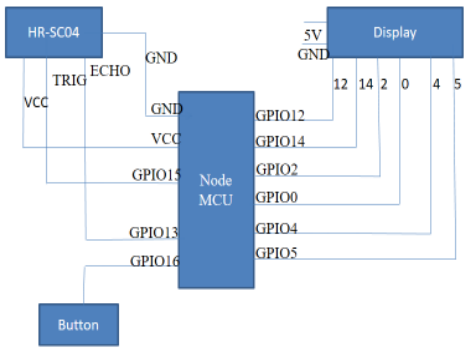

Fig 3.4: Communication between the Sensor and the MCU

3.3 CLOUD COMPUTING

The Cloud computing, also known as on-demand computing, is a kind of Internet-based computing, where shared resources, data and information are provided to computers and other devices on-demand. Cloud Computing is the use of hardware and software to deliver a service over a network (typically the Internet).With cloud computing, users can access files and use applications from any device that can access the Internet. An example of a Cloud Computing provider is Google's Gmail. Node micro controller application developers just need a ready-made firmware. There is a cloud build service with a nice user interface and configuration options for them shown in Fig.3.3

3.4 ULTRASONIC DISTANCE SENSOR

Using sound waves, the distance of the object is measured in the Ultrasonic sensor .Following the methodology of Bats, the sound waves are sent and when it is reflected back , by analysing its frequency the distance is measured. The distance between the sensor and the object is calculated by the time gap generated by the sound wave when it reflects back. The connections between the microcontroller and the sensor is shown in Fig.3.4

3.5 HUNGARIAN ALGORITHM

Considering the machine learning in this application, clustering based analysis is done. Grouping of same kind of certain task and works comes under cluster analysis. Combinatorial Optimization algorithm can be done for the assignment problem in polynomial time. Depending upon the linearity, the Hungarian algorithm is applied to this application. The problem is to find the lowest cost way to assign the tasks. Some of the facts that are considered are the medicine nearing the expiring date, the level of medicines. By creating a table for the above facts and by calculating the minimum cost for the factors by using the Hungarian algorithm.

Result and discussion .4

The results can be displayed in a liquid crystal display, and thereby connecting with the devices which use internet through Wi-fi is used for knowing the information. In this paper we have used a mobile application is used to convey the details about the content in the jar .Using Internet of things, this content can be viewed in any device.

4.1 RESULTS

This node micro controller unit development kit has digital pins and analog pins. Two digital pins are connected to the echo and trigger pins of ultrasonic distance sensor. Ultrasonic sensor when triggered produces sound waves. After striking an obstacle, the waves are reflected. The time taken for reflection is calculated and it is converted into distance in meters. Arduino Integrated Development environment is the programming platform.Embedded C language is the program dumped into the Arduino board. The details of the medicine is displayed in the LCD screen. The final result is viewed with the help of a mobile application.JAVA and XML programming is used to develop an application.The level of content in the jar is displayed in a pie chart and details of the medicine is displayed in the tabular column as shown in the Fig.4.1,Fig.4.2,Fig.4.3,Fig.4.4. and displayed in LCD in Fig 4.4 and 4.5.

Fig. 4: Measurement results-1

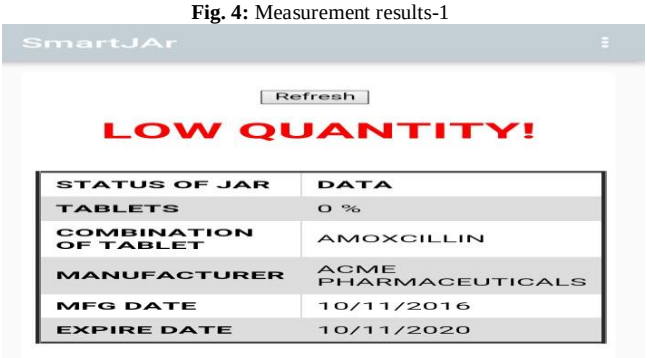

Fig 4.1: Display example

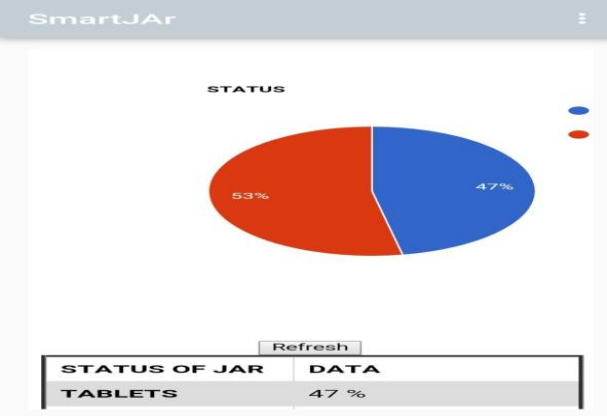

Fig.4.2: Pie-chart results

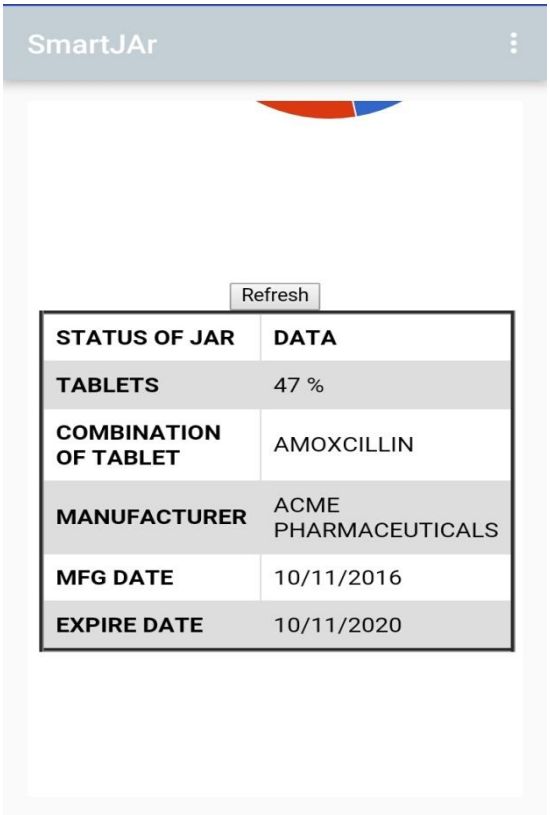

Fig. 4.3: Measurement results

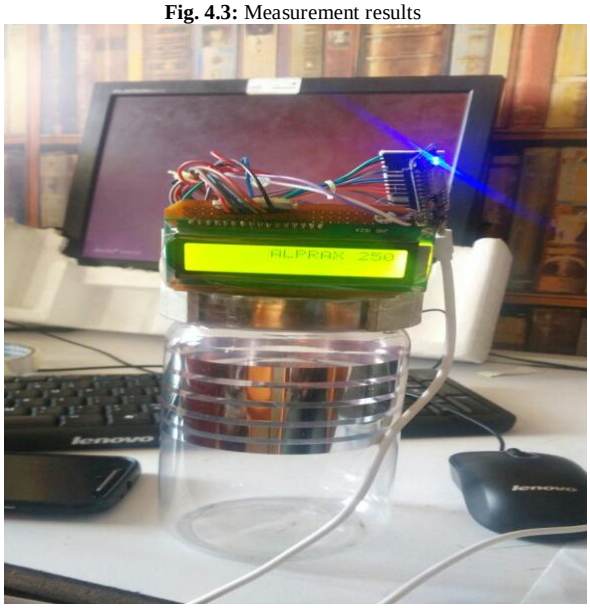

Fig. 4.4: LCD showing the label

LCD showing the expiry date .**4.5 .Fig**

4.2 COMPARISIONS

The greedy randomized adaptive search procedure in clustering analysis works on the basis of successive iterations of the tasks, which may lead a certain point as a greedy randomized solution, whereas in Hungarian algorithm, the assign problems are solved on the basis of lowest cost.

5 Conclusions

Development of smart jar is an effort towards society based automation. This system identifies the medicines quantity in the pharmacy. This smart jar is embedded with sensors to measure the weight of an item. Based on the database information shopping list preparation are useful and helping the pharmacist to manage the pharmacy activity.

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