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A Smart Medi-Care Refrigerator using IOT

P. M. Benson Mansingh[1], R. Jeeva Prakash[2]
[1]*Assistant Professor,* [2]*UG Scholar, Sri Ramakrishna Institute of Technology, Coimbatore.*

Abstract: ***Every person has to take medicine at any point in his lifetime. Medication causes severe harm when it is taken wrongly. A recent survey was conducted by University academics in Manchester, Sheffield and York has found out that more than 230 million medication errors a year took place in the National Health Services (NHS). Apart from heart disease and cancer, the medical errors are the third-leading cause for death. All medication errors are avoidable. Therefore, it is necessary to integrate smart devices such as sensors, embedded components to create a system for providing health information to Patients, Doctors and Medical center to save time, cost and life. To address this issue, We are proposing an IOT based smart hardware to integrate with the Refrigerator in the Pharmacy/ Medical centre with the following modules 1) to monitor the expiry date of the medicines, 2) to maintain the constant temperature inside the refrigerator for avoiding medical waste and 3) to provide high security using Biometric authentication with magnetic door. All the information is stored periodically in the Cloud. When there is any deviation in the temperature or power failure, warning message will be sent to the Pharmacist.***

Keywords: IOT, Node MCU, LM35, Home Automation

I. INTRODUCTION

Many smart appliances are emerging in our day-to-day life. The year 2016 was an important landmark for medical technology where Virtual Reality, Augmented Reality, Smart wearable medical devices were introduced. In today's world, Internet of Things (IOT) is the fastest growing technology where the objects/things get connected to the Internet. It is used in Home automation system, Traffic control management, Smart cities, Health services and Business applications. IOT in health care is not only used for monitoring the Patient's health but also for connecting patients and health providers to diagnose, monitor, track and store vital statistics and medical information. .

II. LITERATURE SURVEY

A single flaw can be the variation between life and death. Suppose, due to a mistake of pharmacist or mere circumstance, a patient dies. Hence, the proposed system will avoid the rate of death due to medication errors, reduces manpower which leads to the modern era of medical devices. Smart fridge which is able to sense the quantity as well as quality of the food items kept inside it. With smart sensing techno-logy, this fridge will keep check on the expiry of food products and the spoilage of eatable items. Smart enough to notify the current status. Remind about the items spoilage and save the money and food wastage. Slow performance.

In this paper the Smart refrigerator is capable of sensing and monitoring its contents and it can also able to remotely notify the user about required products to fill via android application. It also facilitates the purchase of required items to fill by providing a link of the online vendor of that particular item. A refrigerator that can think on its own as an IoT object and discuss with the items stored within, gathers information about them, process this information into relevant data that is further communicated through an IoT platform to its owners, in our case, a smart refrigerator. The smart fridge can enable better nutrition and enhance health. In this work, the fridge is equipped for managing items stored in it and teaching its users with cooking methods based on what kind of food is stored. Enable better nutrition and health. Micro waves are used to set auto defrost frozen before use.

In this work, a module is being designed to connect any door with the internet, so that the access can be controlled and monitored from anywhere in the world. Suppose if anyone is not at home and a visitor is at his door steps then the authorized person will be notified about the visitor via twitter and the owner can see the person outside from the web through the camera from anywhere. This module helps to take a picture of the visitor outside and keep a record by sending an attachment through E-mail or tweet in twitter. It is highly secure and low of automation.

III. METHODOLOGY OF THE PROPOSED WORK

Refrigerators play a vital role in the medical industry for storing vaccines, insulin, organs or blood samples. Vaccines are very sensitive to temperature and should be stored under consistent specifications. A recent survey by the United States' National Institute of Standards and Technology indicates that 13.5% of vaccines got frozen accidentally due to temperature variations during refrigeration. Hence, this project proposes a Smart Medical Refrigerator using Internet of Things for avoiding the medical errors. The proposed system has following modules and the architectural diagram is shown in Figure 1.

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A. Acquisition Of Fingerprint

Finger print biometric authentication is used for recognizing and accessing the refrigerator. Fingerprint scanner initially scans all the authorized persons in the Pharmacy and saved in the database. Any individual requires access to the Refrigerator puts their finger in the scanner and the device checks the fingerprint image with the available database. To reduce the noise in the image, Histogram equalization process is used, Morphological Image Processing is applied for thinning the lines in the acquired image up to the predefined range so that it will not harm the structure of an image further. Lastly, Artificial Neural Network is used for the recognition of a fingerprint. This Enhanced image will be sent to NN (neural networks) based trained system to diagnose and match finger print with data set. This technique is finally used in smart medical refrigerator for authentication and to provide high security with buzzer alarm and magnetic locking system.

B. Access Through Magnetic Lock

This secured refrigerator uses magnetic lock with finger print sensor for accessing the device.

C. Temperature Monitoring

The LM35 is an ideal temperature sensor for measuring and monitoring ambient temperature inside the refrigerator. LM35's is used in this project since it is better than thermistors and thermocouples and also they are so linear and require no signal conditioning.

D. Expiry Date Monitoring

Expired products are nothing more than a trash. Barcode scanner is used for scanning the manufacturing dates and expiry dates of all the drugs/vaccines kept inside the refrigerator. All the information are periodically updated in the cloud which will send us the notification message when the expiry date is reached.

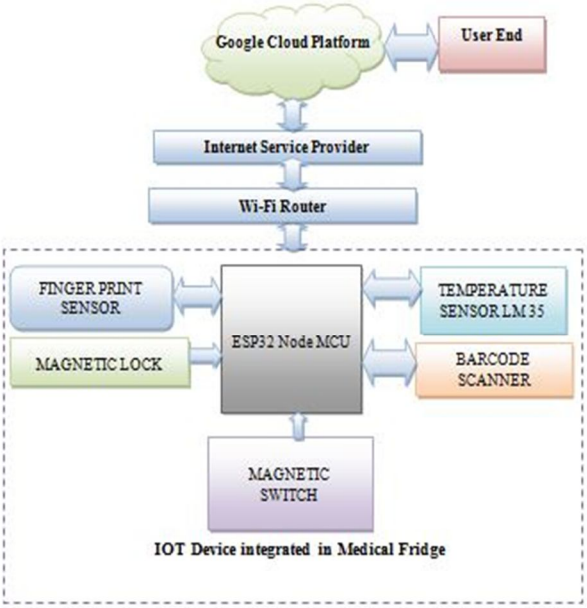


Fig.1 Proposed system Block Diagram

E. Cloud Storage

IOT devices get real time data from the refrigerator and these collected data must be stored in the cloud for further processing.

1) Advantages

The Proposed system works both in online and offline mode perspective.

a) The system does not need human operator to analyse the data stored inside the refrigerator.
b) Time consuming to make decision is low.
c) Cost of project is low because of using low cost hardware implementation.
d) This System provides high security and authentication.

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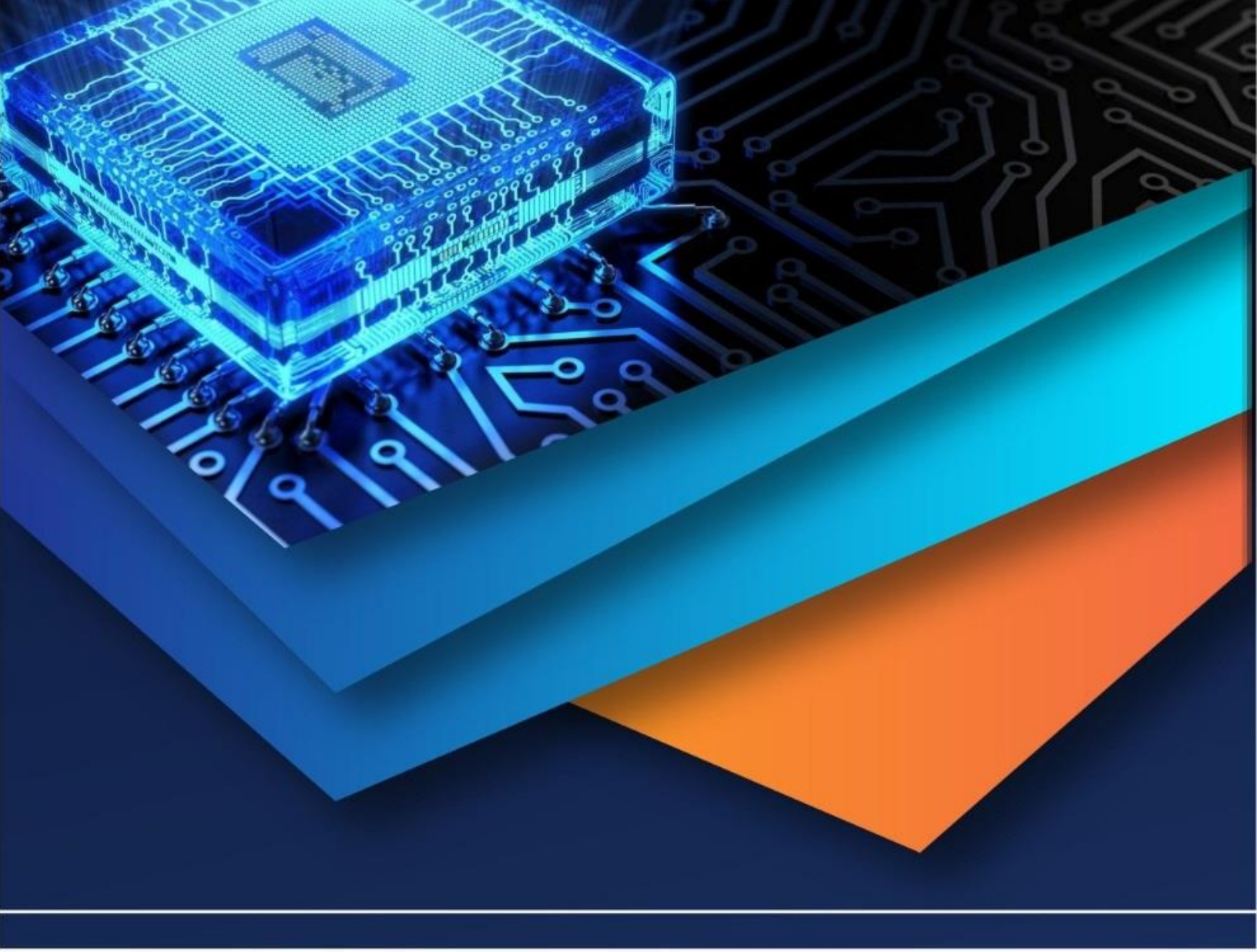
IV. CONCLUSION

The overall objective of the current work is development of prototype which is used by all the medical organizations and pharmaceutical agencies over the world to reduce wastage of medicine and medical errors in refrigerator. Computational Intelligence Technique is used for pattern detection and matching. Monitoring the expiry date of the medicines, maintaining the constant temperature inside the refrigerator for avoiding medical waste. Providing security using Biometric authentication with magnetic door. The future work is to develop a new authentication algorithm for biometric and cloud storage technique and to improve high security measures for smart medical refrigerator and hence it provide a better framework for development of neural network algorithm for the medical system. This integrated IoT based smart environment empowers each and every individual to follow the basic healthcare principle "THE RIGHT CARE FOR THE RIGHT PERSON AT THE RIGHT TIME", which leads to better outcome and improvement in fulfilment and thus making healthcare cost-effective.

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