IoT Based Smart Hospital Management System

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ABSTRACT:

The Hospital management system with patient health monitoring using RFID tags & multiple sensors aims at building a better means of storing and retrieving patient data. RFID technology helps us to monitor the status of the patient by tracking all the health services given to patients. RFID systems are used for hospital information system and it provide full information about patient identification, token number and medicines. In this paper we proposed electronic wifi controller based IoT hospital management system. This project uses the hardware kit to get the patient id and patient health history. It will send the patient id & other details to the web server system. The patient details can accessed by the doctor via python base web system, Specific ID used for logging into doctor's account. The doctor can view and update patient's medical records and prescriptions. It mainly deals to monitor the health status of a human body like Heart Beats, Blood oxygen level and Temperature. It's aims at standardizing data, consolidating data ensuring data integrity and reducing inconsistencies.

Keywords: Healthcare, Hospital management system, wifi-controller, Sensors, IoT.

I. INTRODUCTION

A Health Monitoring System (HMS) is a sophisticated technology and an alternative to the traditional management of patients and their health. It consists of a wifi controller device like a ESP32 with sensors that are paired with an application for a doctor to access the medical information. Patient is one of the most important entities in the hospital environment because most of the data revolves around the patient such as admission, status, treatment, follow-up, medication and testing. We have identified the key entities in the smart hospital system and develop the database model by integrating RFID technology & python base web server.

Smart RFID card system is very secured process to start and access the data and works as secure data exchange. This smart RFID card data technology is a privacy protection mechanism in handling the personal health information and sensitive information of patients. It is not an interface to provide display & web page, so smart card readers are used to read the data from particular ID only.

RFID tag has unique ID number which helps to maintain the database for each patient name, medical records, and recent treatment and for test reports etc., to help this system patients get their treatment quickly by their doctors. Multiple departments & Emergency room is allocated for emergency patients by using this RFID card system.

Many hospitals does not have smart RFID card technology so they have many problems, paper work is very heavy for that hospital management. So this smart card avoids the usage of paper work.

II. NEED OF DEVELOPMENT

1. Better patient identification: smart card has good security processing in the verifying patient identification details it creates digital signature. So no one can hack the smart card details.

2. Administrative efficiencies: it creates good communication by admitting the patient with the up-to-date information of patient with

smart card so there is no time wasting.

3. Better medical records: using smart it is efficient and accurate process to maintain patient medical records.

4. Quality of care: it gives quality of caring.

5. Reduces health cost: it reduces health care cost.

III. PROPOSED BLOCK DESIGN

Fig. i Block Diagram of Smart Hospital Management System

IV.COMPONENTS

A. MAX30100 Pulse Oximeter Sensor

Fig. ii Oximeter Sensor

MAX30100/102 Pulse Oximeter sensor is integrated with Pulse Oximetry and Heart

B. RFID-RC522

Here we have images of the card and the key ring, as well as the RFID antenna. An important detail is that its Interface is SPI.

Fig. iv RFID tags and card

Check Patient registration & department, if new add manually with help of Hardware – RC522 RFID module with esp32 controller (with inbuilt Wi-Fi). Any Doctor or user can see Any patient history using user ID.

Rate monitor sensor solutions. It operates with 1.8V to 3.3V power supply. Also, it can be powered down using software with negligible standby current, allowing the power supply to be connected all the time. The sensor combines two LEDs, a photo-detector, optimized optics, and low-noise-analog signal processing to detect pulse and heart-rate signals.

C.LM35 Temperature Sensor:
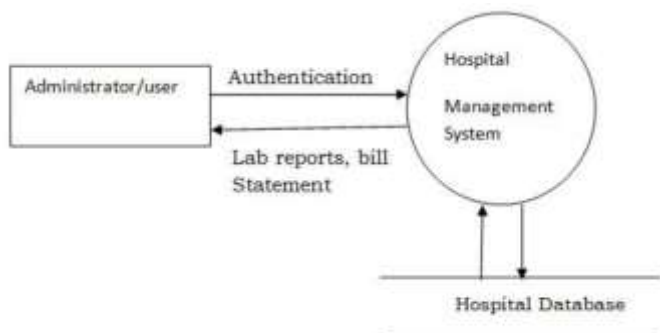

Fig. iii Temperature Sensor

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range.

V.SYSTEM FLOW

1.Reception:

we add Patient Name, Patient ID, Patient's Oxygen, heartbeat, BP, diabetes, and dept of the patient. This all data will be added by the receptionist at the reception and when patient enters the doctor's room, doctor will see all the data added by the receptionist.

2.Notification:

When Patient get access using Tag respective doctor get notification using Buzzer.

3.Health monitoring:

Check Heartbeat, SO2 & Temperature using sensors & store respective data to web against RFID. Hardware- LM35 Temperature Sensor, MAX30100 Heartbeat & Blood oxygen sensor.

4. Admin Doctor's review:

Doctor can see pervious history of patient & also add prescription & web page directly.

The doctor can edit this data after checking to the patient.

By using "HEALTH MONITARING SYSTEM" doctor check to the patient and he can add medicine into the patient's database.

In that web page, there is one block is there namely prescription where doctor can write medicine related to that patient.

Doctor can see patient's last visited date, and lastly give medicine to the patient that is Doctor can see patient's all history only using that small card.

VI. SOFTWARE DESIGN

The proposed system is divided into Receptionist's module, Doctor's module and Pharmacist's module.
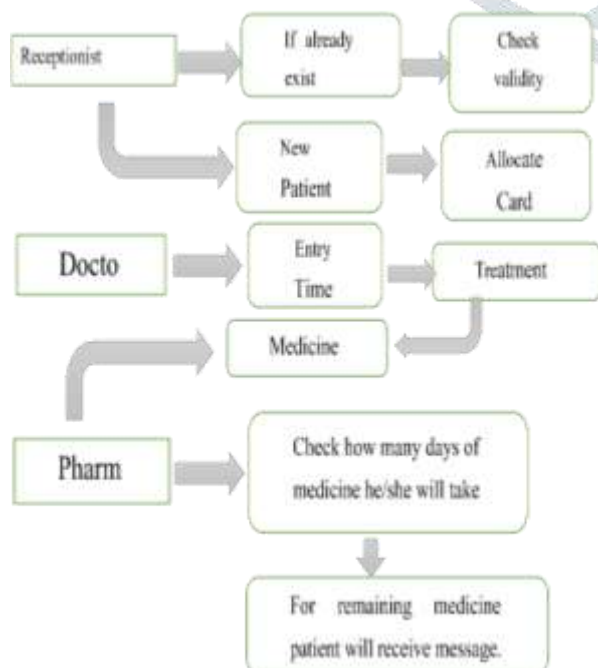
Receptionist Module:

CREATE DATA ACCOUNT -A Patient ID is assigned for new patients o VERIFY USER – For an existing patient, "Patient ID"is verified to check for the validity of the account PRG (Payment Receipt Generator) – this assigns a receipt from the voucher generated by the doctor.

Search Engine: To search for the patient's data (both payment records and also account authenticity)

Inbox: an advanced feature that will manage messages received from the medical superintendent.

Doctor's Module:

CREATE DATA ACCOUNT (For new patients, a "Unique No" is assigned for medical records on behalf of the patient.

VERIFY USER: Verifying "Registration No" is assigned to the patient if coming as an existing patient in the hospital. Just as to check for the validity of the account)

Fig. vi Flowchart

VII. SCOPE OF THE PROJECT

This application will help user to access and view all his reports from anywhere online. An element of bias might have crept in from the side of the official interviewed. This could also have resulted in some kind of modification of the information divulged. Through an attempt was to collect information from the best possible source in the company, it was difficult to meet the top officials due to their busy schedules. Most of the analysis and interpretations, made for this report, are based on secondary data obtained. This data could have some inherent mistakes and errors. Finally, although due care has been taken those can be typing and compilation errors in the report itself.

The tasks specified were not well defined because nothing was mentioned regarding validations in the project. Though we gave maximum effort to check the software with different validation tests, a few of

them might be present in this version.

- Due to limited time available survey could not be undertaken for intended 20 consumers and thus had to be limited to 10.

- Communication gaps exist between employees and management, as seniors don't share problem with subordinates resulting in violation of psychological contract.
- Poor rewarding system(slow)
- Poor working conditions

The limitations may be many and the magnitude of the influence of these limiting factors may have a bearing on the report, but it in no way alters the ultimate aim of the project and because it's highly USER FRIENDLY, it would be the choice of all kinds of personnel.
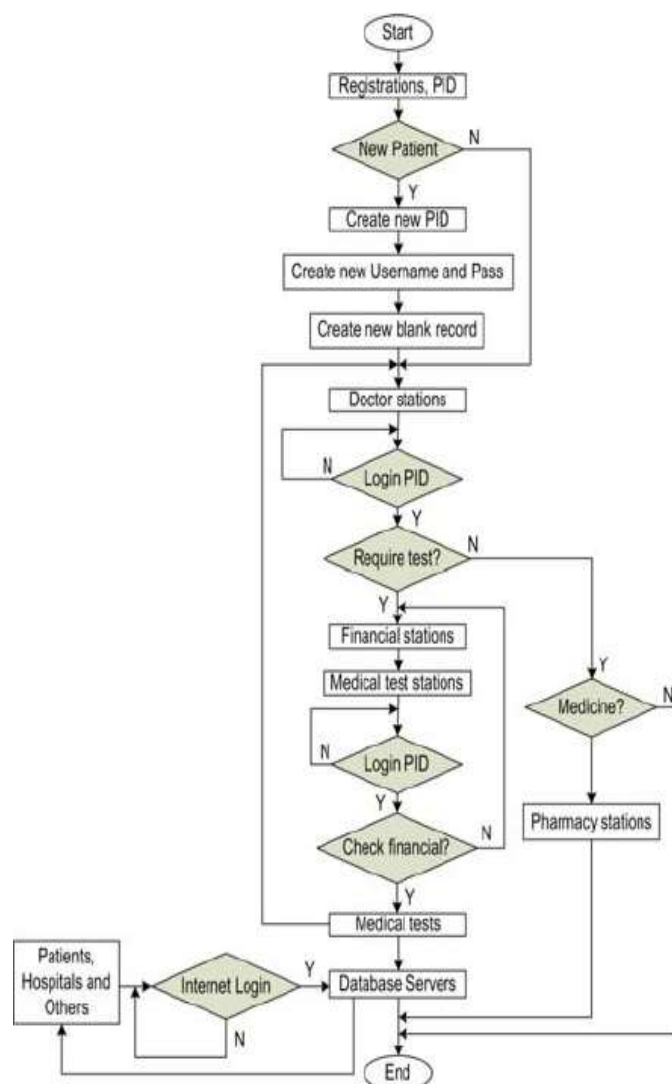
VIII. System Development Life Cycle:

System life cycle is an organizational process of developing and maintaining systems. It helps in establishing a system project plan, because it gives overall

list of processes and sub-processes required for developing a system.
System development life cycle means combination of various activities. In other words we can say that various activities put together are referred as system development life cycle. In the System Analysis and Design terminology, the system development life cycle means software development life cycle.

IX. NEED

This paper designed the given proposed system in the JSP to automate the process of day to day activities of Hospital like Room activities, Admission of New Patient, Discharge of Patient, Assign a Doctor, and finally compute the bill etc., online facilities to the multiple users etc.

a) The complete set of rules & procedures related to Hospital's day to day activities and generating report is called "Hospital Management System". This project gives a brief idea regarding automated Hospital activities.
b) The following steps that give the detailed

information of the need of proposed system are:
Performance: During past several decades, the hospital management system is supposed to maintain manual handling of all the hospital daily activities. The manual handling of the record is time consuming and highly prone to error. To improve the performance of the hospital management system, the computerized hospital management system is to be undertaken. The computerized hospital project is fully computerized and user friendly even that any of the hospital's members

can see the patient's report and the doctor's report.
Efficiency: The basic need of the project is efficiency. The project should be efficient so that whenever a new patient is admitted, and Automatically a bed is assigned and also a doctor is assigned to the patient according to the patient's disease. And if any patient is getting discharged, the bed assigned to him/her should automatically free in the computer.
Control: The complete control of the project is under the hands of authorized person who has the password to access

Fig vii Showing General Life Cycle Process And Percentage Of Time Devoted

this project and illegal access is not supposed to deal with. All the control is under the administrator and the other members have the rights to just see the records not to change any transaction or entry.
Security: Security is the main criteria for the proposed system. Since illegal access may corrupt the database and it will affect not only the hospital but also it also affects the patient's life. So security has to be given in this project.

X. CONCLUSION

Since the Hospital Management System is essential for maintaining detail about the Doctor, Patient, Hospital staff etc. we understand that by using of Hospital Management System project the work

became very easy and we save lot of time. Hospital administrators would be able to significantly improve the operational control and thus streamline operations. This would enable to improve the response time to the demands of patient care because it automates the process of collecting, collating and retrieving patient information. Accounting sometimes becomes awfully pathetic and complex. This product will eliminate any such complexity.

X. REFERENCES

[1]. Olusanya Olamide.O,Elegbede Adedayo. W And Gunseye Abiodun. A, Design And Mplementation Of Hospital Management System Using Java[Internet].April 2015[Cited 2015 March 02];32-36.Available From: Http://Iosrjournals.Org/IosrJmca/Papers/Vol2-Issue1/F0213236.Pdf

[2]. Dr. M. H. B. Ariyaratne, A Private Hospital Management System .[Internet].September 2010;33-37.Availabale From: Http://Webcache.Googleusercontent.Com/Search?Q=Cache:Sagwbvzxifwj:Sljbmi.Sljol.Info/Article/10.4038/Sljbmi.V1i0.3551/Galley/2987/Download/+&Cd=1&Hl=En&Ct=Clnk&Gl=In&Client=Firefox-B

[3]. Adebisi O.A, Oladosud.A,Busari O.A And Oyewola, Design And Implementation Of Hospital
[4]. Management System.[Internet].July 2015;Available From:Http://Www.Ijeit.Com/Vol%205/Issue%201/Ijeit1412201507_06.Pdf

[5]. Premkumar Balaraman, Kalpana Kosalram, E–Hospital Management & Hospital Information Systems –Changing Trends[Internet].May 2013,50-58.Availabale From:

[6]. Http://Www.Mecs-Press.Org/Ijieeb/Ijieeb-V5-N1/Ijieeb-V5-N1-6.Pdf
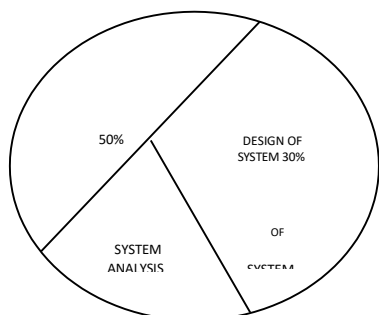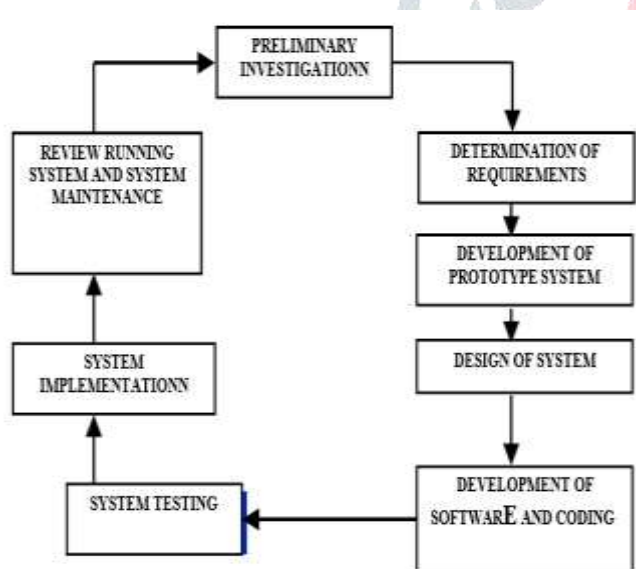
[7]. Gunjan Yadav, Parth Lad, Parul Pandey,Tejaswi Kolla, Advanced Hospital Database Management System,[Internet]April 2016;Available From: Http://Www.Ijarcce.Com/Upload/2016/April-16/Ijarcce%2056.Pdf

[8]. D. Nguyen, Md, Phd1,, Hai D.V,John G. Webster,Amit J. Nimunkar, A Web-Based Electronic Medicalrecords And Hospital Information System For Developing Countries[Inter Net]March 2011,Available From: Http://Webcache.Googleusercontent.Com/Search? Q=Cache:Imhbjjfqhcqj:Www.Jhidc.Org/Index.Php /Jhidc/Article/Download/58/9 3+&Cd=2&Hl=En&Ct=Clnk&Gl=In

[9]. Asabe, S. A,Hospital Patient Database Management System[Internet],March 2013,Available From:

[10]. Pedro Luiz Côrtes; Eliana Golfette De Paula Côrtes , Hospital Information Systems: A Study Of Electronic Patient Records,[Internet]Sep 2011,Availabale From: Http://Www.Scielo.Br/Scielo.Php?Script=Sci_Artt ext&Pid=S1807- 17752011000100008

[11]. Jahidul Hasan, Integrated Hospital Information System (His) Special Focus On Birdem Hospital,[Internet]June 2013.Http://File.Scirp.Org/Pdf/Etsn_20130628154 20238.Pdf [12]. Nidhi Kushwaha, Shashank Sahu, P. Ahmed, Gathering Requirements For Hospital Management System Using Intelligent Agents .[Internet],March 2012.Availabale From: Http://Www.Ijeit.Com/Vol%201/Issue%203/Ijeit1 412201203_54.Pdf

[13]. Ravinder Kaur, Information Retrieval System For Hospital Management,[Internet],March 2015.Available From: Http://Ijmc.Rtmonline.In/Vol2iss4/0430117.Pdf

[14]. Mohammed Thabit Abd Alameer, Electronic Patient Record Management System,[Internet]May 2013.Available From: Http://Www.Iasj.Net/Iasj?Func=Fulltext&Aid=791 62. [15]. Rr. Tutik Sri Hariyati,Mera Kartika Delimayanti And T. Widyatuti, Developing Prototyotype Of The Nursing Management Information System In Puskesmas And Hospital,[Internet],September 2011,Available From: Http://Www.Academicjournals.Org/Journal/Ajbm/ Article-Full-Text-Pdf/C3f361819965

[16]. Eric W. Fleegler, Referral System Collaboration Between Public Health And Medical Systems: A Population Health Case Report,[Internet]May 2016,Availabale From: Https://Nam.Edu/Wp-Content/Uploads/2016/05/Referral-System-CollaborationBetween-Public-Health-And-Medical-Systems-A-Population-Health-Case-Report.Pdf

[17]. Esmaeil Mehraeen,Evaluation Of Hospital Information Systems In Selected Hospitals Of Iran,[Internet],October 2014,AvailableFrom:Http://Airccse.Org/Journal/Ija it/Papers/4514ijait01.Pdf