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SMART ICU USING IOT

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Abstract - *Intensive Care Unit or ICU is where the patients who are critically ill are admitted for treatment. For such critical conditions the Doctors need to have an all-time update patient's health related parameters like their blood pressure, heart pulse and temperature, feet detection, oxygen level. To do manually, this is too tedious a task and also for multiple patients it becomes close to impossible. For this type of situations this IOT based system can bring about an automation that can keep the Doctors updated all time over internet. IOT Based ICU Patient Monitoring System is IOT based system which collects patient's information with the help of few sensors. It uses module to communicate this information to the internet. There is admin can add ICU supervisor and doctor. The ICU supervisor can add patient and assign kit and specific doctor for patient and stay update of that patient. The ICU supervisor can only view the current sensor value of patient who admitted in ICU. The Doctor can view Patient with their profile and all medical history. Sensor can sense and get statistics graph according to age group and disease wise which is show by doctor. According to statistic graph the doctor can predict the health of patient based on sensor value and history*

***Key Words*: ICU, IOT, PATIENT HEALTH, DOCTOR**

1. INTRODUCTION

Information and Communication Technologies solutions for modern healthcare systems continuously grow worldwide. Recent years have seen a rising interest in wearable sensors and today several devices are commercially available for personal health care, fitness, and activity awareness. In addition to current smart medical devices, researchers have also considered applications of such technologies in clinical applications in remote health monitoring systems for long term recording, management and clinical access to patient's physiological information. Based on current technological trends, one can readily imagine a time in the near future when your routine physical examination is preceded by a two–three day period of continuous physiological monitoring using inexpensive wearable sensors. The work developed in this paper focuses on the study and the development of an intelligent patient monitoring system in medical environment. Indeed, one of the specialized sections of a hospital that are Intensive Care Units (ICU) are of great importance because of the seriousness of the health status of patients staying and therefore need special attention. Due to the severity of patients treated in the intensive care units, these units are commonly equipped by a variety medical-equipment that is handled a multidisciplinary medical team in order to monitor ICU's patients in real time. In addition, we find, nursing staff, the monitoring and life support devices necessary to provide continuous care to patients that are severely ill and medically unstable. The latter receive special care and are monitored in real time by the medical team through a breathing assistance system and the decision-making support that is, for instance the ECG. To help the patient to stay alive, a partial or total ventilator support is mandatory depending on the severity of the condition in which the patient is located. It appears of course that, the respiratory support justifies a significant monitoring system in ICUs that is very particular and intricate. Faced with these requirements, the limits of the performance of these systems are obvious. The shortcomings of the current patients monitoring system in ICU are well established. They were the subject of a thorough study well supplied in the state of the art. Among many limitations, we have a very alarmist monitoring system with a significant rate of false alarms that hinder the tranquility of the patient. In order to attempt answer those identified issues, a review will be performed on the importance of smart and connected health care using Internet of Things

2.1 FUNCTIONAL REQUIREMENT:

The health monitoring sensors are used to collect health related data i.e. for sensor value data acquisition. Communication can be done by controller for sending data on internet wirelessly. Data processing has been done at server. All data collected and aggregated at server point. To get ICU patient health related information in sensor value format it can be shown on MSG i.e. data management. The results collected from sensor are analyzed i.e. if abnormal behavior has been detected , then emergency plan activated to inform the Doctor about ICU patient's health .So it reduces critical conditions in Hospital.

The objective of this project is to monitor and improve the quality of care of people in remote location and to provide continuous information about the patient for making better healthcare decisions in critical situation and to reduce the emergency checkup of the ICU's patients. It helps the doctor to monitor their patients at any time apart from their consulting hours. It improves patient care and safety by reduction in overall costs for care.

2.2 Communication interface:

This project supports all types of patient admitted in ICU. Based on an IoT solution called patient health prediction, this paper proposed the health monitoring and give immediate treatment to patient according to sensors current value rate.

2.3 NONFUNCTIONAL REQUIREMENTS:

2.3.1 Performance Requirements:

In this paper, the sensing devices from the patient are connected to the ARUDINO and programmed to convert the sensed data from the patient to readable signals and then Heart rate is a very vital health parameter that directly related to the Patient cardiovascular system. This project describes a technique of measuring the health rate of patient through a fingertip using a Arduino Board. This fluctuation of sensors value can be detected through an optical sensing mechanism placed around the patients. The signal can be amplified further for the Arduino Board to count the rate of fluctuation, which is calculate the health rate of patient.

2.3.2 Safety Requirements:

Health of the patients are monitored using internet o things (IoT) and enables the doctor to monitor their patients outside the clinic and also apart their consulting hours. Connected health care devices utilize resources to provide an improved quality of care, leading to better clinical outcomes. Measureable benefits of connected medical devices include reduces clinic visits, including reduction in bed days of care and length o stays in hospitals. Using Internet of Things (IoT), patient conditions are obtained and stored for further analysis. In this project the heart rate and blood pressure o patient are monitored.

2.3.3 Software Quality Attributes:

From this work it is expected to monitor the whole body of the patient from remote location and improve the technology to world widely for patient monitoring by providing personalized and optimized services, it will promote a better standard of living. Nations across the world to improve patient care and IoT provides a timely and cost-effective response to those critical situations. Healthy and active people can also benefit from IoT-driven monitoring of their well-being, It also enables features for the aged persons who want only a monitoring device that can detect a fall or other interruption in every day activity and report it to emergency responders or family members.

3. SYSTEM REQUIREMENTS:

3.1 Hardware:

- Arduino
- Temperature Sensor
- Vibration Sensor
- Pulse Sensor
- SP02 MAX 30100 Sensor
- ECG sensor AD 8232 module

3.2 Software:

Technology: Java

Domain: IOT, Machine Learning

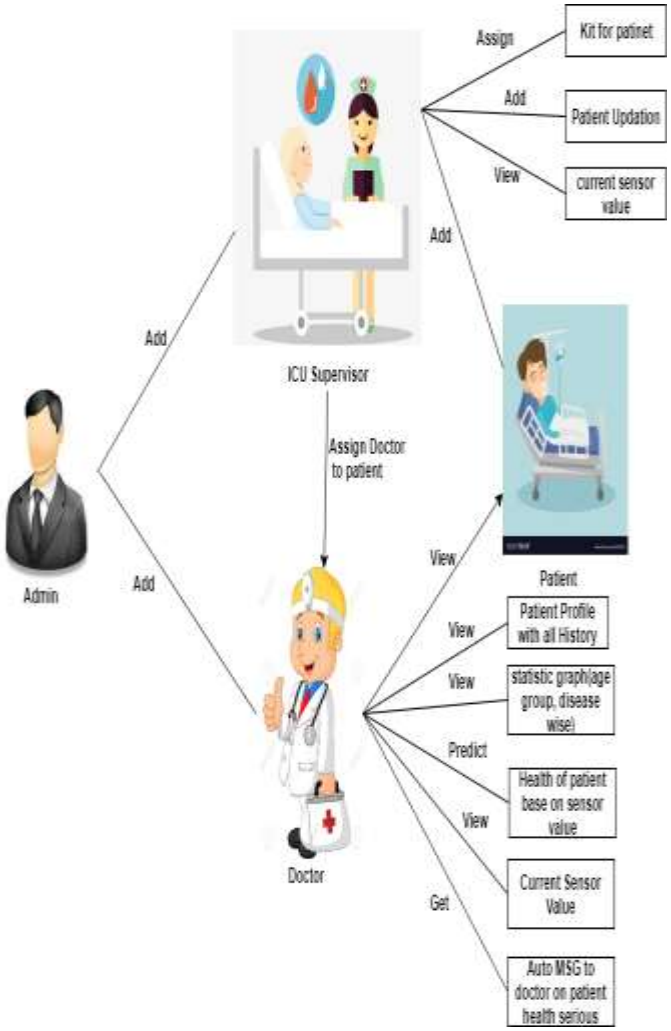
Front End: HTML, CSS

Back End: MYSQL

4.1 SYSTEM ARCHITECTURE:

In this paper connotation of smart ICU system is analyzed. And based on the introduction of existing system architectures of IOT, combined with the characteristics of hospital ICU scene, the system architecture composed of sensing, network layer and application layer in smart ICU is also discussed in detail. Then, from the aspects of compilation of information specifications and standards, construction of the unified network platform and embedded mobile electronic ICU patient records application platform, the key technology and content in the construction of smart ICU is sufficiently studied. Application scheme of smart ICU is given, providing meaningful reference for the overall implementation and extension.

In this proposed system;



Admin:

In the proposed system admin can add ICU supervisor and add doctor for patient treatment.

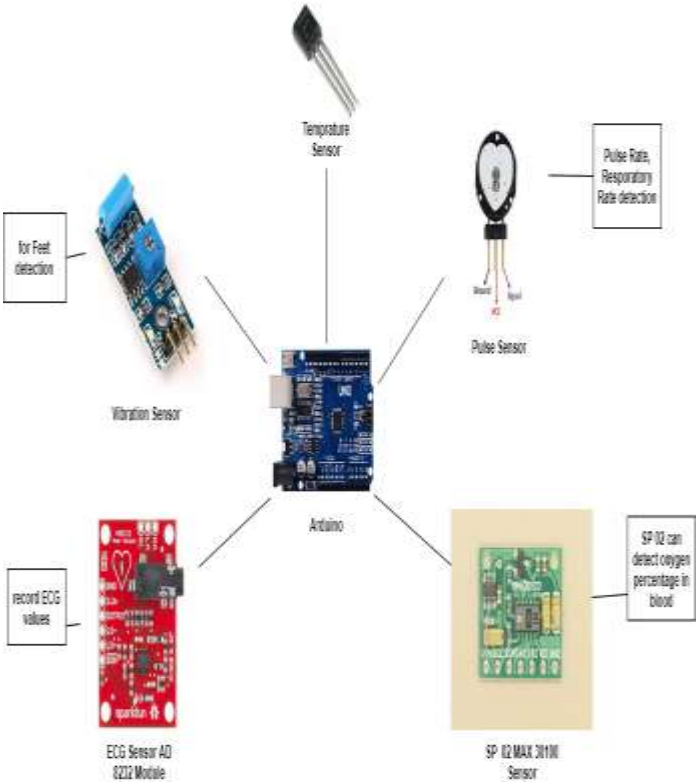
ICU supervisor:

The supervisor can add the patient in ICU section and assign a kit and specific doctor for him to give proper attention and treatment of ICU patient. Supervisor can do any update of patient record who already added by him in ICU section and get treatment from assigned doctor from supervisor. There are various sensors are built in ICU section, that sensor can change their value according to the ICU section and patient condition. That all record of patient with current records are viewed and monitored by the ICU supervisor.

Doctor:

ICU supervisor can assign doctor for a patient who admitted in ICU section. That doctor can view patient with their profile and all previous medical history. According the patient age group and disease wise statistic graph will be created that is view by doctor. Doctor also can predict the health of patient based on the updated sensor value and current value. This current sensor values also view by both ICU supervisor and patient's assigned doctor. If assigned doctor is not near to patient then also he continuously watch on ICU patient health according to the sensor value. Doctor can get auto MSG if patient health get serious or patient's critical condition.

4.2 Block diagram:



Conclusion:

In this paper, we highlight the opportunities and challenges for IOT in realizing this vision of the future of health care. Indeed, the intensive care unit is a great example whose need for smart system becoming unavoidable. In this paper, we succinctly reviewed the current state and projected future directions for integration of intelligent remote health monitoring in patient admitted in ICU technologies into the clinical practice of medicine. In this sense, we proposed a smart and pervasive ICU using an architecture based on wireless sensors Based-IOT for Improving Intensive medical care. This hybrid architecture of wireless technology has the advantage of uniting in a platform for converged data transmission services for the efficient transport of medical data. Noted that there are several benefits of Smart Process Applications can have for patient monitoring in ICU like:

1) Smart functions provide accurate, transparent data processes

2) Smart functions, collect, process and consolidate information and analyses, simplifying records and reporting processes and integrating all decision-making processes

3) Smart functions help optimizing patient monitoring system in ICU, thereby increasing medical care quality and reducing costs.

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