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Better & Smart Healthcare System for Comatose Patients using Arduino Uno

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Abstract - *Today is the era of digitalization and technology, as we all know. Digitalization and technology have developed and strengthened their grasp on practically every aspect in today's world. The medical profession is where technology has made the most impact. As a result, the medical industry has advanced significantly. Today, as we all know, whether it's a bank transaction or the ability to buy groceries from the comfort of one's own home, a human being's largest problem may be handled in a matter of seconds on his phone or computer screen. Similarly, nothing is more essential to a doctor than his patient, especially when he is working for him 24 hours a day. This document is intended for patients who are comatose. The daily state of comatose patients will be documented and shared with doctors and their family members in this study using various types of sensors, processing devices, and storage units.*

***Key Words*: — Smart healthcare, telemedicine, Body sensor, Remote monitoring, Comatose Patients, Internet of Things.**

1.INTRODUCTION

There has been a boom in digital innovation activity in recent years. This is the time for radical digital health innovation. In this study, we demonstrate how doctors and patients' families may monitor the activity of comatose patients digitally utilizing smartphones. Family members may experience anguish, nervousness, physical and emotional exhaustion, and irritation as a result of their loved one's risky position and unknown diagnosis.

Unfortunately, restricting visitors to intensive care units is still necessary since patients must be protected from infection and stress. Furthermore, staff space and privacy must be considered secure, allowing them to focus on the needs of patients on an hourly basis for the reasons stated earlier, relying exclusively on a bedside monitor to detect physiological circumstances of comatose.

For starters, bedside monitor data can only be seen from a short distance away; observers must be present on the same site of the system where family members have limited access. Second, even though the data display is perceptible, the data are difficult for ordinary people to understand; special knowledge is required to completely comprehend the data displayed on the bedside monitor. Aside from that, many hospitals have rules that prohibit family members from being in the ICU all of the time. As a result, a system that allows family members to view the patient's physiological state in a more accessible format and receive notifications is needed. When an aberrant state is recognized, there is no requirement for time or space constraints. This report describes the development of a smart health monitoring system for family members of comatose patients in intensive care units. As a result, doctors and family members can see the patient's current status on their mobile and computer screens at all times and determine the patient's condition. If the patient's condition worsens or worsens, the doctor can use telemedicine to administer medication on time based on his condition.

The report on the patient's and doctor's prescriptions will be saved on the server or in the cloud for future reference. According to their approved access, both the doctor and family members can view this report.

2. LITERATURE & RELATED WORK

The integration of digital technology with health, health, life, and society in order to increase healthcare efficiency is known as digital health. Provide and improve medicine personalization and accuracy. The field entails the use of information and communication technologies (ICTs) to address health concerns and challenges confronting those under supervision. These technologies encompass both hardware and software solutions and services, such as telemedicine, Web-based analysis, mail, mobile phones applications, and text messaging, clinical and remote sensors. In general, digital health is concerned with the

development of interconnected health systems in order to improve the use of computational technologies, smart devices, computational analysis techniques, and communication media to assist healthcare professionals and their clients in managing illnesses and health risks, as well as promoting health and wellbeing.

3. RELATED WORK

In the medical field, several articles and research papers on technology have been provided. Many research studies claim that health monitoring systems have advanced rapidly over the last two decades and have the potential to transform the way health care is currently delivered. Although smart health monitoring systems automate patient monitoring duties and hence improve patient work flow management, their effectiveness in clinical settings remains questionable. The primary goal is to examine current state-of-the-art monitoring systems.

Aside from that, numerous such paper presentations in this subject have brought a new perspective to the concept of SMART HEALTH. In today's world, prompt patient treatment is more crucial than ever. This study was written with comatose patients in mind. Many recent technologies, such as cloud storage and the Internet of Things, are also utilized in this article. I hope that this paper will be useful to COMATOSE sufferers both now and in the future. Further sections provide a detailed description of the components employed in this system.

4. SURVEY REPORT

According to some surveys, 2.4 million Indians die each year from treatable diseases. Poor care quality kills more people than a lack of access to healthcare—1.6 million Indians died in 2016 as a result of poor care quality, roughly twice as many as perished as a result of a lack of access to healthcare (838,000 persons). According to the study, nearly 122 Indians per 100,000 die due to poor care quality each year, making India's death rate due to poor care quality worse than that of Brazil (74), Russia (91), China (46) and South Africa (93) and even its neighbors Pakistan (119), Nepal (93), Bangladesh (57), and Sri Lanka (51).

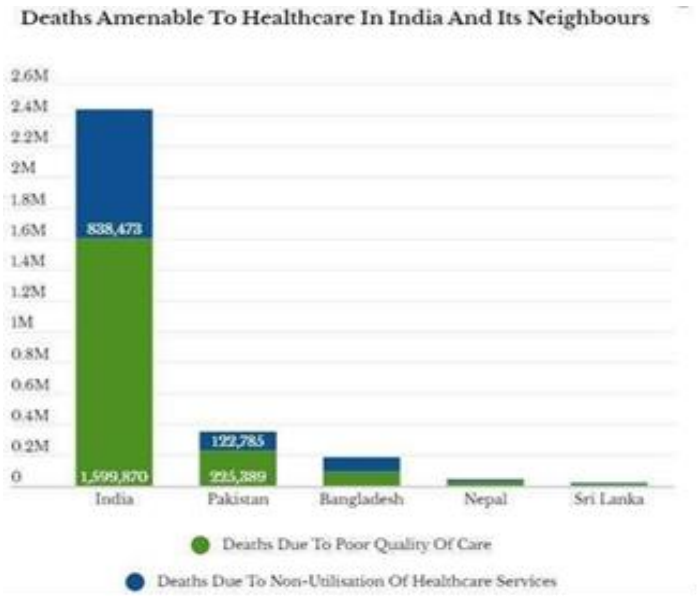

Fig.1 Poor quality care and non-utilization of health care services data chart.

According to the Lancet Global Health Commission on High Quality Health Systems, approximately 8.6 million deaths occur each year in low or middle-income countries due to conditions that can be treated by healthcare, of which 5 million are caused by poor quality and 3.6 million are caused by poor access to care. According to the medical publication "The Lancet," on September 6, 2018. The source is The Lancet.

According to a survey report, 405 (58 percent) of patients died on day 3 (1 to 10) following ICU admission, and at night or on weekends. At the time of death, 586 (84%) of the patients had one or more organ failures, as indicated by a specific SOFA sub score greater than or equal to 3. Hemodynamic (405 [58%]), respiratory (216[31%]), renal (230 [33%]), neurologic (209[30%]), hepatic (56 [8%]), and hematologic organ failures were among those reported (56 [8%]). At the time of death, 621 (89%) patients required at least one organ support, including catecholamine infusion (440 [63%]), mechanical breathing (593[85%]), renal replacement treatment (195 [28%]), and extracorporeal liver support (2 [1%]). The failure to

diagnose and treat ICU patients at the appropriate time is a unique cause of death. As a result, the fatality rate of COMATOSE patients in India is rising.

4. PURPOSE

The primary goal of this study is to deliver suitable treatment to patients at the proper moment. In this study, an attempt is made to modernize the health- care system through the use of various types of technology.

5. PROTOTYPE & DESCRIPTION

This section offers a full description of the prototype that will be implemented in healthcare to provide faster, better, and more accurate services. The prototype is depicted in the block diagram below:

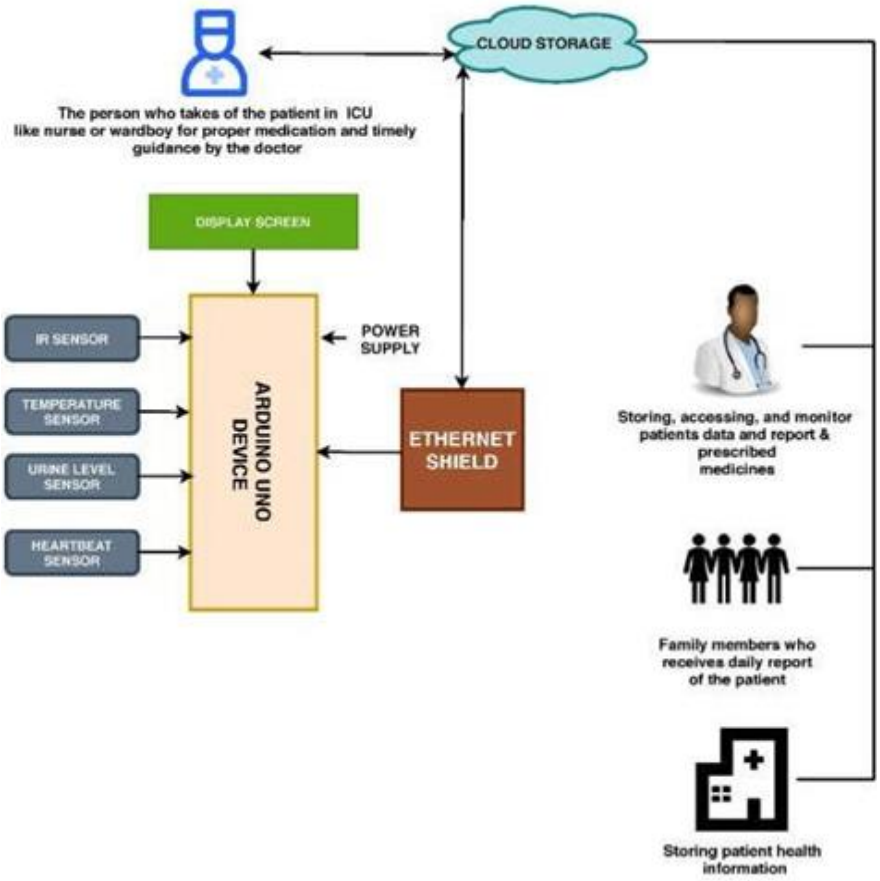

Fig.2 Better and Smart healthcare system Prototype

In proposed model many sensors, processing device, display units and storage technology is used. A technology stack related to this is described in detail in below paragraph:

- The basic concept of an **Infrared Sensor** which is used as Obstacle detector is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the wave is received at the infrared receiver. This sensor connects to the Arduino Uno device and sends reading to the respective processing device.
- Human body temperature is also playing a vital role to maintain a co-ordination with all other metabolism. So, to track body temperature sensor.
- Heartbeat sensor is deployed to keep an eye on the heartbeat, blood pressure and sends reading to the Arduino Uno device continuously.

- Urine level is measured by deploying a urine sensor.
- The Ethernet shield allows the Arduino Uno to transfer data to the cloud, where it may be accessed by doctors, family members, and caregivers at their leisure.
- The Arduino Uno gadget is critical in the processing of data obtained from numerous types of sensors attached to the patient's body.
- A display unit is also attached to the Arduino Uno device whose purpose is to give the alert message to the care taker of the patient.

6. WORKING

This model makes use of a variety of sensors. We can detect activity in the human body with the help of these sensors. Depending on their function, these sensors send various types of readings to the Arduino Uno gadget. After conducting some processes, the Arduino Uno microcontroller displays them in alert form on its associated display unit and transfers them to a server or cloud storage using an Ethernet shield. The data recorded on cloud storage can only be accessed by the doctor, a family member, and the individual who is being cared for in the ICU. The doctor administers medicine via telemedicine technology based on the patient's condition.

7. CONCLUSION

To summarize, the system developed in this study can accurately monitor physiological characteristics of patients such as body temperature, heartbeat, blood pressure, and urine level and convey this information to the doctor and the patient's family. When an abnormal circumstance is detected, the system can also issue a notification. Overall, this strategy helps us improve the conditions of ICU patients, therefore saving their lives, and it also helps physicians observe the situations of comatose patients. However, further advancements in this field are required, such as security, accuracy, and a variety of other factors.

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