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Analysis on Available Health Monitoring Systems

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ABSTRACT: Healthcare is a critical component in offering better medical services to patients as well as assisting doctors and hospitals. In general, the patient in a critical case is admitted to the hospital, and treatment begins with the placement of various sensors on the body to measure ECG and PPG in order to diagnose the reaction. This sensor, embedded system is a cardiogram system with a wired connection. The patient's mobility is limited. During the course of treatment, the doctor may or may not be present in the hospital. Various approaches, such as GSM, Arduino Uno, Microcontroller, Li-Fi network, and others, have been employed for patient health monitoring systems in recent years.

KEYWORDS: Healthcare, GSM, Arduino Uno, Microcontroller, Li-Fi network.

I. INTRODUCTION

Medical practitioners can perform real-time monitoring, early diagnosis, and treatment for potential health hazards using the modern healthcare system. As wireless communication technology progresses, medical telemetry systems, often known as telemedicine, are fast growing. Commercial goods and research prototypes for remote health monitoring have made significant progress recently. For patient consultations and medical diagnosis, these improvements rely on wired/wireless communication networks. Modern healthcare is used to provide more efficient physician use, lower the cost of hospital stays, lower the skill level and frequency of home-care professional visits, lower hospital readmission rates, and promote health education at all levels. [8].

A doctor or other paramedical staff frequently performs this task in hospitals where a patient's status must be regularly monitored. Due to a scarcity of qualified doctors in underdeveloped nations like India, it is difficult for a single doctor to supervise multiple patients at the same time.

As a result, the doctor may be clueless of the state of all of the patients in this situation. Even a minor delay in treatment in an emergency can risk the patient's life [6].

II. LITERATURE SURVEY

Several researchers have developed several forms of health monitoring systems in the last year. This section describes the many methods that were employed to create the system in the previous year. A real-time monitoring system was proposed by Salvatore Nadeo et al. [1]. The system is designed to provide patients with equipment that allows them to quickly monitor analyze and preserve their own vital signs utilizing wearable sensors and an Android device such as a smartphone or tablet, resulting in a time, human error, and cost-effective solution. Using several sensors, the suggested system can monitor a variety of health indices. On a mobile device, the physiological data is processed and evaluated locally. The analysis report and the original data are kept, can be seen at any time by the user, and are transmitted to the medical specialist. An Android device, which is simple to use and capable of capturing and storing data from wearable sensors, can be used by a patient to monitor his or her own vital signs. After the data is collected, the Android smartphone sends it to a remote Personal Health Record (PHR) server, which the doctor can access to keep track of the patient's health.

K. Spandana et al. [2] presented a system to automatically measure a person's heartbeat and transmit a message through GSM if the heartbeat is abnormally high or low. We can calculate the heartbeat rate by utilising a cardiac sensor. It has a high-powered LED and a low-power LDR for calculating heart rate and sending messages through GSM. The AT89C51(8051) microcontroller is being used in this project. The PORT-2 port was used to connect the LCD. This is done with an LCD that is 8 bits. As a result, eight data lines were utilised. P3.7 is used to control the register select, and P3.6 is used to control the enable. As a result, we can display any data we want on the LCD. The heart rate sensor and



temperature are used to monitor the patient's health and are attached to the appropriate port pins, while GSM is connected to the UART1 for transmitting messages in the event of an adverse condition. P0.1 corresponds to heartbeat, while P3.4 and P3.5 correspond to temperature.

ICU patient health monitoring system developed by Keertirani et al. [3]. With the help of bio-medical sensors, the system measures physical characteristics such as blood pressure (Systolic and Diastolic), heart beat pulse rate, body temperature of a human, and patient movement. The health of ICU patients is continuously monitored, and the same data is communicated to doctors and patient attendants via Bluetooth. The patient's position may also be observed on a display. The buzzer goes off if the patient has an irregularity, allowing the doctors to care to the patient right away. The system is both cost-effective and adaptable. System for monitoring patients in intensive care units.

Porselvi S. et al. [4] suggest a Li-Fi network application in the hospital for monitoring patient conditions such as temperature, pressure, heartbeat, glucose level, and breathing conditions with appropriate sensors. The collected data from the sensors is delivered to the sink, where it is processed by the microcontroller before being shown as graphs or charts on the display unit. A prototype model based on the notion of visible light communication was created and tested using a PIC microcontroller and basic sensors as peripherals. As a result, the use of Li-Fi as a health monitoring system was shown in an experimental setting.

Md. Manirul Islam et al. [5] offer a continuous non-invasive cuffless blood pressure measurement system with an alarm circuit for health care monitoring. Because light has no adverse effect on the human body when working in continuous mode, it is used in the sensor network component of this embedded system. The sensor network is also used to calculate pulse rate and determine body temperature in this system. The system's accuracy is determined by comparing the results to those of existing conventional systems. An alarming circuit can be activated if a patient's blood pressure, heart rate, or body temperature exceeds the standard range. The ATMEGA8L microcontroller is in charge of the entire system. The system as a whole is dependable, precise, portable, trustworthy, user-friendly, and cost-effective.

Deepesh K Rathore et al. [6] describe a wireless system that allows for real-time monitoring of several patients' health (s). Patient data, such as heart rate, must be regularly monitored in health care facilities. The suggested system keeps track of the patient's heart rate and other vital signs. A Photoplethysmograph, for example, is used to assess heart rate. A transmitting module is attached, which uses a Zigbee module to continuously send the encoded serial data. In the doctor's cabin, a receiver unit receives and decodes the data and continuously displays it on a PC/Laptop user interface. As a result, the doctor can keep track on multiple patients at the same time. The system also continuously analyses the patient(s) data, and if there are any potential anomalies in a patient's state, the system's alarm system sends out an audio-visual warning signal that the patient in that room requires immediate attention. If the doctor is not in his chamber, the system's GSM modem sends a message to all of the doctors in the unit, with the room number of the patient who need immediate attention.

This paper presents the development of a microcontroller based system for wireless heartbeat and temperature monitoring using RF module, as proposed by Ashish Ganesh Bajaj and Shaila P. Kharde [7]. In this paper, the development of a microcontroller based system for wireless heartbeat and temperature monitoring using RF module is presented. This study is based on remote patient monitoring after he is discharged from the hospital. I conceived and constructed a remote patient monitoring system that is both reliable and energy efficient. It has the ability to send patient parameters in real time. It allows clinicians to keep track of the patient's vital signs (temperature, heartbeat) in real time.

Table 1 Different Methods / Technologies used in the recent year

Journal	Title	Author	Method/Techology
SCITEPRESS – Science and Technology Publications, 2017	A Real-time m-Health Monitoring System: An Integrated Solution Combining the Use of Several Wearable Sensors and Mobile Devices	Salvatore Naddeo et al. [1]	Presented a physiological monitoring application designed for Android mobile devices.
International Journal of Advanced Engineering and Science, 2017	Automatic Wireless Health Monitoring System in Hospital for Patients	K. Spandana et al. [2]	Global System for Mobile Communication (GSM).



International Journal of Advance Research in Science and Engineering	Implementation of Patient Monitoring System Using Arduino Uno	Keertirani et al [3]	Arduino Uno
Innovare Journal of Engineering and Technology, 2017	Healthcare Monitoring Systems Using Li-Fi Networks	Porselvi S. rt al.	Li-Fi network and PIC microcontroller
International Conference on Electrical and Computer Engineering, 2012	Microcontroller Based Health Care Monitoring System Using Sensor Network	Md. Manirul Islam et al. [5]	Microcontroller ATMEGA8L
International Conference on Signal Processing and Communication (ICSC), 2013	Wireless Patient Health Monitoring System	D eepesh K Rathore et al. [6]	GSM modem and Zigbee module
International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, 2016	Patient Health Wireless Monitoring System	Ashish Ganesh Bajaj et al. [7]	AT89S52 Microcontroller
International Journal of Electrical, Electronics and Data Communication, 2014	Home Based Health Monitoring System Using Android Smartphone	SUSHAMA PAWAR et al. [9]	ANDROID SMARTPHONE
International Journal of Engineering Science and Computing, December 2016	Real Time Patient Health Monitoring and Alarming Wireless Sensor Network	SachchidanandJha et al. [10]	ARM microcontroller and wireless communication module (GSM)
2 nd International Conference on New Frontier of Engineering, Management, Social Science and Humanities, 2018	Patient health monitoring system using GSM	Ketan K. Lad et al [11]	Arduino Mega and GSM
International Journal of Science and Research, 2013	Patient Monitoring System	ChanakyaMothukuri et al. [12]	LPC2148 microcontrollers and GSM

III. CONCLUSION

Modern technologies have evolved, allowing for a more pleasant and disease-free life. Human life particularly that of the elderly depends on good health. Diseases have become more common in this generation than in previous generations, necessitating the need to priorities health. Heart attacks and other disorders are becoming more common these days, and real-time health monitoring is necessary to avoid them. In today's health-care system, patients must visit the hospital on a regular basis to learn about their health status, which is a difficult chore for patients to accomplish. This paper discusses various technologies that have been employed in the development of health monitoring systems in recent years.

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