



# Modern Healthcare System Using Line Follower Robot

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**Abstract:** This paper proposes new advancements in the patient monitoring. The healthcare scheme has focused the monitoring of various health parameters of patient's body like pulse and body temperature utilizes a web server where a doctor can ceaselessly screen the patient's condition on his cell phone utilizing the net. The doctor can see the data at whatever point required from any place and require not physically present if any of the sensors value achieves a basic abnormal value. At that point, the information is informed to the doctor utilizing Global System for Mobile Communications (GSM) put in the patient unit. The doctor can convey emergency medicine sent to the patient by a robot. A line follower robot is an electronic system that can detect and follow the path on the floor with Infrared sensor (IR) that introduced under the robot and give medicine to the patient with the assistance of a robot. Generally, a predefined way is indicated for the robot that can be either noticeable like a dark line on a white surface. An ultrasonic sensor additionally has been joined with the robot so a robot can distinguish any obstruction on their ways, if any hindrance in the way, the robot will beep until the point that the hindrance move from the way. This innovation concentrated on the conveyance of auspicious, productive, successful and even handed human services for ceaseless illness patients at remote areas.

**Keywords:** GSM, IR, web server, Ultrasonic sensor, Patient monitoring

## I. INTRODUCTION

Remote patient monitoring advancements that constantly screen their imperative status give extraordinary advantages to the patient at a disaster scene. We have outlined and built up a constant patient monitoring system that incorporates essential signs sensors and web-based interface innovation to permit remote observing of patient status. This framework might encourage doctors accessible for meeting from far off offices. The propelled innovations in remote systems administration, therapeutic sensors, and programming make energizing conceivable outcomes for enhancing the way we give crisis mind.

In recent years, remote patient monitoring systems have gained increased popularity. The patient monitoring advances can enhance restorative administrations by giving more reasonable, opportune, and open care to the patients.

The patient monitoring system can be used in rural areas where timely and proper healthcare access is limited and allow patients to have more frequent interaction with healthcare providers. Patient Monitoring System acquires

patient's biosignals and transmits them using the wireless network connection to the healthcare professional for the assessment of patient's condition. Remote patient monitoring of physiological measurements offers the potential to provide high-quality care to elderly, chronic people in their home environment while making effective use of healthcare resources.

The remote patient monitoring is an innovation to empower checking of patients, which may build access to care, and lessening human services conveyance costs. The utilization of the remote patient monitoring enhances a person's personal satisfaction. It enables patients to forestall confusions, keep up autonomy and limit individual expenses. So as to have the patient monitoring system, a correspondence arrange is exceptionally basic. The greater part of these frameworks is convenient and furthermore remote. Wi-Fi convention is the most generally utilized because of its low power utilization. Wi-Fi serves up for PAN and WLAN region systems with a normal range of 30 to 100 meters



Usually utilized wired observing frameworks influence persistent versatility and solace so the remote monitoring framework ought to be founded on compactable innovations that are effectively used to patients. The effective human services help the endless maladies and maturing populaces by keeping up the prosperity of individuals. The arrangement is remote patient monitoring frameworks on the Internet of Things (IoT) innovation. This paper portrays the utilization of IoT-based applications in the therapeutic field, changing sensor information into a web-based interface and conveys the solution to the patient. Wellbeing checking is assuming an imperative part of keeping up wellbeing for people since it can diminish hospitalization and expands the personal satisfaction.

Remote monitoring can possibly help encourage the conveyance of wellbeing administrations to rustic regions and it offers extraordinary open door as an elective strategy for wellbeing administration conveyance to country territories. So this framework helps the patient by giving the drug at the planning; this spares the patients life from the dead and furthermore bustling individuals cannot get enough time to treat their folks day by day so the proposed framework is extremely useful for that individuals.

## II. BACKGROUND

Prosanta Gope and Tzonelih Hwang et. al. [1] this technology focused on the delivery of safe timely, effective, patient-centred and equitable health care. The system gives online treatment and improves the health of the elderly and chronic patients by regularly monitoring the environmental conditions of people. However, the Current monitoring systems tend to be somewhat large and uncomfortable. Patient monitoring device will instantly transmit all information in real time to the doctors throughout the web server. If an emergency is detected, the patient gets treatment after some time delay. So proposed system helps the patient by giving the medicine to the patient immediately.

Pravin Amrut Pawar et al [2] proposed survey of the nature of administration in the portable patient observing frameworks. This paper introduces a survey of late improvements in the zone of nature of Service provisioning for MPMS, however, there is no reference to the protection framework. This framework is an unpredictable procedure and costly.

Eva K. Lee et. al. [3] has proposed a framework to compelling minimal effort RMS that is promptly deployable. The framework targets endless illness patients and

endeavours to diminish understanding visits to the clinic, human services costs at the same time, there are no insights about the sensors utilized, and it is extremely costly. The framework for controlling the well-being parameters of the patient amid the mishaps. Yet, there might be a postponement caused in light of GSM messages since it is a line-based procedure since it depends on most brief way calculation.

Péter Várady et. al. [4] has proposed a novel way to deal with quiet observing is presented. A patient checking framework was produced and actualized in light of a current industry standard correspondence arrange, utilizing standard equipment segments and programming advances. The open engineering framework configuration offers adaptability, standard interfaces, and adaptable flag understanding conceivable outcomes, be that as it may, there is no reference to the safe the patient subtle elements in the framework. This framework is an overwhelming process and costly.

Mukunda NS et. al. [5] has proposed a framework to extend quiet observing over a more extensive zone, for example, a remote town or town. The power behind this is remote places, as a rule; need appropriate social insurance offices and great specialists to treat different sicknesses. The patients could be scattered in different spots including uneven landscape, where specialists visit accessibility is not practical.

This issue has been tended to in this paper by the plan and usage of an Adhoc sensor organize based arrangement. The proposed method is expected particularly for remote provincial zones where the infrastructural offices, for example, the web, GSM/GPRS and so forth are not accessible. The patients can be checked for different wellbeing parameters like heartbeat rate, level of insulin, circulatory strain, in any case, there are no insights about the information put away on the web and it is extremely costly.

Sura F. Ismail et. al. [6] has proposed a building system to screen the strength of a patient with a diabetic ailment in proactive and responsive observing conduct. This sort of patients experiences issues keeping up sound glucose levels which can be prompt a diabetic unconsciousness, where a patient ends up oblivious and can pass on if left untreated. In the proposed framework a patient has registries in the wellbeing observing organization (HMC) enable them to maintain a strategic distance from the diabetic trance-like states and crisis visits to the clinic.

They wear a nonstop glucose checking (CGM) gadget and a wellness tracker to screen his activity level and breath. In view of the sort of information transmission; proactive or



receptive, these gadgets will process and give the information to the wellbeing checking organization to make the right move when patient is condition of wellbeing moves outside the ordinary range.

Danilo Paniet. al. [7] has proposed a framework to screen and examine rheumatic patients. A novel gadget with remote observing capacities explicitly considered for the necessities of rheumatic patients. It involves a few sensorized instruments and can be utilized either in an outpatient centre for hand practical assessment, associated with a PC, or stood to the patient for home Kinesio treatment sessions But the framework utilized for tolerant checking has been shown just in few cases.

Li-Wei H. Lehman et. al.[8] has proposed a study for an exchanging vector autoregressive structure to methodically learn and distinguish an accumulation of essential sign time arrangement flow, which are potentially recurrent within a similar patient and might be shared over the whole companion. We demonstrate that these dynamical practices can be utilized to portray the physiological "state" of a patient. We approve our strategy utilizing recreated time arrangement of the cardiovascular framework, and human accounts of HR and BP time arrangement from an orthostatic pressure think about with known postural states. However, the framework has not given any clarification on framework if patient's sensor esteem achieves the basic esteem.

A framework [9] for a wearable electrocardiograph gadget developed with little, low-fueled "bit" sensors, which is utilized for the patient monitoring. Electrocardiograph gadgets are the most generally utilized apparatus utilized for heart checking at the same time, there is no definite clarification about the equipment utilized as a part of the framework. The working of electrocardiograph gadgets is not clarified legitimately and the yield subtle elements do not appear.

Maradugu Anil Kumar et. Al. [10] has proposed an arrangement of the web server and android application are utilized for the patient observing which consequently since the bio motion into the web server with the assistance of GPS. Despite the fact that the framework is mechanized it a long procedure. Each time the GPS cannot follow the bio flag and send a message.

S. Maglaveraet. Al. [11] has proposed a framework to give a locally established analysis apparatus that can recognize a wide range of rest cluttered breathing (obstructive and focal apnea, wheezing, upper aviation route protection disorder) at the same time, there are no insights about the sensors utilized and it is extremely costly.

A study by Luliana Chiuchisan et. Al. [12] utilizes a framework that can get the safety efforts and information correspondence security associated with medicinal services frameworks to guarantee data assurance is displayed in this paper. The particular security issues engaged with the improvement of a medicinal services framework that oversees information to help observing and recovery of patients.

### III. PROPOSED METHOD

The proposed system helps the patients experiencing constant maladies and an elderly people. By doing this, by doing this, an unnecessary visit to the health centre can be avoided. This system demonstrates that it is the best devices for different constant infection administration in a remote area. The patient is equipped with body temperature and pulse sensor, which records their health parameters, if it detects an abnormal state, patient, gets emergency medicine with no time slack, So our proposed system comprises of three primary units, patient unit, robot unit and doctor unit which organizes with each other and keep up the patient's body typical.

#### A. Working of Patient Unit

The health parameters like pulse and body temperature are detected utilizing sensors are set in the patient unit will persistently detect for any little scale changes on the patient in fig.1 appeared in the beneath. The health parameters like pulse and body temperature are detected utilizing sensors are set in the patient unit will persistently detect for any little scale changes on the patient in fig.1 appeared in the beneath. This observed information can see on the website page with help of the node MCU and at once transferred on to the LCD display. The microcontroller ATmega328 controls all components in the patient unit. An RF transmitter gets bit information when doctor clicks the emergency medicine, the microcontroller gets the bit and it set the bit as a high. The RF transmitter passed these bit remotely through its antenna. The signal will caution when understanding press an emergency medicine if any variation from the normal value is recognized an emergency medicine will be sent to the doctor's mobile through the GSM by sending appropriate messages fig.2.

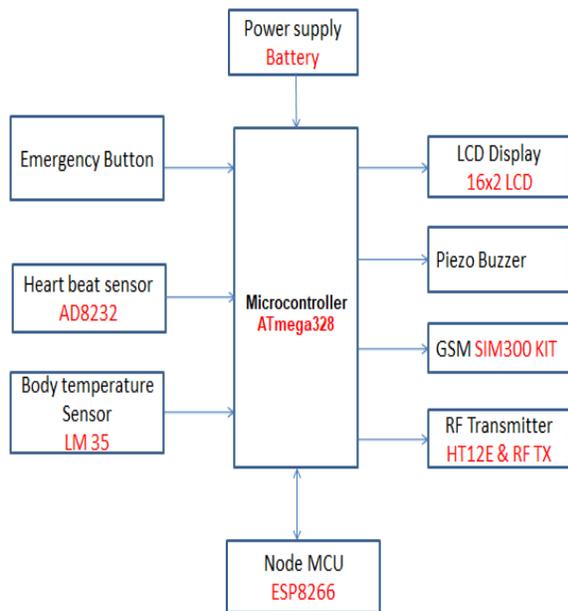


Fig.1 Block diagram of patient unit



Fig.2 GSM message

The RF transmitter passed bit wirelessly through its antenna. The signal will caution when understanding presses an emergency medicine if any abnormality is recognized the alert message, will be sent to the doctor's mobile through the GSM by sending suitable messages.

#### B. Working of Robot Unit

When RTC's time is equivalent to the medicine time, the robot begins to move and sense the bed. The bell will caution when the robot achieves the bed for alarming the patient. The robot's activities are shown on the LCD display. The LCD shows the message "Take your medicine" around then specific medicine array will open and a patient can take

medicine. The robot will wait for sometimes or patient can press the close button of the medicine tray on the robot then robot closes the medicine array moves back to the position. The arrays of the medicine tray are open with help of the servomotor. The servomotor is a revolving actuator and it pivots the engine at a specific edge then the exhibit will open. Medicine time and real time can enter by utilizing a keypad and RTC. There are four IR sensors are utilized, left IR, right IR, focus IR and stop IR. The line follower robot that can recognize and take after the line drawn on the floor with IR sensor that introduced under the robot.

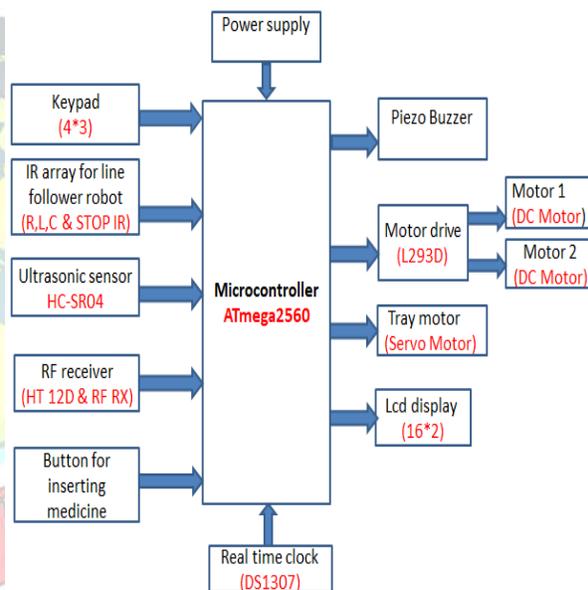


Fig.3 Block diagram of robot unit

Generally, the way is predefined and can be either noticeable like a dark line on a white surface. The robot detects the line by utilizing sensor and after that sends the flag to Arduino. At that point, Arduino drives the engine as per sensor's yield. The ultrasonic sensor is utilized for staying away from hindrances in a predefined way and can gauge the separation to a protest by utilizing sound waves. RF receiver gets the bit from the transmitter and gives emergency medicine to the patient. The block diagram of the robot unit is above fig.3.

#### C. Working of Doctor Unit

The doctor gets the alarm message from the patient unit when the variation from the norm is distinguished, at that point doctor login the website page and doctor can send emergency to the patient unit. At the point when the ordinary



and unusual conditions come, the site page is this way in fig. 4& 5

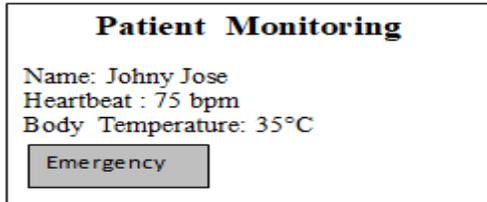


Fig.4 ordinary webpage

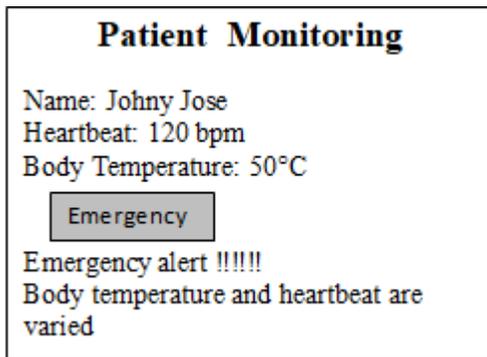


Fig.4 unusual conditions

#### IV. RESULT AND DISCUSSION

The system was able to operate in a good performance. The sensor data was monitored (fig.7) and based on the data the doctor can deliver emergency medicine sent to the patient by a robot (fig.8). The robot receives the bit and delivers medicine to the bed. The alert was activated when variations from the norm are identified.

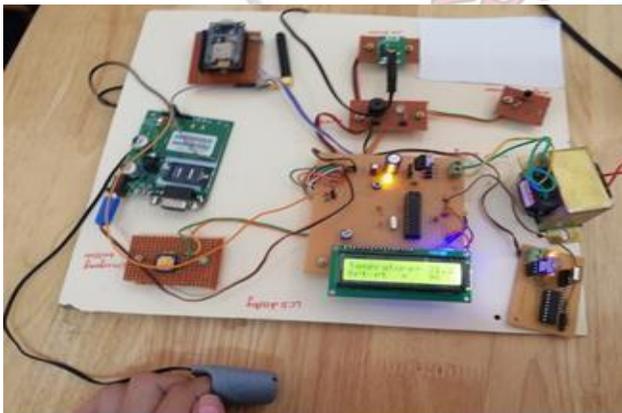


Fig.5 Hardware of patient unit



Fig.6 Hardware of robot unit

#### V. APPLICATIONS

**Medical Diagnosis:** Modern healthcare system using line follower robot retrieves patients from that chronic diseases. The goal of the system is to provide diagnostic support by a doctor can login and see the status of the patient in the web if alert message receives on his mobile and he/she can deliver the emergency medicine to the patient.

**Security Check:** Password is required for accessing the web page.

#### VI. CONCLUSION

Planning and usage of IoT based present day medicinal services framework utilizing a nursing robot is effectively finished. The framework can screen the health parameters of the patient and cautions the security alert in light of the security conditions. The website page could get information from the patient unit by means of NodeMCU and show on the page. The framework worked well as outlined. The system could also be monitored remotely.

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#### REFERENCES

- [1]. Sagar P. Mohammad "Review of Quality of Service in the Mobile Patient Monitoring Systems", IEEE Region 10 Symposium (TENSYP) 2017, no.1 – 6.
- [2]. Eva K. Lee "Designing a Low-Cost Adaptable and Personalized Remote Patient Monitoring System", 2017 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), p.p13-16, Nov. 2017.
- [3]. Péter Várady, Zoltán Benyó, and Balázs Benyo "An Open Architecture Patient Monitoring System Using Standard Technologies", Transactions on information technology in biomedicine, vol. 6,no. 1,march 2002.
- [4]. Mukunda N S "A remote patient monitoring system in an adhoc sensor network environment", Proceedings of the 5th International Conference on IT & Multimedia at UNITEN (ICIMU 2011) Malaysia.
- [5]. Sura F. Ismail "Internet of Everything (IOE) solution for a diabetic Patient monitoring", 8th International Conference Technology (ICIT) 2017, Pages: 244-248.
- [6]. Danilo Pani" A Device for Local or Remot Monitoring of Hand Rehabilitation Patients", IEEE Journal of Translational Engineering in Health and Health Informatics , Volume: 19, Issue 3, May 2015.
- [7]. Li-wei H. Lehman "A Physio logical Time Series Dynamics-Based Approach to Patient Monitoring and Outcome Prediction", Published in: IEEE Journal of Biomedical and Health Informatics ,Volume: 19, Issue 3, May 2015.
- [8]. Steven "A Wearable Patient Monitoring Application (ECG) using Wireless Sensor Networks", Proceedings of the 28th IEEE EMBS Annual International Conference New York City, USA, Aug 30 –Sept 3 2006.
- [9]. Maradugu Anil Kumar and Y.Ravi Sekhar "Android Based Health Care Monitoring System", IEEE Sponsored 2<sup>nd</sup> International Conference On Innovations in Information Embedded and Communication System ICIIES'15.
- [10]. S. Maglavera "sensation remote monitoring system for enabling the anytime, anywhere", monitoring of patients with selected sleep disorders", Proceedings of the 28th IEEE EMBS Annual International Conference New York City, USA, Aug 30-Sept 3, 2006.
- [11]. Luliana Chiuchisan (2012)"A Security Approach for Health Care Information Systems"The 6th IEEE International Conference on E-Health and Bioengineering - EHB 2017 Grigore T. Popa University of Medicine and Pharmacy, Sinaia, Romania, June 22-24.
- [12]. Prosanta Gope "BSN-Care: A Secure IoT-based Modern Healthcare System Using Body Sensor Network", DOI

10.1109/JSEN.2013.2502401, IEEE. Transactions on, vol. 10, pp.117- 130, 2001.

#### BIOGRAPHY



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