A Modern Healthcare System based on IoT Using a Network of Body Sensors

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Abstract: - Technology stages the key part in healthcare organization, not only for recording parameters over sensory devices nonetheless likewise in interacting, recording and presenting the measured parameter. Developments in information and communication technologies have directed to the advent of Internet of Things (IoT). It is very vital to monitor many health parameters and stake effective statistics. To access the patient's health parameters in resident and distant zone, healthcare communication by means of Internet of Things (IoT) technique is espoused. In the modern health care milieu, the convention of IoT technologies fetches expediency of doctors and patients since they are applied to many health expanses (for instance real-time specialist care, patient info managing, and healthcare supervision). The body sensor network (BSN) technology is one of the central technologies of IoT advances in healthcare organization, where a patient can be supervised by means of an assemblage of tiny-powered and lightweight wireless sensor nodes. The chief objective of this paper is to communicating the patient's health monitoring parameters through wireless communication. These input statistics are uploaded in cloud server and transmitted to the computer and mobile for doctor's reference. The information from microcontroller is transmitted to cloud server. In this paper, three parameters viz., heart beat rate, body temperature and respiratory levels are observed and transmitted. The healthcare system arrangement is replicated by means of Proteus software, and the parameters are observed by remote health app and patient specialist care screen. We suggest a modern healthcare system based on IoT using a network of body sensors which can proficiently achieve those necessities.

Keywords: Internet of Things (IoT), Body Sensor Network (BSN), Local Processing Unit (LPU), Proteus Software.

INTRODUCTION

Fitness and Well-being is one of the worldwide encounters for humankind. As per the compositions of World Health Organization (WHO) the uppermost achievable standard of well-being is a central right for people. Individuals in good physical shape also lessen burden on the by now overawed hospitals, clinics, and health authorities and decrease load on the community care systems, donations, and governmental (or non-governmental) officialdoms. To keep individuals in good physical shape, an operative and readily available modern healthcare system is a precondition. A modernized healthcare structure should deliver improved healthcare facilities to individuals at whatever time and from anyplace in an economic and patient welcoming way.

In the old-style method, the healthcare authorities play the main part. They need to officially visit the patients for required analysis and guiding. There are two straightforward complications allied with this method. First of all, the healthcare experts must be on location of the patient all the time and secondly, the patient remains admitted in a hospital, bound to bedside biomedical gadgets, for a period of time. To solve these two hitches, [2] the patient slanted method has been regarded. In this method, the patients are fortified with acquaintance and info to piece a more dynamic part in ailment analysis, and deterrence. The main component of this second method is a dependable and readily accessible Patient Monitoring System.

By capturing the rewards of modern bio instrumentation, computers, and telecommunication machineries a modern PMS should obtain, record, show, and convey the biological statistics from the patient body to a far-off place at whatever time.

A dynamic database organization must be allied with the PMS. Thus, a patient can be supervised from a far-off place. Prevailing and extensive mobile phone grids can aid in this respect. By means of the mobile phone systems, healthcare schemes can be made accessible for individuals, who are living in isolated zones deprived of considerable access to other kinds of communications. Accordingly, the patients, living in far-flung areas, can cut redundant back-and-forth travel to the remotely positioned healthcare centers.

LITERATURE REVIEW

In the study of a Wireless Multimedia Sensor Network (WMSN) and Radio Frequency Identification (RFID) based u-Healthcare system, the system [11] can monitor the patient's health standing via RFID body sensor and wirelessly communicates the health statistics to a native workstation (WMSN entryway) before transmitting it to the central database server. Owing to the patient's actions, WMSN node's actions will be spotted with the functionality of the Mobile IPv6. Patients can be forewarned in circumstance of emergency over their wearable device and can also accept communications through their smartphones. The planned system is intended [3] to measure and monitor vital functional statistics of a patient to precisely designate the standing of his health and fitness. The patient's temperature, heart beat rate, muscles, blood pressure, blood glucose level, and ECG data are scrutinized, presented, and stockpiled by their arrangement. To safeguard dependability and precision, the planned system has been field tested. The test outcomes display that their system can measure the patient's biological data with a very high precision. Proposed system encompasses [12] the plan and execution with subsystems. Data is sent via IP to a database server comprising quantifiable statistics, which can be retrieved on the smart phone and can also be shared with the doctor anytime to pursue health guidance as soon as required. Two wireless protocols were explored: a Bluetooth (IEEE 802.15.1) ad-hoc network and a Wi-Fi (IEEE 802.11) ad-hoc network. To do so, two subsystems were designed: a sensor system and a display system. The sensor system comprises of two thermometers and a wireless transmitter/receiver. The information will be transferred to the display system wirelessly. The display comprises of a wireless transmitter/receiver and an iOS mobile device. The outcomes regarding the efficiency and feasibility of the intended system and the incorporation with a radiometer will be offered. The specialist care system can screen bodily parameters from numerous patient bodies. In another similar proposed system [9], a controller node has been attached on patient's body to gather all the signals from the wireless sensors and directs them to the base station. The attached sensors on patient's body form a wireless body sensor network (WBSN) and they can sense the heart rate, blood pressure and so on. This system can perceive the anomalous situations, issue an alarm to the patient and direct a SMS/E-mail to the doctor. Intended and developed as a body temperature measurement device [13] that can be experiential by the doctor in real time in addition to history data via internet with an alarm/warning in situation of oddities. The temperature sensors will direct the analyses to a microcontroller using Zigbee wireless communication. To direct the real-time

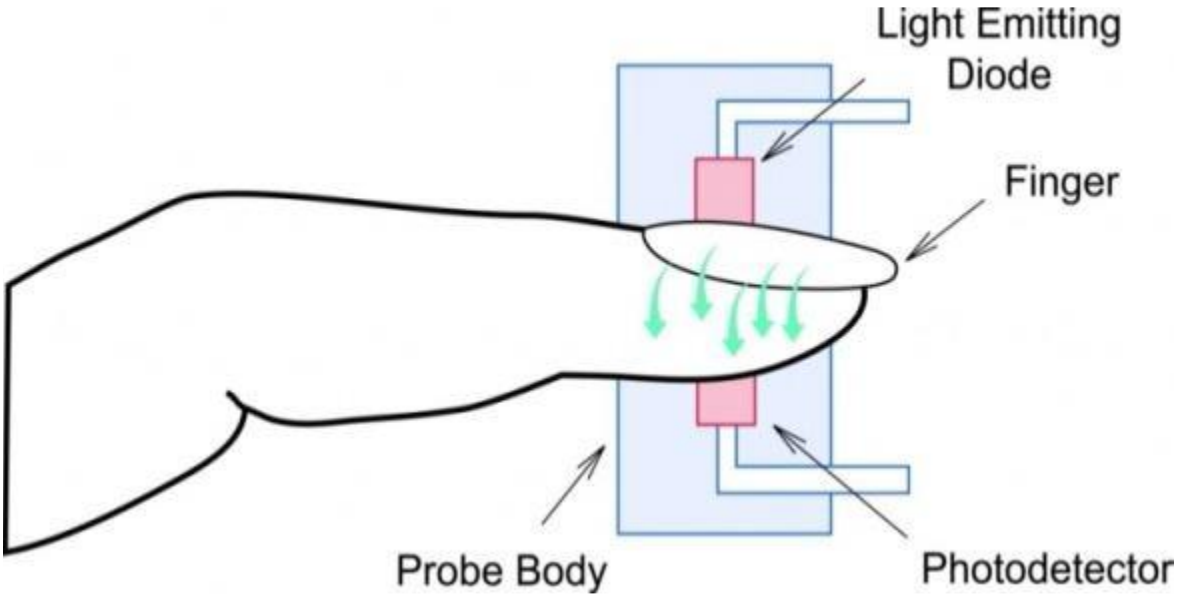
information to health monitoring database, wireless Local Area Network (WLAN) has been used. Arduino with Ethernet shield based on IEEE 802.11 standard has been used for this drive. Test outcomes from a cluster of volunteers demonstrates the real-time temperature interpretation effectively supervised nearby (at home) and remotely (at doctor's computer).

PROPOSED METHOD

In this paper, the projected technique uses PIC18F452 microcontroller as a doorway to interconnect to the numerous sensors such as temperature sensor, pulse oximeter sensor and respiratory sensor. The microcontroller picks up the sensor data and directs it to the network and henceforth delivers real time specialist care of the health care constraints for doctors. The statistics can be retrieved anytime by the doctors. The controller warns the caretaker about discrepancy in sensor output.

A. Pulse Oximeter Sensor

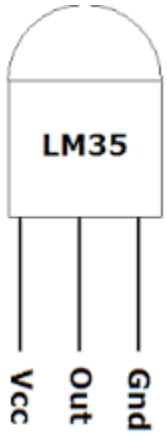
The principle of pulse oximeter is grounded on the red and infrared light captivation physiognomies of oxygenated and deoxygenated hemoglobin. Oxygenated hemoglobin engrosses more infrared light and permits more red light to traverse. Deoxygenated (or condensed) hemoglobin engrosses more red light and permits more infrared light to traverse. Red light is in the 600-750 nm wavelength light band. Infrared light is in the 850-1000 nm wavelength light band.



Pulse oximeter uses a light emitter with red and infrared LEDs that glows over a levelheadedly translucent location with decent blood stream. Archetypal grown-up/pediatric locations are the finger, toe, pinna (top) or lobe of the ear. Infant locations are the foot or palm of the hand and the big toe or thumb. Opposite the emitter is a photo sensor that accepts the light that passes through the gauging location.

B. Temperature Sensor (LM35)

The LM35 series are accuracy integrated circuit temperature sensors, whose output voltage is linearly proportionate to the Celsius (Centigrade) temperature. The LM35 consequently partakes a benefit over rectilinear temperature sensors attuned in ° Kelvin, as the user is not obligatory to subtract a large constant value from its output to attain appropriate Centigrade scaling. The LM35 does not necessitate any exterior tuning or adornment to deliver distinctive precisions of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range.

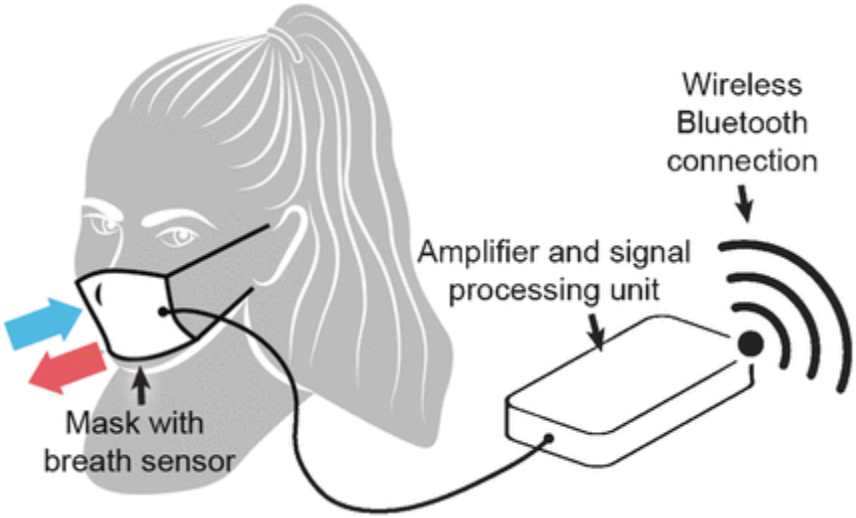


C. Respiratory Sensor

Breathing (which in creatures with lungs is termed aeration and comprises inhalation and exhalation) is a fragment of respiration. The frequency at which breaths ensue, typically calculated in breaths per minute, is termed the ventilation rate, or, by established convention, the respiratory rate. Examining a patient's respiratory status typically takes place in a hospital location and may be the chief drive for a patient being observed or admitted to a medical location.

Human respiration rate is measured when a person is at relaxation and comprises counting the number of breaths for one minute by counting how many whiles the chest rises. An optical breath

rate sensor can be used for inspecting patients during a magnetic resonance imaging scan. Respiration rates may upsurge with disease, sickness, or other health circumstances. When examining respiration, it is vital to also note whether the individual has any trouble while breathing.



D. Cloud Computing

Cloud computing depends on on distribution of resources to attain consistency and frugalities of scale, like an efficacy (like the electricity network) over a grid. At the underpinning of cloud computing is the wide-ranging impression of congregated substructure and collective amenities. Cloud computing, or in unpretentious shorthand just the cloud, also emphases on make best use of the usefulness of the shared resources. Cloud resources are typically not only shared by several users but are also animatedly reassigned for each request. This can work for apportioning resources to users. Cloud computing encompasses of kinds. They are private cloud and public cloud.

E. INTERNET OF THINGS

The Internet of Things (IoT) is the interconnection of exclusively distinguishable embedded computing gadgets indoors the prevailing Internet substructure. Characteristically, IoT is projected to proposal of cutting-edge connectivity of gadgets, structures, and amenities that goes yonder machine-to-machine communications (M2M) and shelters a diversity of conventions, realms, and applications. The interconnection of these embedded devices (together with smart objects), is

projected to use mechanization in almost all areas, while also empowering innovative applications like a Smart Lattice. Things, in 'IoT', can allude to a extensive diversity of gadgets such as heart intensive care transplants, biochip transponders on farmhouse creatures, vehicles with in-built sensors, or turf action devices that support fire-fighters in hunt and save acts.

Algorithm steps: -

Step 1: Patient registration

Step 2: Login

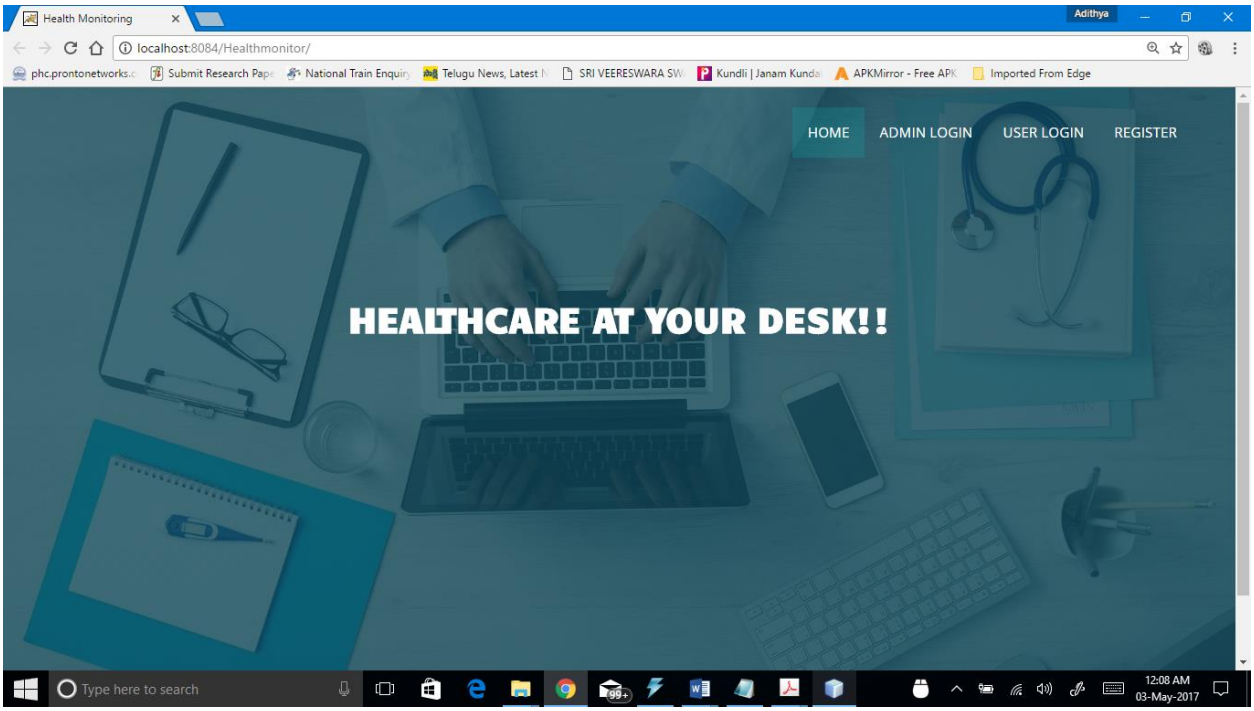
Step 3: Insert normal data into data base for comparison

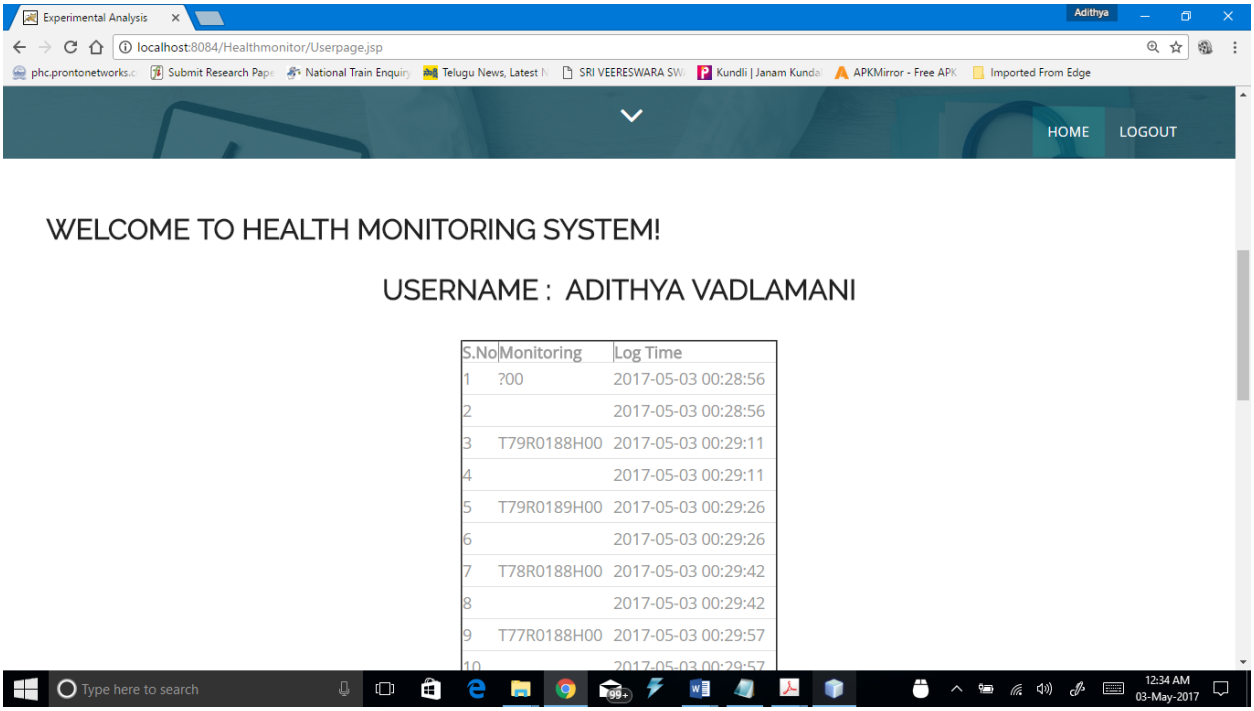
Step 4: In every 2 seconds, data is gathered from patient and stored

Step 5: Compare collected data to normal data

Step 6: If any high changes are found in data, then find doctor's, relative's or friend's number

Step 7: send message to doctor's, relative's or friend's number





CONCLUSION AND FUTURE SCOPE

In this paper, in the beginning we designated the problems in healthcare applications using traditional practices. Afterward, we found that although most of the prevalent body sensor network grounded research projects recognize the issues, but they fail to entrench robust amenities that could aid patients proficiently remotely. So finally, we projected an IoT based healthcare system by means of a network of body sensors which can resourcefully achieve numerous necessities of the healthcare organization. The system can perform a long-standing specialist care on patient's ailment and is fortified with an emergency rescue system via SMS. This system can be heightened by obtaining further health constraints from the patient's body.

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