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Research Article

Survey Paper On Automated Health Peril Predictor Using Naive Bayes Classifier and Max30102

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Abstract

This paper describes different methods used for tracking the health condition of the user. Although there are a lot of challenges in persistent connections and providing a cheaper way of implementing it. From time to time, several techniques are discovered which are more improved and better than previous versions. In this survey paper, we describe and compare many techniques of identification from various researches.

Keywords: *naive bayes classifier, iot,wifi , persistent monitoring, max30102, arduino uno wifi, prediction, android app, wireless device, li-ion charging*

Introduction

Elderly and physically disabled people are vulnerable to certain medical conditions, hence they need to be constantly monitored.Emergency situations are unpredictable hence we need to be ready to provide medical assistance.

Therefore we need solutions that are unpredictable hence we need to be ready to provide medical assistance on time and modify the caretaker or the relatives of the user.Hence we came up with an idea of a band which can be worn by the user 24/7, that will get the job done.

A great demand of modern earth is to get everything within a very short time. In the present situation, people want to realize their current health condition and also want proper care rapidly. But older and disabled people are incapable without someone's help. Even they have to face so many difficulties to inform someone about their health condition.

- CVDs are the number 1 cause of death globally: more people die annually from CVDs than from any other cause.

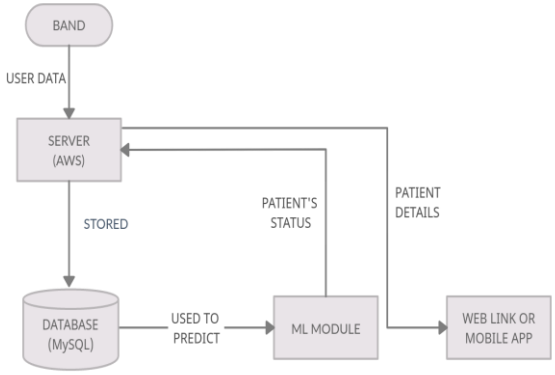
- An estimated 17.9 million people died from CVDs in 2016, representing 31% of all global deaths. Of these deaths, 85% are due to heart attack and stroke.
- Over three quarters of CVD deaths take place in low- and middle-income countries.
- Out of the 17 million premature deaths (under the age of 70) due to noncommunicable diseases in 2015, 82% are in low- and middle-income countries, and 37% are caused by CVDs.
- Most cardiovascular diseases can be prevented by addressing behavioural risk factors such as tobacco use, unhealthy diet and obesity, physical inactivity and harmful use of alcohol using population-wide strategies.
- People with cardiovascular disease or who are at high cardiovascular risk (due to the presence of one or more risk factors such as hypertension, diabetes, hyperlipidaemia or already established disease) need early detection and management using counselling and medicines, as appropriate.

Cardiovascular disease (CVD) is one of the main causes of morbidity and mortality in industrialized countries. Cardiac autonomic dysfunction is a risk factor for the development of CVD that can be measured **non-invasively using heart rate variability (HRV)**

To solve this problem a smart system has been proposed. The proposed system consists of health monitoring systems with body temperature and heartbeat measurement.

This health monitoring system displays temperature and heart rate data on an LCD, it also sends an automatic notification to caretakers or doctors. A fall detection system is added to abstain from unintentional injury and death for old and disabled persons

When the data crosses the normal value and the fall detector detects the fall, that time the system sends an automatic notification. This paper will focus on basic health monitoring and caring systems for older and disable people.



Literature Survey

In hospitals, where a patient' s condition needs to be constantly monitored, it is usually done by a doctor or other paramedical staff.

In developing countries like India due to paucity of specialized Doctors, it becomes difficult when the same doctor has to monitor many patients simultaneously. Hence in such a condition, the doctor may be unaware of the condition of all the patients. In the case of an emergency, even a little delay in treatment may pose a threat to the patient' s life.

There have been many related research works in this area. S owmyasudhan S. and Manjunath S. [2] proposed a system which uses sensors to detect pathological parameters of a person. These signals are then processed and monitored with the help of a microcontroller. A cell phone is also interfaced to this system, which uses the TEXT application protocol of the cell phone to alarm the respective doctors.

Edward Teaw et al. [3] proposed a system that uses wireless sensors along with RFID and internet to monitor users' vital signs and notifies relatives and medical personnel of their location during life threatening situations. Zimu Li et al. [4] propose a wireless health monitoring system that can monitor individual vital signs and send them through a wireless network to a hospital or health care provider. The papers [5] - [8] are examples of health monitoring systems proposed in various IEEE conferences from 2003 to 2012. They are compared with our system on the basis of:

1) Proposition of generic Architecture
2) System is wireless or not
3) Presence of user friendly and compatible User Interface
4) Capability of transferring multiple signals
5) Portability
6) SMS facility

The primary advantages of our system are evident owing to its pervasive monitoring and updating of data of multiple patients. Further processing of data is done to facilitate diagnosis by providing a wide range of reader friendly graphs of different intervals during the day.

This system would make the work of the supervising doctor very easy as one can monitor multiple patients at the same time. Also,even when the doctor is not in his chamber, he will be immediately appraised about the patients' condition. This will greatly reduce the workload of Doctor and paramedical staff to a great extent[5]-[8]

Gulam Gaus Warsi et. Al checked up the temperature,blood pressure and electro-cardiogram with the help of hand held device.This device is build using thermometer, electro-cardiogram sensor and sphygmomanometer attached to an arduino which transfer its data to servers using a wifi-module.

Alvee Rahman et. The system collects continuous data from ECG sensor and digital temperature sensor and stores the values in the cloud and MySQL database along with the timestamp and heart rate that is derived from the ECG signal. The impressive part in the system is,In case of an emergency, the patient presses a push switch when they are feeling uncomfortable and the system sends a SMS notification just is sent, alongside the SMS, a video call is made to the predefined individual so that they can see for themselves the condition of the patient.The drawback is over complexity of the prototype.[20]

The sensor's data is collected and transmitted to the cloud for storage via the Wi-Fi module connected with the controller. The data is processed in the cloud and feedback steps are taken on the analysed data which can be further analysed.The main drawback of the system is unnecessary fingerprint authentication for the accessing of data which may trouble during significant times.[21]

Edward Teaw et. Al developed a prototype for wireless sensor system, the Health Tracker 2000, that can monitors users' vital signs and notifies relatives and medical personnel of their location during life threatening situations.The system has the temperature and pressure sensors with the connectivity processors which is connected to bluetooth.To ensure a proper reading of these sensor outputs, the signals must be amplified using op amps.These signals are processed using a microcontroller or microprocessor and the data is output via a wireless module.Respiratory rate can be measured.The system is able to track the patient location which helps to reach them soon.[22]

The servers then compute the data which can be displayed on hand held devices.In case the values received from the sensors is outside the normal range then an alert will be sent to the user from the server.Once the data is collected then it has been in a database,where the electrocardiogram, temperature and blood pressure readings can be monitored.[23]

Vani Yeri developed a prototype for IoT based Real Time Health Monitoring.The system consists of the web and mobile application based on continuous wireless monitoring of patients. The vital parameters are measured by the sensors such as pulse sensor, temperature sensor and SpO2 sensor. . Sensors are being used for measuring the patient vital signs by using the wireless network. [24]

Tarannum khan and Manju K., Chattopadhay,2017 presents a smart health monitoring system that uses biomedical sensors to check a patient's condition and uses the internet to inform the concerned. The biomedical sensors here are connected to an Arduino UNO controller to read the data which is in turn interfaced to an LCD display/serial monitor to see the output. Data is uploaded to the server to store and converted into JSON links for visualizing it on a Smartphone. An android application has been designed in order to easily see the patient's information by their doctors and family members.[11]

The Proposed system monitors the vital health parameters and transmits the data through a wireless communication, which is further transferred to a network via a Wi-Fi module. The data can be accessed anytime promoting the reception of the current status of the patient. In case any abnormal behavior or any vital signs are recognized, the caretaker, as well as the doctors are notified immediately through a message service or an audio signaling device (buzzer). In order to design an efficient remote monitoring system, security plays an important part.[12]

Table 1. Comparison Table

Author	**Year**	**Approach**	**Description**
Deepesh K Rathore,Ankita Upanmyu Deepanshu Lulla	2013	Heart rate is measured through a Photoplethysmograph and sent wirelessly.	For monitoring heartbeat it is programmed to count the number of pulses real time and display it on the doctor's pc/laptop.
Tarannum khan and Manju K, Chattopadhay	2017	Using arduino uno,Heart beat sensor,LM35 temperature sensor	Data of the user is monitored and stored in the SD card as well as sent to the server and notified when an emergency situation occurs.
Shreyaasha Chaudhury,Debasmita Paul,Roop Tirtha	2017	Using traditional heart rate sensor,LM35	Data is collected through the sensor and sent through the cloud server and then an alert message is sent during emergency situations.

Mukherjee and Siddhartha Haldar		temperature sensor,arduino uno based on ATmega328P	
D., Shiva Rana Krishnan ,Subhash Chand Gupta and Tanupriya Choudhury	2018	Arduino Uno with Atmega controller,IC LM35,ECG sensor	Sensor value is sent to the server and compared with the threshold value then the data is displayed on the website.
Naina Gupta, Hera Saeed ,Sanjana Jha, Manisha Chahande and Sujata Pandey	2017	Uses GSM, smartphones, Bluetooth, sweat sensor,LM35	Using RFID the device location is detected and the health condition of the user is also monitored.
Md.Rasheduzzaman Ruman ,Amit Barua ,Waladur Rahman ,Khan Roushan Jahan ,Md.Jamil Roni and Md.Foyjur Rahman	2020	Uses pulse rate sensor,LM35 body temperature sensor,and ECG sensor.	The data is exerted by Arduino and sent to the Thingspeak online software. The cloud storage is well developed server site which is very useful to store the real time data
Sohail Shaikh ,Dattatray Waghole ,Prajakta Kumbhar ,Vrushali Kotkar and Prafulkumar Awaghade	2017	Uses Wearable sensor system combining ECG, PPG and IMU	The paper proposes a data management framework called the ‘modified LED*’ for biosensors which begins its working right from data collection to make the right decisions.
Raha Talal Hameed ,Omar Abdulwahabe Mohammad and Nicolae Tapus	2016	UsingArduino Uno version R3 board,Airflow sensor,Glucometer sensor,Patient	The proposed system used e-health sensors platform integrated with Arduino Uno board To send data wirelessly to the caretaker.

		position sensor	
Himadri Nath Saha ,Supratim Auddy ,Subrata Pal ,Shubham Kumar ,Shivesh Pandey ,Rocky Singh ,Amrendra Kumar Singh ,Priyanshu Sharan ,Debmalya	2017	Using Temperature sensor, pulse sensor, blood sensor	This system includes four-protocol layers start from device layer, followed by network layer, middleware layer and application layer
C S Krishna and Nalini Sampath	2017	Uses raspberry pi and arduino uno along with DS18B20	They used two seperate motherboards for data collection and wireless transmission
Alvee Rahman ,Tahsinur Rahman ,Nawab Haider Ghani ,Sazzad Hossain and Jia Uddin	2018	Using Raspberry Pi 3 Model B, Raspberry Pi Camera Module, Arduino Uno and Single Lead Heart Monitor	All the components are packed inside a box and the data is sent to a website which plots graphs based on the data.
D.C Shubhangi and Van Yeri	2020	Pulse sensor, Temperature sensor, SpO2 sensor and Wi-Fi module and GSM module.	Using traditional ECG body stickers to monitor the user's vitals and transmitting through wifi to the doctor
E.Teaw ,G. Hou ,M. Gouzman ,K.W. Tang ,A. Kesluk ,M. Kane and	2005	Uses Crossbow MICA2 (left) and MICA2DOT	They figured out a way theoretically to pull this off,but it was just on papers when the paper was published.

J. Farrell		(right) with Nonin ipod	
Gulam Gaus Warsi ,Kanchan Hans and Sunil Kumar Khatri	2019	Uses thermometer, electrocardiogram sensor, sphygmomanometer,Arduino and Wifi Module	Live stream data from the sensors to the servers which would then process that data and it would raise alert in the system in case of emergency.

Conclusion

The Internet of Things is considered now as one of the feasible solutions for any remote value tracking especially in the field of health monitoring. It facilitates that the individual prosperity parameter data is secured inside the cloud, stays in the hospital are reduced for conventional routine examinations and most important that the health can be monitored and disease diagnosed by any doctor at any distance. In this paper, an IoT based health monitoring system was developed.

The system monitored body temperature, pulse rate and room humidity and temperature using sensors, which are also displayed on an LCD. These sensor values are then sent to a medical server using wireless communication. These data are then received in an authorized personnel smartphone with IoT platform. With the values received the doctor then diagnosed the disease and the state of health of the patient.

Thereby we conclude by saying that, prevention is better than cure.Hence the above solution is a feasible and much cheaper solution to predict the heart diseases with the help of user data.In future due to the ample amount of data, a lot of people can get better diagnosis and can be safe from emergency situations.

References

[1] Ali, D. Suresh and P, "An overview of research issues in the modem healthcare", American Journal of Applied Sciences, vol. 9, no. I , pp. 54-59, 2012.

[2] Sowmya Sudha S and Manjunath S, "A wireless based real-time Patient monitoring system", International Journal of Scientific & Engineering Research, vol. 2, no. I I, Nov. 20 I 1

[3] Edward Teaw, Guofeng Hou, Michael Gouzman, K . Wendy Tang,Matthew Kane, Amy Kesluk and Jason Farrell, "A Wireless Health Monitoring System", International Conference on Information Acquisition, Print ISBN: 0-7803-9303-1 , June 27 - July 3 2005.

[4] Zimu Li, Guodong Feng, Fenghe Liu, Jia Q Dong, Dr. Ridha Kamoua and Dr. Wendy Tang, "Wireless Health Monitoring System",Applications and Technology Conference (L1SAT), 2010.

[5] Isais R, Nguyen K., Perez G , Rubio R and Nazeran, H , "A low-cost microcontroller-based wireless ECG-blood pressure telemonitor for home care," Engineering in Medicine and Biology Society, proceedings of the 25th Annual International Conference of the IEEE, vol. 4, pp 3 1 57- 3 1 60, 2003 .

[6] Priya, B., Rajendran, S., Bala, R. and Gobbi, R., "Remote Wireless Health Monitoring Systems," Innovative Technologies in IntelligentSystems and Industrial Applications-CITISLA, pp 383 - 388, 2009.

[7] Jubadi, W.M. and Mohd Sahak, S.F.A., "Heartbeat Monitoring Alert via SMS ",IEEE Symposium on Industrial Electronics & Applications- ISIEA, pp I - 5, 2009.

[8] AIMejrad, A.S., "A Single Supply Standard 805 1 Microcontroller based Medical K-grade Isolation ECG Module with Graphics LCD," Second International Conference on Intelligent System Design and Engineering Application -ISDEA, pp 1 1 84 - 1 1 87, 20 12.

[9] Deepesh K Rathore,Ankita Upanmyu and Deepanshu Lulla,2013.Wireless patient health monitoring system.International Conference on Signal Processing and Communication(ICSC), DOI: 10.1109/ICSPCom.2013.6719824.

[10] Sarthak Gupta,Divyansh Dahiya,Gaurav Raj,2018.Remote Health Monitoring System.International Conference on Advances in Computing and Communication Engineering(ICACCE),DOI:10.1109/1CACCE.2018.8441731.

[11] Tarannum khan and Manju K., Chattopadhay,2017.Smart health monitoring system. International Conference on Information Communication and Control (ICICIC), DOI: 10.1109/ICOMICON.2017.8279142 .

[12] Shreyaasha Chaudhury,Debasmita Paul,Roop Tirtha Mukherjee and Siddhartha Haldar,2017.Internet of Thing based health care monitoring system.8th Annual Industrial Automation and Electromechanical Engineering Conference (IEMECON), DOI: 10.1109/IEMECON.2017.8079620 .

[13] D., Shiva Rana Krishnan ,Subhash Chand Gupta and Tanupriya Choudhury,2018.An IOT Based Patient Health Monitoring System.International Conference on Advances in Computation and Communication Engineering (ICACCE), DOI: 10.1109/ICACCE.2018.8441708.

[14] Naina Gupta, Hera Saeed ,Sanjana Jha, Manisha Chahande and Sujata Pandey,2017.IOT based health monitoring systems.International Conference on Innovations,Embedded and Communication Systems (ICIIECS),DOI: 10.1109/ICIIECS.2017.8276181 .

[15] Md.Rasheduzzaman Ruman ,Amit Barua ,Waladur Rahman ,Khan Roushan Jahan ,Md.Jamil Roni and Md.Foyjur Rahman,2020.IOT Based Emergency Health Monitoring System. International Conference on Industry 4.0 Technology(I4Tech), DOI: 10.1109/I4Tech48345.2020.9102647 .

[16] Sohail Shaikh ,Dattatray Waghole ,Prajakta Kumbhar ,Vrushali Kotkar and Prafulkumar Awaghade,2017.Patient monitoring system using IOT.International Conference on Big Data, IOT and Data Science (BID),DOI: 10.1109/BID.2017.8336594 .

[17] Raha Talal Hameed ,Omar Abdulwahabe Mohammad and Nicolae Tapus ,2016. Health Monitoring system based on wearable sensors and cloud platforms. International

Conference on System Theory, Control and computing (ICSTCC),DOI: 10.1109/ICSTCC.2016.7790722.

[18] Himadri Nath Saha ,Supratim Auddy ,Subrata Pal ,Shubham Kumar ,Shivesh Pandey ,Rocky Singh ,Amrendra Kumar Singh ,Priyanshu Sharan ,Debmalya Ghosh and Sanhita Saha,2017.Health monitoring using Internet of Things(IoT).8th Annual Automation and Electromechanical Engineering Conference (IEMECON), DOI: 10.1109/IEMECON.2017.8079564.

[19] C S Krishna and Nalini Sampath ,2017. Healthcare Monitoring System Based on IoT.International Conference on Computational systems and Information Technology for Sustainable Solution (CSITSS),DOI: 10.1109/CSITSS.2017.8447861 .

[20] Alvee Rahman ,Tahsinur Rahman ,Nawab Haider Ghani ,Sazzad Hossain and Jia Uddin ,2019.IoT Based Patient Using ECG Sensor.International Conference on Robotics,Electrical and Signal Processing(ICREST),DOI:10.1109/ICREST.2019.8644065

[21] D.C Shubhangi and Van Yeri ,2020. IOT Based Real Time Health Monitoring.Second International Conference on Inventive Research in Computing Applications(ICIRCA), DOI: 10.1109/ICIRCA48905.2020.9183194.

[22] E.Teaw ,G. Hou ,M. Gouzman ,K.W. Tang ,A. Kesluk ,M. Kane and J. Farrell,2005. A Wireless health monitoring system.IEEE International Conference on Information Acquisition,DOI: 10.1109/ICIA.2005.1635090.

[23] Gulam Gaus Warsi ,Kanchan Hans and Sunil Kumar Khatri ,2019.IOT Based Remote Patient Health Monitoring System. International Conference on Machine Learning , Big Data, Cloud and Parallel Computing (COMITCon) , DOI: 10.1109/COMITCon.2019.8862248.