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Health Monitoring Wearable Device Using Internet Of Things

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Abstract – The hospitalization of the victims suffering from certain diseases depend hugely over keeping an eye on the information repetitively. New wearable devices and technologies for this purpose are discovered to enhance the continuous monitoring of systems. This newly developed approach is recognized as body-body communion. Using the human body, we can convey various information, data and signals. Practicing this newly developed approach eradicates the existing complex structures which are composed of cords and wires. This makes it uncomfortable for the patient for prolonged hours. This increases the difficulty in critical patients especially the patients which tend to require immediate and timely assistance by the doctors and nurses. In this system, sensors are implemented on the body of the patients' which regularly keeps an eye on the needed parameters. There are five respective sensors which are being used in this system. They are heart rate sensor, ECG sensor, respiratory sensor, humidity sensor and dust level sensors. Therefore we are able to determine the requirements and needs of the patient almost immediately and accurately. Information which is gathered is relocated from an intermediate network to a hospital. This can later be analysed on the respective customized gadgets and equipments or saved in the victim's electronic database. Doctors are then able to interpret the problem by making use of the collected information, and can come up with a method of prescription and medication required. This is very helpful in reducing the time and complexity in the prescription planning and analysis. This helps to save a lot of time in preparing a treatment plan and to redeem medical reserves.

Index Terms – Internet of Things, Data Security, Wearable Sensors, Medical Devices, Monitoring

1. INTRODUCTION

Internet of Things prevails a structure of interlinked accessories, equipments and gadgets which help in transferring data without human being involvement with computers in most cases. It is a combination of both hardware and software. They facilitate the doctors to finish their tasks in an organized and scheduled form. They tend to hand over analytical information that helps the doctors to devise and propose various treatment plans for the patient. IoT is known to work based on processes.

IoT in the medical field has a crucial motive of elaborating and fixing the patient-doctor experiences. Similar growths in technology boosts the patient outcomes by helping in early detection of symptoms, which in turn reduces the usage of medical resources and saving time for the healthcare practitioners.

The travel of patient to hospitals was limited to visits before the discovery of IoT. Before

the development and usage of IoT, there were no available methods using which the well-being of the patients could be monitored regularly and appropriate treatment plans could be devised. It can also escalate the patients' contentment, complacency and engagement with doctors. Regular survey of patients' health in a continuous interval helps in reducing the duration of stay within the hospitals and expenses of medical resources. IoT can also boost a drastic decrease on healthcare expenses and revamps the results of the patient.
Wearable devices give the patient the entry way to customized attention according to their needs alone. They

contain various sensors deployed for a certain purpose and has computational abilities. IoT helps in monitoring of hygiene, which helps in prevention of patients from getting infected. They can capture more accurate information which are closely related to the signs and symptoms.
IoT is reformulating healthcare by administering better performance and increased treatment results by the healthcare practitioners. There are a wide range of advantages which can be visibly seen in the medical side due to the usage of IoT. Such recent developments and achievements in technologies have made it easier for workers in the medical field to use it to their full advantage. Algorithms to be developed to track the health monitoring during motions involved. [9]

Section II demonstrates the approaches and processes utilized in the existing systems. Section III denotes the proposed system and the working of the proposed system. Section IV contains the discussions, applications and partial results of the system. Section V concludes the discussion and results.

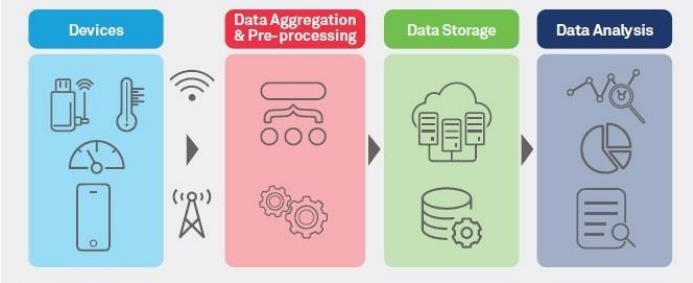

Fig. 1 Layers of IoT

2. EXISTING SYSTEM

The RLS produces a troublesome feeling in legs, which causes the patient to constantly move his/her limbs to induce some sort of relief. This occurs at night or when the patient is in some sort of resting period. It is stationed on the ankles of victims. This determines the exercise of the limb muscles which usually generates the troublesome feeling. This is done by using an antenna which aids in locomotion of the sensor and in bringing some relief to the patient. It is favorable for patient while sleeping by utilizing tags situated on the victim's upper body region. This tends to reduce the discomfort and uneasiness and provides some amount of favor to the patient.
For the restriction of provincial healthcare, it helps to predict the death rate because it is large due to insufficient medical resources and insufficient knowledge in villages. The hospitals in the rural areas are not equipped in terms of both staff and equipments. The health care staff also lack in knowledge of treating certain diseases and symptoms. They also lack in knowledge on how to operate such devices. Information on how to use and operate such

devices can be provided in the local newspapers so that it can be accessible to all. The emphasis on the costs of these devices can be done in the rural areas compared to urban areas.

E-health system is operated by using different sensors in the respective devices which regularly records the parameters of the patient. They help to investigate and provide the necessary medications. Even the older generations can make use of the e-apps with ease. Almost 100% accuracy is accomplished for sensory information. Disposition of e-health system during any urgent situations during which if any setbacks or delay occurs, causes a catastrophe. E-health applications are excluded of preference; they are considered as normal applications. But there is no way which helps in differentiating normal mobile applications and e-health applications.

M-health is the coordination of phones and devices used for the diagnosing the diseases. This evolution depends on the growth in technologies. The main target is to assimilate the present technology and constructing it into more handy and reachable. It is useful to detect the level of drugs in blood. Data can be accumulated at any place and time. The main concern is in assimilating required measures for scrutinizing the level heart beat. If certain errors occur, it is not able to function properly.

Stress levels in drivers are determined by using a personalized technology. There are increasing number of road accidents and road casualties occurring due to tired automobile drivers. Certain unfortunate accidents and incidents can be avoided when measures are taken appropriately. To avoid such incidents, ECG signals of automobile drivers are obtained. The required parameters are determined by this device. From the above, the ECG signals are classified low, medium and high respectively. When increased stress levels are obtained from results, the driver is requested to stop driving and to relax for certain period of time. Outdated health care is not able to cater to every requirement and it also cannot be afforded by everyone. It also helps to watch over the patients' carefully and decreases the expenses for treatment. It also reduces errors, noise and unwanted data. To reduce the hardship of doctors, and to make prompt decisions, the visualization sets a regular monitoring data in an impromptu manner. Alarms are triggered while a value reaches the maximum threshold and these measures the austerity of the problem. The most important task is in

envisioning outcomes and reducing the risk of the patient. It broadens the tasks to the doctors and it is not very expensive.

3. PROPOSED SYSTEM

The system which is proposed employs a new approach called as body-body communion. Using the human body, we can convey all sorts of information, data and signals required to various locations. The current approach reduces utilization of wires and cables which poses a huge threat to security and privacy of the data. It provides a safe and easy mode for communication that involves the gadgets in computing heart rate, ECG, respiratory rate, dust levels and humidity. The proposed device can be worn on any part of the body and it is not bulky like other equipments. The proposed system boosts the preservation of transmitted information in comparison to other wearable devices available in the markets. It also boosts the security protection and data protection which is lacking in other devices available in the markets.

This approach utilizes sensors, which continuously regulates needed specifications like heart rate, respiratory, humidity, dust levels and ECG. Five types of sensors are deployed in this system which is heart rate sensor, respiratory sensor, humidity sensor, dust sensor and ECG sensor. The humidity sensor is used to measure the temperature or the humidity of the

patient. If extremely high or low temperature is detected, then the corresponding LED glows. The respiratory sensor determines the respiratory rate of the patient.

If extremely high or low respiratory levels are detected, then the corresponding LED glows. The heart rate sensor is designed to produce the digital output of the heart beat when a finger is placed on it. If higher or lower heart beat rate of BPM(Beats per Minute) is detected, then the LED corresponding to the sensor lights up. The ECG sensor records the electrical activity produced by the heart muscles. If any anomality is measured, the corresponding LED glows. The dust sensor detects any dust particles which are dangerous for asthmatic patients. If higher levels of dust particles are detected, the motor rotates, signaling that there are high levels of dust present in the air. The sensors note the specifications. These specifications are then broadcasted to the doctor or the hospital. The doctor can then distinguish the probable disease by means of utilizing the collected data and propose a mode of treatment for the patient.

This approach facilitates the regulation of the patient, which cuts down expenses, medical resources, lesser errors, wastes generated and trips to the healthcare practitioners [8]. It also facilitates physicians to make proper and correct decisions

based on the accurate information collected. This ensures complete clarity between the patient and the healthcare practitioner.

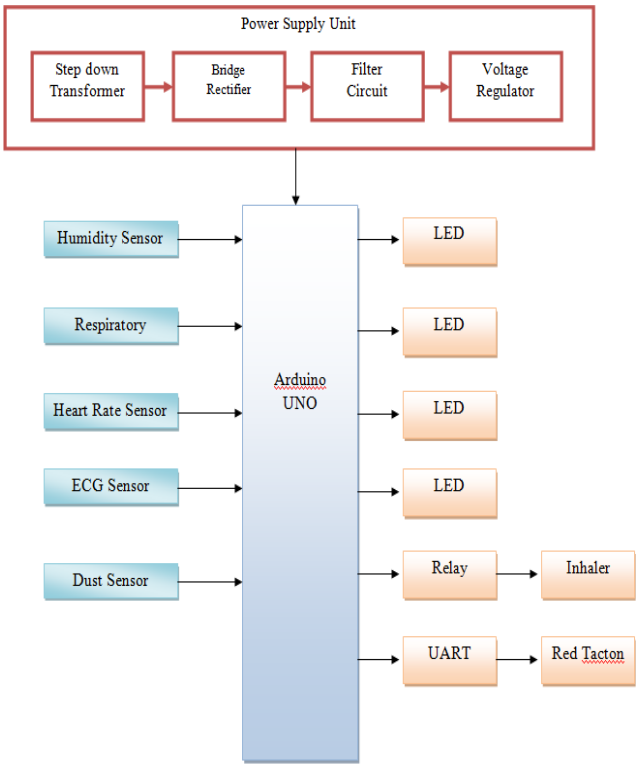

Fig. 2 Block diagram of the transmitter unit

In this transmitter unit, the sensors assemble and compile the information from the victim and passes on the obtained information to the Arduino UNO as shown in Fig. 2. The Arduino UNO matriculates whatever information is obtained to the UART and Red Tacton. Onto the monitoring unit, a LCD display shows the information of the patient and the obtained parameters. LCD is connected to PIC16F877A microcontroller which dispatches information to doctors through the UART and Red Tacton as shown in Fig. 3. The major specialty of this

system is that it uses two different types of microcontrollers which are the Arduino UNO and the PIC16F877A microcontroller. The PIC microcontroller is one of the nominal microcontrollers ever to be discovered and it carries out any possible task presented to it. If irregularities and deformities are noted in the degree heart rate, ECG, respiratory and humidity, then the LED which is associated with the respective sensors lights and an alert message is dispatched to the doctor immediately.

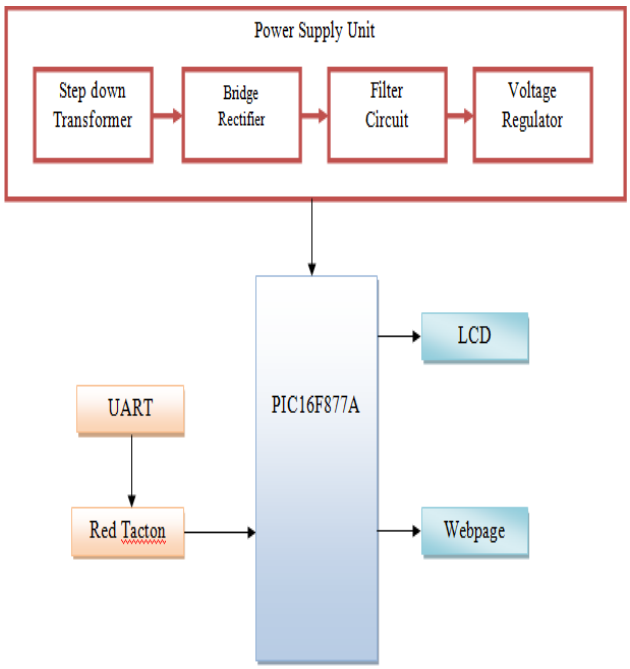

Fig. 3 Block diagram of the receiver unit

4. DISCUSSION

These structures could be utilized in health sector for crucial signal supervision, inserts or implantations (body enlargement), chronic illness governance such as diabetes mellitus and activity of brain and eye. It could be utilized for surveillance of the large standards of the patient such as ECG, heart rate, respiratory rate and humidity as shown in Fig. 4. It can additionally be utilized for fitness reasons such as physiological surveillance (sleep or emotion tracing), mass or power controlling (weight management), and posture adjustment (interactive training).

Fig. 4 Wearable Device

For sports and wellness intents, it could be utilized to trace sports presentation, training virtually, exterior browsing

and tracing, temperatures of heat and cold of the body. It could also be utilized in the military (armed forces) for specific duties and observing the army officers.

5. CONCLUSION

Healthcare IoT has its fair share of both advantages and disadvantages. It is a type of heterogeneous computing. IoT devices collect huge amount of information, which also contains extremely private information. This causes worries about data being private and secure. Carrying out the protection activities is therefore important.

The application of body-to-body transmission excludes the disadvantages of high-tech technologies that uses cables and wires for transfer of information. The healthcare practitioner be able to distinguish the probable infection by utilizing the collected information and propose a mode of therapy for the patient. Such device facilitates the monitoring of the patient, which cuts down expenses, medical resources, lesser errors, wastes generated and trips to the healthcare practitioners.

6. REFERENCES

[1] Walter, Timothy J., and Uma Marar. "Systems, devices, and methods for treating restless leg syndrome and periodic limb movement disorder." U.S. Patent Application 12/438,267, filed September 30, 2010.
[2] Rohokale, Vandana Milind, Neeli Rashmi Prasad, and Ramjee Prasad. "A cooperative Internet of Things (IoT) for rural healthcare monitoring and control." In 2011 2nd International Conference on Wireless Communication, Vehicular Technology, Information Theory and Aerospace & Electronic Systems Technology (Wireless VITAE), pp. 1-6. IEEE, 2011.
[3] McCurdie, Tara, Svetlena Taneva, Mark Casselman, Melanie Yeung, Cassie McDaniel, Wayne Ho, and Joseph Cafazzo. "mHealth consumer apps: the case for user-centered design." Biomedical instrumentation & technology 46, no. s2, 2012.
[4] Xu, Boyi, Lida Xu, Hongming Cai, Lihong Jiang, Yang Luo, and Yizhi Gu. "The design of an m-Health monitoring system based on a cloud computing platform." Enterprise Information Systems 11, no. 1, 2017
[5] Patangay, Abhilash, Jeffrey E. Stahmann, and Robert J. Sweeney. "Monitoring of heart sounds." U.S. Patent 8,801,624, 2014
[6] Rodrigues, João GP, Mariana Kaiseler, Ana Aguiar, João P. Silva Cunha, and João Barros. "A mobile sensing approach to stress detection and memory activation for public bus drivers." IEEE Transactions on Intelligent Transportation Systems 16, no. 6, 2015.
[7] Saranyadevi.G, R.Vani, V.N.Bhargavee, Waste disposal management system for smart city using LORA, Journal of Advanced Research in Dynamical & Control Systems, Vol. 12, 03-Special Issue, 2020, pp.1360- 1364.
[8] Vani, R, N. Ushabhanu, and M. Sangeetha, Fast Motion Estimation Algorithm using Hybrid Search Patterns for Video Streaming Application, International Journal of Computers, Communications & Control, pp. 715-727, vol. 12, no. 5 2017.