# Smart Health Care Monitoring Using Sensors Based Internet of Things (IoT) and Challenges

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**Abstract:**

Old age patients should be frequently monitored and their loved ones need to be conversant about their physical condition status. So we propose an innovative system that automated this task with ease. Our system puts forward a smart health tracking system that uses Sensors to track patient health and uses internet to report to their loved ones in case of any issues. Our system uses temperature as well as heartbeat sensing to keep track of patient health. The sensors are connected to a microcontroller to track the status which is in turn interfaced to an lcd display as well as wifi connection in order to transmit alerts. If system detects any abrupt changes in patient heartbeat or body temperature, the system automatically alerts the user about the patients status over IOT. The sensor will monitor and integrate the patients with the everyday activities and without restricting mobility and also provides responses to the patients that is based on the presence sensor signal. In this paper, we highlight the opportunities and challenges for IoT in realizing this vision of the future of health care.

**Keyword:** IoT, Health care, Sensors

## I. Introduction

Today increasingly growing number of people with chronic diseases, this is due to different risk factors such as dietary habits, physical inactivity, alcohol consumption, among others. Chronic diseases are highly variable in their symptoms as well as their evolution and

healing. Some if not scrutinized and extravaganced early, they can end the patient's life, it can be avoid through the rapid progress of the Internet of Things (IoT), medical sensors, and Internet applications, online medical service has become possible in recent years[1].

It. While more and more seniors need long-term concern, they also want to remain self-determining and vigorous and live in their own homes for as long as possible. Due to the lack of medical possessions, they cannot be taking care of appropriately. The hospitals are filling up with an aging population, recovery groups and high risk groups. IoT technology is used to maintain medical consultations among pastoral patients, health workers, and urban city specialists. With the use of IoT[2], M-health concept, which is defined as mobile computing, medical sensors, and communication technologies for healthcare, attracts more and more researchers applying fourth-generation (4G) mobile communication technology and IoT in healthcare service.

More attentions have been paid in developing ever-present data accessing solutions to acquire and process data in decentralized data sources [8]. A cloud platform is developed to handle heterogeneous physiological signal data to provide personalized healthcare services. In the related research, clinical data heterogeneity is still the main obstacle that hinders the clinic data integration and interoperation. In this research an efficient interoperability of medical data through Internet of things is explained and successfully shown how it is helpful to patients and doctors.

## II BACKGROUND

Wireless sensor networks (WSNs) are a rising knowledge that possesses a enormous potential to play an vital role in many applications [4]. The speedy growth in physiological sensors, low-power included circuits, and wireless communication has enabled a new invention of wireless sensor networks, now used for rationale such as scrutinizing traffic, crops, infrastructure, and health. However, with the presence of sensor networks, many braves have materialized in terms of flexibility, scalability, and various information services. The integration of WSN with cloud provides greater flexibility, unlimited resources, enormous dispensation control, and the capability to give rapid reaction to the client [6].

Cloud computing provides scientists with a completely new model for employed the computing infrastructure. Computer resources and storage resources and applications can be dynamically provisioned (and integrated within the existing infrastructure) on a pay-per-use basis [7]. To provide more suitable and convenient network services, cloud computing has become even more flexible for personal use. Since the cloud is a broad collection of services, organizations can choose where, when, and how they use cloud computing. The IoT healthcare network or the IoT network for health care (hereafter “the IoThNet”) is one of the vital elements of the IoT in health care.

It supports access to the IoT backbone, facilitates the transmission and reception of medical data, and enables the use of healthcare-tailored communications. As shown in Fig. 2, this section discusses the IoThNet topology, architecture, and platform. However, it should be mentioned that the proposed architectures in [3] and [7] can be considered as a good starting point for developing insights into the IoT network.

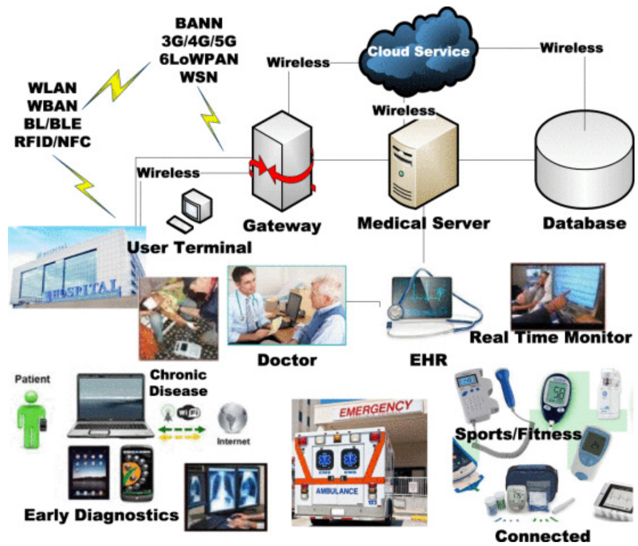


**FIGURE 1.** Healthcare trends.

Converting the Traditional Helath care system into electronic health monitoring systems has promised to transform the conventional health care methods, integrating the IoT paradigm into these systems can further increase intellect, flexibility and interoperability. A device utilizing the IoT scheme is uniquely addressed and express at any time and anywhere through the Internet. IoT based devices in remote health monitoring systems are not only capable of the conventional sensing tasks but can also exchange information with each other, health institutes exchange the health information through the Internet, significantly simplifying set up and administration tasks

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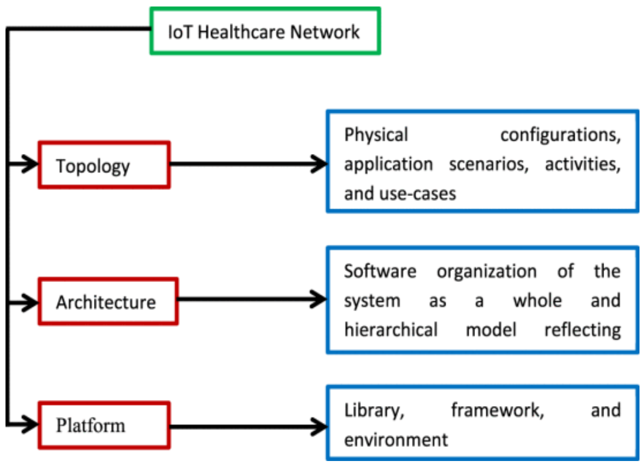


**FIGURE 2. Healthcare Network .**

## IV. SYSTEM ARCHITECTURE

Figure 3 show the Remote Health Monitoring Architecture. Data Acquisition is performed by multiple wearable sensors that measure physiological biomarkers, such as ECG, skin temperature, respiratory rate, EMG muscle activity, and gait (posture). The sensors connect to the network though an intermediate data aggregator or concentrator, which is typically a smart phone located in the vicinity of the patient. The Data Transmission passing on recordings of the patient from the patient's house to the Healthcare Organization (HCO) with assured security and privacy, preferably in near real-time.

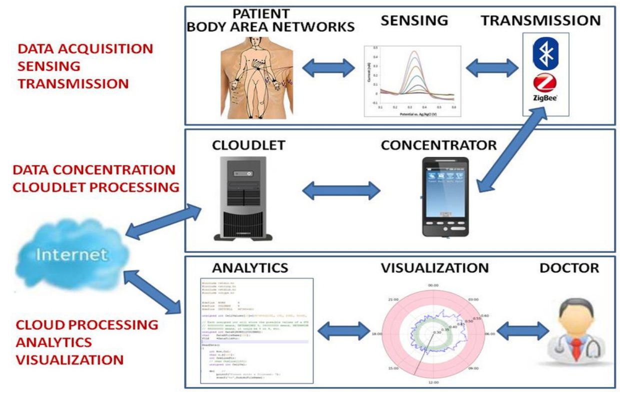


**Figure 3.Architecture**.

There is a three distinct components for Cloud Processing: storage, analytics, and visualization. Patients biomedical information is stored for lomg term and the that system is designed to assisting health professionals with diagnostic information. Cloud based medical data storage and the upfront challenges have been extensively addressed in the literature [2], [4]. Analytics that use the sensor data along with e-Health records that are becoming prevalent can help with diagnoses and prognoses for a number of health conditions and diseases.

Smart Sensors:

To better understand the role of smart sensors in the IoT, let's first define the smart sensor. What makes a smart sensor "smart" is its onboard signal/data-processing capabilities. According to one definition, a smart sensor[2] "includes a microprocessor that conditions the signals before transmission to the control network. It filters out unwanted noise and compensates for errors before sending the data. Some sensors can be custom-programmed to produce alerts on their own when critical limits are reached." They often integrate VLSI technology and MEMS devices to reduce cost and optimize integration

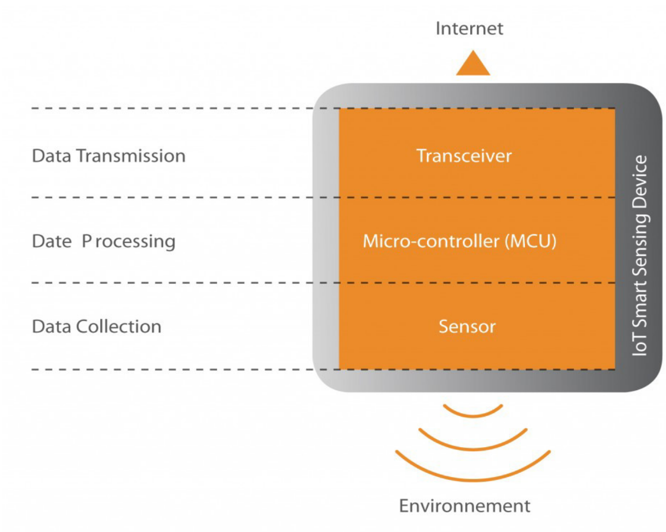


**Figure 4. The Fundamental Components**

Hence, the IoT can collect large amounts of quality, sensor-based data anytime and from anywhere, and transmit it over a network in real time. This provides enhanced awareness of our immediate or remote environment, bringing forth opportunities for faster and better decision-making, as well as gains in efficiency and productivity.To validate the efficiency of the system is used in patients with diabetes and heart arrhythmia. For this, a sample of 16 people which used the system for a month, each measuring sensors had diabetes, and EGC, Bluetooth audio devices to broadcast audio guide was made to take readings and workout routines, in addition to containing the smartphone application.

## V. ANALYTICS

Compared with the lab and office based measurements that are the workhorses of current clinical medical practice, wearable sensors can readily incorporate multiple physiological measurements and enable gathering of data with much finer temporal sampling over much longer longitudinal time scales. These rich datasets represent a tremendous opportunity for data analytics: machine learning algorithms can potentially recognize correlations between sensor observations and clinical diagnoses, and by using these datasets over longer durations of time and by pooling across a large user base, improve medical diagnostics. Analytics on wearable sensor data can conceptually utilize a wide-range of pattern detection and machine learning techniques [4], that have matured significantly and are now commonly available as toolboxes in several software packages [5], [6]. Several challenges must, however, be overcome before analytics can be deployed on

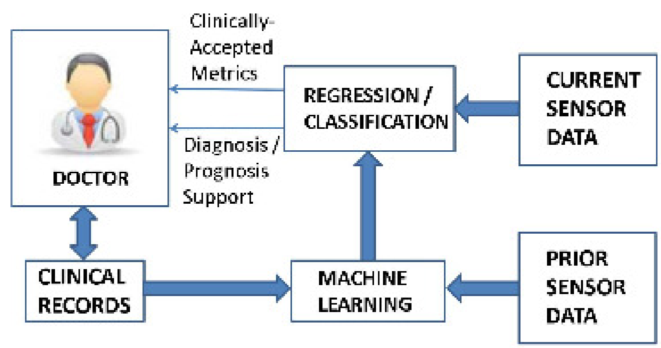


**Figure 5. Workflow**.

Process Step :

1. While getting Inputs from Sensors .

2. The Processing unit process convert the analog data into digital data .

3. Processing unit has ADC that covert the signal as data .

4. Processor which will process input digital data and convert as message Alert format .

5. Processing unit has connect with caretaker handled device via Internet and send status message as alert

Here we are using Sensors and Camera as assistant for both patient and caretaker .

**Implementation:**

If tablet taken,

If tablet taken is less than or equal to desired time

Proximity sensor will sense

Processsing unit process the conversion

Capture the image of patient

Internet server will sends the notification with the captured image to the caretaker.

Else

Alarm placed in the processing area remembers you to take medicine.

Message is sent to the caretaker.

Else

Heartbeat level is sensed by the sensor.

Message is sent to the caretaker

## VI CONCLUSIONS

Researchers across the world have started to explore various technological solutions to enhance healthcare provision in a manner that complements existing services by mobilizing the potential of the IoT. Innovative uses of IoT technology in healthcare not only bring benefits to doctors and managers to access wide ranges of datasources but also challenges in accessing heterogeneous IoT data, especially in mobile environment of real-time IoT application systems. The asymmetric/symmetric encryption technology is used to protect the inspection report and the biological data of the elder. The elder's biological data and other personal information can be uploaded to the cloud via authentication. The hospital can notify the elder or dispatch an ambulance directly to him/her if there is an emergency situation. The elders can be receive their medical information in a periodical time to their mobiles. . Our system is designed to reduce the medical resources ususage and improve the flexibility. This paper surveys varied aspects of IoT-based healthcare technologies and presents various healthcare network architectures and platforms that support access to the IoT backbone and facilitate medical data transmission and reception. The main aim is to improve the quality of life of patients, not just monitoring them, but also to enable direct them to improve their eating habits and workout routines

## VII REFERENCES


[1] X. D. Wu, M. Q. Ye, D. H. Hu, G. Q. Wu, X. G. Hu, and H. Wang, "Pervasive medical information management and services: Key techniques and challenges," Chin. J. Comput., vol. 35, no. 5, pp. 827– 845, May 2012.

[2] K. Vasanth and J. Sbert. Creating solutions for health through technology innovation. Texas Instruments. [Online]. Available: http://www.ti.com/lit/wp/sszy006/sszy006.pdf, accessed Dec. 7, 2014.

[3] N. Bui and M. Zorzi, "Health care applications: A solution based on the internet of things," in Proc. of the 4th Int. Symposium on Applied Sciences in Biomed. and Com. Tech., ser. ISABEL '11. New York, NY, USA: ACM, 2011, pp. 131:1–131:5.

[4] T. Soyata, R. Muraleedharan, C. Funai, M. Kwon, and W. Heinzelman, "Cloud-Vision: Real-Time face recognition using a Mobile-CloudletCloud acceleration architecture," in Proceedings of the 17th IEEE Symposium on Computers and Communications (IEEE ISCC 2012), Cappadocia, Turkey, Jul 2012, pp. 59–66.

[5] A. Pantelopoulos and N. Bourbakis, "A survey on wearable sensor-based systems for health monitoring and prognosis," IEEE Trans. Sys., Man, and Cybernetics, Part C: Applic. and Reviews, vol. 40, no. 1, pp. 1–12, Jan 2010.

[6] Y. Mao, Y. Chen, G. Hackmann, M. Chen, C. Lu, M. Kollef, and T. Bailey, “Medical data mining for early deterioration warning in general hospital wards,” in IEEE 11th Int. Conf. on Data Mining Workshops (ICDMW), Dec 2011, pp. 1042–1049

[7] M. Bazzani, D. Conzon, A. Scalera, M. Spirito, and C. Trainito, “Enabling the IoT paradigm in e-health solutions through the VIRTUS middleware,” in IEEE 11th Int. Conf. on Trust, Security and Privacy in Computing and Com. (TrustCom), June 2012, pp. 1954–1959.

[8] Y. J. Fan, Y. H. Yin, L. D. Xu, Y. Zeng, and F. Wu, ‘‘IoT-based smart rehabilitation system,’’ IEEE Trans. Ind. Informat., vol. 10, no. 2, pp. 1568–1577, May 2014.

[9] C. Doukas and I. Maglogiannis, ‘‘Bringing IoT and cloud computing towards pervasive healthcare,’’ in Proc. Int. Conf. Innov. Mobile Internet Services Ubiquitous Comput. (IMIS), Jul. 2012, pp. 922–926.