Healthcare Monitoring and Management System Using IoT

V. P. Wable[1] K. D. Yadav[2] D. A. Bodare[3] A. A. Kulkarni[4]
[1,2,3,4]B.E. Student
[1,2,3,4]Department of Computer Engineering
[1,2,3,4]SVPM's C.O.E. Malegaon (Bk.), 413115, Savitribai Phule, Pune University, Maharashtra, India

Abstract— Advances in information and communication technology have brought about the emergence of Internet of things (IoT). in the present day healthcare surroundings using IoT technologies brings comfort of physicians and sufferers considering that they are applied to diverse scientific regions (which include actual-time tracking affected person facts management, and healthcare management). The body sensor network (BSN) generation is one of the center technology of IoT traits in health-care gadget, in which a affected person may be monitored the usage of a group of tiny-powered and lightweight WI-FI sensor nodes. but, development of this new era in healthcare programs without thinking about protection makes patient privacy in-clined. At first we highlight the main protection necessities in BSN based totally current healthcare machine. Further, we propose a secure IoT based totally health-care gadget the use of BSN, called BSN-Care, which could efficiently accomplish the ones necessities.

Key words: BSN- BODY Sensor Network, Data integrity, Authentication, e-Health, Internet-of-Things, Security and reliability issues in distributed applications

I. INTRODUCTION

Recently, the reason for a patient staying in the hospital is not that he or she actually needs active medical care. Often, the principal reason for a lengthy stay in the hospital is simply continual observation. Therefore, efforts have been made to avoid acute admissions and long lengths of stay in the hospital. Wireless Sensor Networks (WSNs) with intelligent sensor nodes are becoming significant enabling technology for wide range applications. Recent technological advances in integrated digital electronics and miniaturization of physical sensors, microprocessor, and radio frequency devices into a single micro-chip has led to the emergence of very lightweight, ultra-low power, monitoring sensor devices. These sensor devices have the capability of sensing, processing and transmitting vital physiological signals using wireless technology. Contrary to the traditional sensor networks that are carefully planned and deployed in the predetermined positions, WSNs can be deployed in an ad-hoc manner which make them robust, fault tolerance, and increase in spatial coverage. They can greatly be used to monitor and track conditions of patients in both cities and rural areas using an intranet or internet thereby reducing the stress and strain of healthcare providers, eliminate medical errors, reduce workload, increase efficiency of hospital staff, reduce longterm cost of healthcare services, and improve the comfort of the patients. Also, these systems provide useful methods to remotely acquire and monitor the physiological signals without the need of interruption of the patient's normal life, thus improving life quality. Sensor nodes can be strategically placed on the human body to create a cluster that is called wireless body area network (WBAN) that can be used to collect patient's vital signs. It is worth noting that sensor nodes are being operated by batteries, their power consumption during transmission must be minimal for efficient and reliable data transmission between WBAN and personal server.

II. LITERATURE SURVEY

A. "BSN-Care: A Secure IoT-based Modern Healthcare System Using Body Sensor Network"- Prosanta Gope, Tzonelih Hwang 2015.2502401 IEEE Sensors Journal.[1]*

In this article, at first we highlight the major security requirements in BSN based modern healthcare system. Subsequently, they propose a secure IoT based healthcare system using BSN, called BSN-Care, which can efficiently accomplish those requirements.

B. "Towards Realizing a Self-Protecting Healthcare Information System."-Qian Chen and Jonathan Lambright - 2016 IEEE 40th Annual Computer

Software and Applications Conference.[2]
In this paper they discuss the current security challenges of HISs, and designs an Autonomic Security Management (ASM) approach, which proactively self-protects a HIS from internal and external attacks? The performance of a HIS is monitored in real time, and potential attacks that may disrupt HIS services are predicted by the intrusion estimation module. They also discuss the functionality and feasibility of intrusion detection systems for detecting known and unknown cyber-attacks threatening then confidentiality and integrity of EHRs. The intrusion response system of the ASM approach selects the most appropriate protection mechanisms to recover the compromised HIS back to normal with little or no human intervention.

C. "A Mobile Health Monitoring Application for Obesity Management and Control Using the Intemet-of-Things",Mohamed Alloghani Abir Hussain!, Dhiya AI-Jumeily!, Paul Fergus!, Omar Abuelma'atti, Hani Hamden.[3]

This paper presents a mobile health application intended to increase the awareness levels of parents and children about the obesity risks and help them to sustain balanced and healthy eating lifestyle. The proposed mobile application is an educational tool for the evaluation of interventions to prevent obesity risk levels. The application is based on the Internet of Things approach, which allows tracking food intake, remote capturing and constant monitoring of children data with interactive feedback displayed on the mobile application

D. "Exploiting the FIWARE Cloud Platform to Develop a Remote Patient Monitoring System" - Maria Fazio , Antonio

Celesti , Fermn Galan Marquez, Alex Glikson, Massimo Villari.[4]

This System aims to allow care givers to improve remote assistance to patients at home, optimizing the management of the workflow of doctors, physicians, medical assistants, and other involved hospital operators. In this paper, they specifically describe the main FIWARE components that they had adopted to design there architecture and how they have been integrated.

E. "A Health Care Self-Monitoring System for Patientswith Visual Impair-ment using a Network of Sensors",Oana GEMAN1, Iuliana CHIUCHISAN-The,5th IEEE International Conference on E-Health .[5]

They intend to improve their quality of life by creating a low-cost health care self-monitoring system using a network of sensors that transmits the biomedical information played by voice to the patient and help him to move and to know the exact location of obstacles, using a sound signal received in headphones or speakers.

III. SYSTEM MODEL

The core of this system is the user called the patient. Wearable sensors are attached to the patient body forming wireless body sensor network (BSN)[5] to monitor changes in patients vital signs closely and provide real time feedback to help maintain an optimal health status. The medical sensors typically consist of five main components:

1) Sensor (2) Microcontroller (3) Memory (4) Bluetooth Transceiver (5) Power supply.

1) Sensor: Read Patient vital signs closely.
2) Microcontroller: Compute Sensor values.
3) Memory: Manage and log the data
4) Bluetooth Transceivers: To communicate with server
5) Power supply: To supply the power

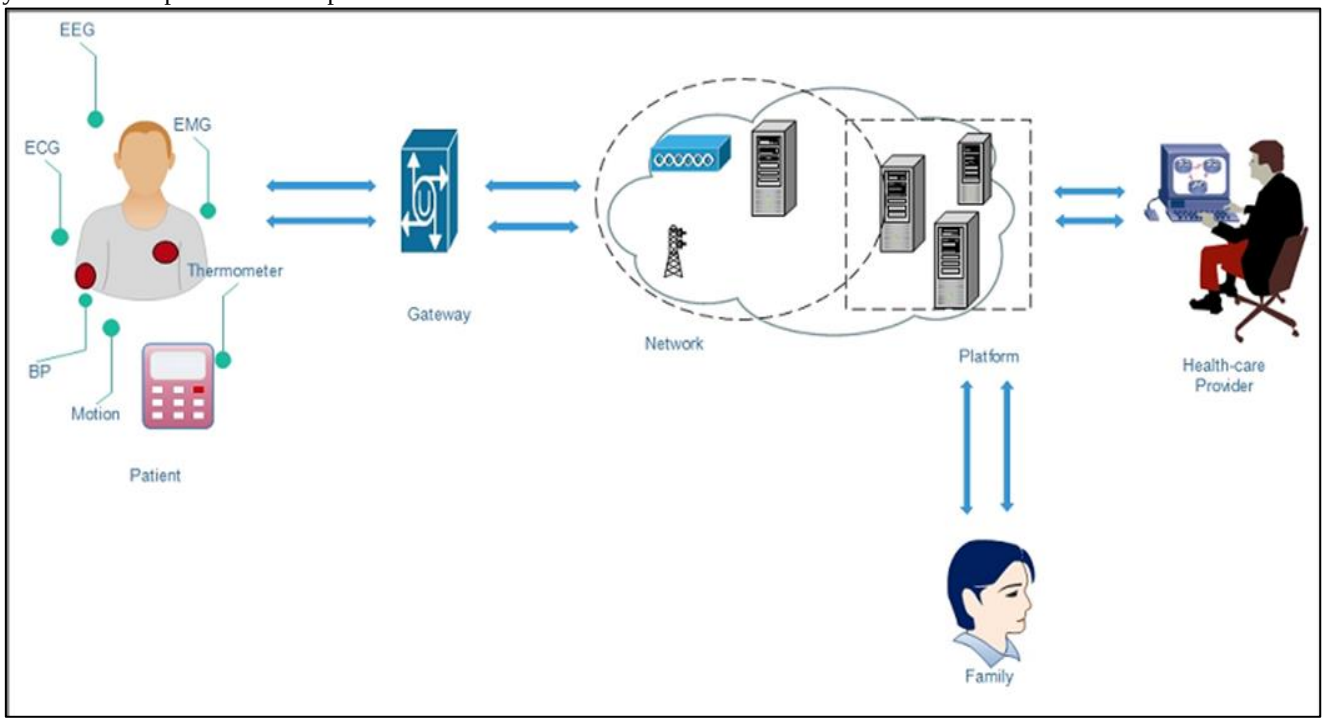

Fig. 1: System Architecture

IV. SUMMARY & CONCLUSION

We reviewed the current state and projected future directions for integration of remote health monitoring technologies into the clinical practice of medicine. Wear-able sensors, particularly those equipped with IoT intelligence, offer attractive options for enabling observation and recording of data in home and work environments, over much longer durations than are currently done at office and laboratory visits. This treasure trove of data, when analysed and presented to physicians in easy-to-assimilate visualizations has the potential for radically improving healthcare and reducing costs. We highlighted several of the challenges in sensing, analytics, and visualization that need to be addressed before systems can be designed for seamless integration into clinical practice.

REFERENCES

[1] "BSN-Care: A Secure IoT-based Modern Healthcare System Using Body Sensor Network"- Prosanta Gope, Tzonelih Hwang* 2015.2502401 IEEE Sensors Journal.
[2] "Towards Realizing a Self-Protecting Healthcare Information System" Qian Chen and Jonathan Lambright -2016 IEEE 40th Annual Computer Software and Applications Conference
[3] "A Mobile Health Monitoring Application for Obesity Management and Control Using the Intemet-of-Things",Mohamed Alloghani Abir Hussain!, Dhiya AI-Jumeily!, Paul Fergus!, Omar Abuelma'atti, Hani Hamden.
[4] "Exploiting the FIWARE Cloud Platform to Develop a Remote Patient Monitoring System" Maria Fazio , Antonio Celesti , Fermn Galan Marquez, Alex Glikson, Massimo Villari.

[5] ”A Health Care Self-Monitoring System for Patients with Visual Impairment using a Network of Sensors”,Oana GEMAN1, Iuliana HIUCHISAN The,5th IEEE International Conference on E-Health
[6] ”Health Monitoring and Management Using Internet-of-Things (IoT) Sensing with Cloud-based Processing: Opportunities and Challenges.” Moeen Hassanalieragh, Alex Page, Tolga Soyata, Gaurav Sharma, Mehmet Aktas, Gonzalo MateosBurak Kantarci, Silvana Andreescu.
[7] ”Internet of Things: Remote Patient Monitoring Using Web Services and Cloud Computing” - 2014 IEEE International Conference on Internet of Things (iThings 2014), Green Computing and Communications (GreenCom 2014), and Cyber-Physical-Social Computing (CPSCom 2014)
[8] ”Survey Based Analysis of Internet of Things Based Architectural Framework for Hospital Management System.”-Amna Pir, M. Usman Akram, Muazzam A. Khan., 2015 13th International Conference on Frontiers of Information Technology
[9] S. Pai, M. Meingast, T. Roosta, S. Bermudez, S. Wicker, D. K. Mulligan , S. Sastry, ”Condentiality in Sensor Networks: Transactional Information,” IEEE Security and Privacy Magazine. 2008
[10] J.W.P. Ng, B.P.L Lo, O. Wells, M. Sloman, N. Peters, A. Darzi, C. Toumazou, G. Yang, ”Ubiquitous Monitoring Environment for Wearable and Implantable Sensors (UbiMon),” Proceedings of 6th International Conference on Ubiquitous Computing (UbiComp04); Nottingham, UK. 714 September 2004.
[11] Ofce for Civil Rights, United State Department of Health and Human Services Medical Privacy. National Standards of Pro-tect the Privacy of Personal-Health-Information. Available online: http://www.hhs.gov/ocr/privacy/hipaa/administrative/privacyrule/inde x.html (accessed on 15 June 2011).
[12] R. Chakravorty, ”A Programmable Service Architecture for Mobile Medical Care,” Proceedings of 4th Annual IEEE International Conference on Pervasive Computing and Communication Workshop (PERSOMW06); Pisa, Italy. 1317 March 2006.
[13] J. Ko, J. H. Lim, Y. Chen, R. Musaloiu-E, A. Terzis, G. M. Masson, ”Me-dian: Medical Emergency Detection in Sensor Networks,” ACM Trans. Embed. Comput. Syst. vol. 10, pp. 129, 2010.
[14] P. Rogaway, M. Bellare, and J. Black. OCB: A blockcipher mode of opera-tion for efcient authenticated encryption. ACM Transactions on Information and System Security (TISSEC) 6 (3) pp. 365403, 2003.
[15] T. Hwang, P. Gope, Provably Secure Mutual Authentication and Key Exchange Scheme for Expeditious Mobile Communication Through Synchronously One-Time Secrets. Wireless Personal Communications 77(1), pp. 197-224, 2014.
[16] P. Gope, T. Hwang, Enhanced secure mutual authentication, and key agreement scheme preserving user anonymity in global mobile networks, Wireless Personal Communications, DOI: 10.1007/s11277015-2344-z, 2015.

