International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 9 Sep. 2022, pp: 864-868 www.ijaem.net ISSN: 2395-5252

A Survey over Advancement of Health Maintenance Surveilling System in the Domain of IoT

Thipparthi Sathwika Reddy
Dept. of ECE
Guru Nanak Insitutions Technical Campus, Hyderabad
Konakanchi Yashwanth Dept. of CSE Sharda University Greater Noida

Date of Submission: 10-09-2022 Date of Acceptance: 20-09-2022

ABSTRACT: Currently, due to adverse environmental conditions there have been an overall impact over a person's mental and physical health. The maladies related to heart, respiration, mind stroke, etc. have been on inclination. Thus, it is of utmost importance for common people to have regular medical check-ups to counter these hazardous conditions. Since, today a normal human being is so engrossed in his/her work that he/she wants everything on its desk. Thus, smart technologies have came into action and such advancement has been made in medical domain as well. IoT based Health Maintenance Surveilling System (HMSS) has emerged as one such prominent outlook.As a result, the technology uses varied sensors through which it cansurveil different human activities and collate the data and thereby infer some conclusions through their doctors or the caretakers. This would give an edge to the doctors to monitor a patient more efficiently. In this articulation, an elucidation has been made to infer diverse technologies revolving around Health Maintenance Surveilling Systems displaying anomalies in apatient.

Keywords: Internet of Things (IoT), Health Maintenance Surveilling System (HMSS), Body Sensor Network (BSN), E-HealthCare, RFID, etc.

I. INTRODUCTION

The colligation of Internet and varied network collations to different gadgets and sensors is termed as Internet of Things (IoT). Moreover, it's the amalgamation of Devices and Sensors with mechanical and tangible "Thing" [1]. It's the technological domain which has blossomed over various domains such as Education, Agriculture [2], Security, Automobile [3], IT Industries, Smart Vehicular System [4], etc. The emanation of IoT in Health Sector is now flourishing giving potent validation for its applications. The main motive of integration of IoT in Health Systems is to provide a clear and efficient explication, thereby contributing towards good health facilities all around the globe irrespective of time constraint. As a result, to formulate something more budget friendly which canbe applicable to common mob. Thus, toadvance patient health surveillance it's necessary to ameliorate forbearing trackingdevices.

As human body conveys anomaly signs through varied physiological aspects it can be deduced through electrical signs to biochemical. The human bio signals can be efficiently extracted and can be usedtoinferbodily problems and reaction of a body towards the externalelements.

To prevent oneself from any baleful situation Vital Signs Monitoring is very basic and crucial for measuring and documenting any malady [5]. Electrocardiogram (ECG), Respiration Rate (RR), Heart Rate (HR), Blood Pressure (BP), Blood Oxygen Saturation (SPO2), Blood Glucose (BG), etc. are some usual vital signs [6].

II. RELATEDWORK

Utilization of Body Sensor Network connecting varied sensors that are imbibed inside or outside the human body provides a pliable and budget bounded outlook to patients as well as healthcare controllers. TheproposedsystemuseslightweightBodySensors which spontaneously records forbearing vital signs, thereby sharing the data with other installed devices storing data to give doctors an insight about the patient's condition in real-time through a web-page remotely.Theonlyrequirementforanyonetoaccess the data is the internet access. The major objective

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 9 Sep. 2022, pp: 864-868 www.ijaem.net ISSN: 2395-5252

of the proposed architecture here is to provide a collated one-shot solution for both the forbearing and the doctors[7].

Avitalsignmonitoringapphasalsobeenarticulated to monitor vital sign measurement. It accomplishes real-time vital sign tracking that allows doctors to elucidate the sign in a patient's malady phenomena offering them a normal lifestyle. The VITAL APP efficacy has to be inferred and scrutinized for real- timeusage.

It suffices the ability as an H-IoT gadget for spontaneousexaminingvitalsigns.Throughthisapp inamedicalcenter,itwouldhelpyousavingmanual mistakes and time. The paper also proposed surveilling based on IEEE 802.15.4 standard utilizing hardware module namely Sphygmomanometer, Pulse Rate Sensor, Body TemperatureSensor,etc.forvitalsignquantification such as temperature of body, Blood Pressure, and Pulse Rate [8].

The implementation of IoT based solutions for environs surveilling has been accentuated by using threedifferentWirelessSensors,i.e.,UserDatagram Protocol (UDP) - based Wi-Fi communication, Communication through Wi-Fi and Hyper Text MarkupLanguage(HTTP)andBluetoothSmart.All these are formulated through commercial discrete parts and provides support utilizing few resources related to hardware andsoftware.

The most proficient solution from the three was the Bluetooth Smart Communication, exhibiting higher efficacy and uplifts the procurement of systems dependentonthistechnologicalaspect.Thescrutiny among the three revealed the method that Wi-Fiand BLE are two paradigms rightful forexaminingapplicationsprominentlyinhibitingtheutilizationof Zigbee protocol [9].

An automatically sensing technology using varied sensor based connected networks has been put forwardasasmartpatientsurveillingsystem.Useof Sensors for collection of biological behavior of forbearing and transmitting the information to the IoT cloud has been elucidated. The architecture recognizes patient's intricate conditions by processing the data provided by the sensor and sequentially provides a notification to the medical practitioners.

The incorporation of Arduino 101 as primary controller has been done for collecting information of patient's health from varied sensors which are in connection with primary controller. It also utilized thinger.io IoT cloud paradigm as IoT cloud. The proposed system also formulated mobile application, which represents charts and patient's health data [10].

III. METHODOLOGY

Economical IoT Platform:

Itcomprisesoftwocriterionsi.e.,BodyAreaSensor System connected to Cellular Phone with Cloud Integration and Heart Rate (HR) and Respiratory Rate (RR) which can be subsumed as a structure known as EPIC sensor system. Economical microcontroller having a need of low-power can instantiate all of the body sensors combined with accurate analog preprocessing board. Shimmer can sample the sensor instead which delivers data to a mobile platform over a timid range through Bluetooth. The synchronization can be maintained through the shimmer device which has an ascendancy with the sensor data throughpre-filtered 3Doverview.

The data collected can be sent and stored overcloud platformsforfurtherprocessing.Moreover,thisdata can be delivered over Bluetooth or Wi-Fi to a cellular phone. The manipulation of the data can be carried out over a Smart Phone either Online or Offline. The data can then be uploaded to the cloud via Wi-Fi or GSM [11] aftercompilation.

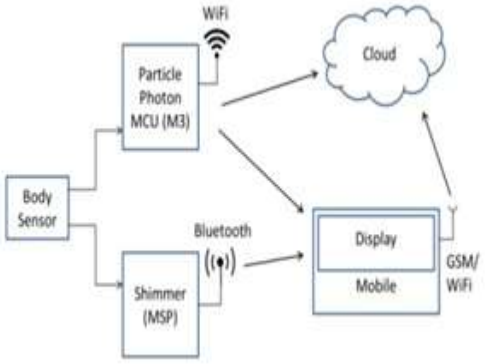

Fig .1. IoT Surveilling Network [11].

Body Sensor Network (BSN):

The methodology utilizes a collation of varied sensorsvehementlyconnectedtoatransmitterboard known as Arduino Fie. The module named as Xbee is integrated to the beneficiary called Arduino Receiver, through which it is connected to the forbearing device and all outputs are scrutinized in the Internet-Linked lab VIEW programme. This lab VIEW permits to create URL, which is accessible through anyPC.

Different sensors and embedded over a humanbody onseparateareasinassociationwithArduinoBoard.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 9 Sep. 2022, pp: 864-868 www.ijaem.net ISSN: 2395-5252

The output of LM35 temperature sensor is transformed to digital form with the aid of an Arduino Board. Pulse Rate Monitor, detects the rate indicatingthroughlightandtheintensityofthelight is based on the flow of the blood into the heart. LabVIEWoffersabiomedicaltoolkitprocessingthe ECG signal. The hand straps are used to tie the monitor around the wrist of a human and once a person presses the specified button it outputs systolic and diastolic pressures. The output values are represented through Arduino Serial Display [7], [12]

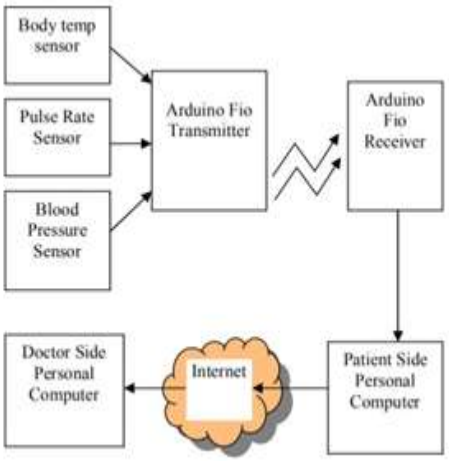

Fig .2. Structure of the System [7].

3. E-HealthCare:

In the plethora of upcoming technological advancements E-Health is an exponentially emerging domain in various paradigms of human sustainability. It delivers a key prospect to prominent health explication for each and every living individual. The prime goal of E-Health emphasizesupononutilizationofInternetforHealth Assistance with cost-effective corroborations to the hosts. The whole system of E-Health forms a pyramid like architecture formulating the scrutiny for most efficient health solutions at doorstep. All the functional outlook occurred confrontingmedical practitionersaremadeonlineandaccessiblethrough Internet.Aone-shotsystemfortheHospitalsaswell astheforbearinghasbeenelucidatedinculcatingIoT into its phenomenon. The medical cost which remains the biggest constraint through visiting the hospitals could be restricted through the proposed outlook. Also, the constraint of time and place can be eradicated thereby saving individuals time and money [13]. The solution if incorporated would create a great impact over the society and a person itself.

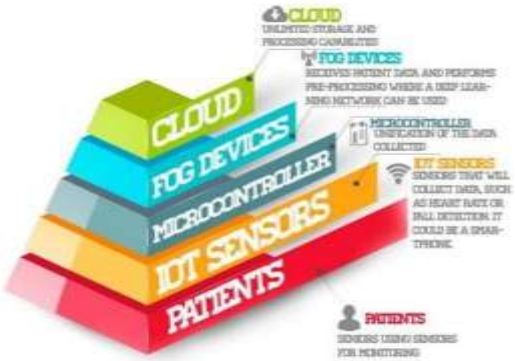

Fig .3. Structure of the E-Health System [13].

RFID Approach:

Radio Frequency Identification (RFID) engages radiowaveswhichreadandcapturesinformationon RFID Tags. These tags are placed over objects which needs to be tracked for any diverse purposes. These tags are imbibed with Transmitter and receiver.

Thus, RFID collated with IoT dominates a major aspect of Health Surveilling System. Varied sensors are embedded over human body to capture the present situation of the patient's health. There is trivial power consumption over Passive RFID tags and opposite for the Active RFID tags.

The prominent disadvantage of any health care paradigmistheprivacyofpatients.Toeradicatethis issue RFID tags are induced which encapsulatesand protects the forbearing information with its portability and usability [14], [15],[16].

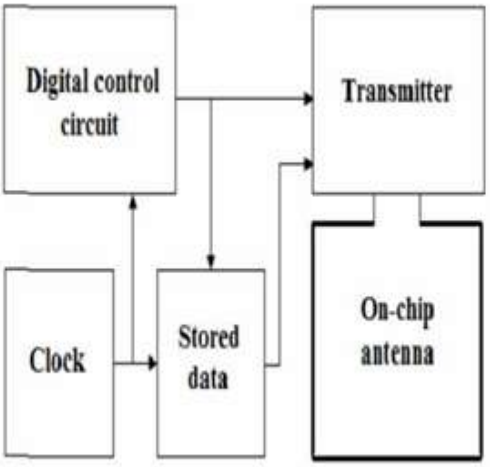

Fig .4. Architecture of incorporated RFID Tag [16].

IV. RESULT ANALYSIS

The analysis of the above methodologies has represented in pictorial format. The efficacy revolving around these outlooks are potent and

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 9 Sep. 2022, pp: 864-868 www.ijaem.net ISSN: 2395-5252

profuse in nature and the application in Health Maintenance Surveilling System could be phenomenal.
Fig.5, Fig.6, Fig.7 represents the methodological prospect specified above.

Trial No.	HR AAE COMPARISON		RR AAE COMPARISON	
	FFT ALORITHM	R-Peak ALORITHM	Nihon Algorithm	UCC Algorithm
1	0.86	**0.05**	1.18	**0.23**
2	1.53	**1.24**	**0.01**	0.27
3	**1.53**	2.36	**0.03**	0.26
4	1.93	**1.17**	**1.12**	1.75
5	**2.19**	4.66	**0.06**	0.29
6	**0.73**	3.63	1.14	1.77
7	**3.13**	4.91	2.36	**0.25**
8	4.33	**0.09**	**0.05**	0.28
9	1.56	**1.01**	**0.04**	0.31
10	5.26	**0.10**	**0.01**	1.7
Mean	2.32	1.92	0.60	0.72
σ2	2.20	3.53	0.66	0.5

Fig .5. Contrasting HR Average Absolute Rate (AAE) and RR Average Absolute Error (AAE) with different algorithms [11].

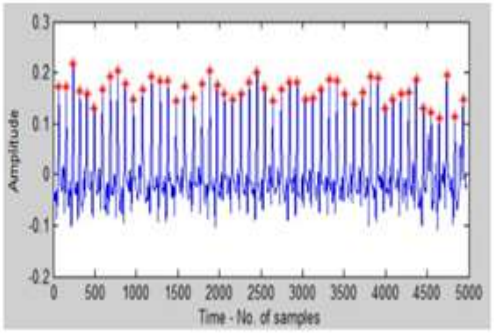

Fig .6. Results of R-Peak Algorithm [11].

Fig .7. Remote Panel Output with Published web page [7].

V. CONCLUSION

The paper emphasizes upon detection of vital signs of a human body for chronic diseases related to heart, brain, etc. The monitoring of these criterions is extremely necessary due to daily chores which a humangoesunder.Theelucidatedsystemshereplay an important role in making oneself aware about themselves and contributing towards the betterment of self and society. The aid to the hospitals and the medical practitioners in analysing an anomaly also has a deep impact over the domain. The data which needs to be processed is the biggest constraint in regulating the health-related systems. To eradicate thisproblem,wehavediscussedabouttheproficient solutions in this paper.

REFERENCES

[1] Md. Milon Islam, Ashikur Rahaman, Md. Rashedul Islam,"Development of Smart Healthcare Monitoring System in IoT Environment", SN computer science, Springer Nature Journal, 26th may 2020, https://doi.org/10.1007/s42979-020- 00195-y.

[2] Abdullah Na, William Isaac, "Developing a human-centric agricultural model in the IoT environment",2016 International Conference on Internet of Things and Applications (IOTA) MaharashtraInstituteofTechnology,Pune,India22Jan-24Jan, 2016,pp292-297.

[3] AakarshShrivastava,AnshulBhardwaj,NitashaHasteer,"IoT in Automobile Sector: State of the Art", 2020 10th International Conference on Cloud Computing, Data Science & Engineering (Confluence), 29-31 Jan. 2020,pp254-259.

[4] Kriti Chopra and Kunal Gupta, "Smart Vehicle Card Using IoT ", 2019 International Conference on Machine Learning, Big Data,CloudandParallelComputing(Com-IT-Con),India,14th- 16th Feb 2019,pp20-24.

[5] A.Raji, P.Golda jeyasheeli, T.Jenitha, "IoT Based Classification of Vital Signs Data for Chronic Disease Monitoring",Mepco Schlenk Engineering College, Sivakasi, India.

[6] Malcolm Elliott, Alysia Coventry, "Critical Care: the eight vital signs of patient monitoring", British Journal of Nursing, 2012,Vol 21, No10.

[7] Vikas Vippalapalli, Snigdha Ananthula, "Internet of things (IoT) based smart health care system", International conference on Signal Processing, Communication, Power and Embedded System (SCOPES)-2016,pp1229-1233.

[8] Manuel B. Gracia, Nino U. Pilueta, Moises F. Jardiniano, "VITAL APP: Development and User Acceptability of an IoT-BasedPatientMonitoringDeviceforSynchron

ousMeasurements of Vital Signs", 2019 IEEE 11th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), 29 Nov.-1 Dec.2019.

[9] George Mios, Silviu Folea, Teodora Sanislav, "Analysis of Three IoT-Based Wireless Sensors for Environmental Monitoring", IEEE Transactions on Instrumentation and Measurement (Volume: 66, Issue: 8, Aug. 2017),pp2056-2064.

[10] Mohammad Salah Uddin, Jannat Binta Alam, "Real Time PatientMonitoringSystembasedonInternetof Things",20174th International Conference on Advances in Electrical Engineering (ICAEE), 28-30 Sept. 2017,pp516-521.

[11] SimonCoulter,M.Mostes,G.Lightbody,E.Popovici,"Low Power IoT Platform for Vital Signs Monitoring", 2017 28th Irish Signals and Systems Conference (ISSC), 20-21 June2017.

[12] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3690007/.

[13] Kayo Monterio, Elisson Rocha, Emerson Silva, Guto Leoni Sntos, Wylliams Santos, Patricia Takako Endo, "Developing an e-health system based on IoT, fog and cloud computing", 2018 IEEE/ACM International Conference on Utility and Cloud Computing Companion (UCC Companion), 17-20 Dec. 2018,pp17-18.

[14] https://www.camcode.com/asset-tags/what-are-rfid-tags/

[15] Yasmeen Shaikh, V.K.Parvati, S.R.Biradar, "Survey of Smart Healthcare Systems using Internet ofThings(IoT)", International Conference on Communication, Computing and Internet of Things (IC3IoT), pp508-513, 2018.

[16] https://www.researchgate.net/figure/Block-diagram-of -the- implemented-RFID-tag_fig1_224142707 Dhaya, R., and R. Kanthavel. "A Wireless Collision Detection on Transmission Poles through IoT Technology." Journal of trends in Computer Science and Smart technology (TCSST) 2, no. 03 (2020):165-