IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 11, November 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.542

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542

|| Volume 9, Issue 11, November 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0911037 |

Review on Health Monitoring of Elder Persons Using IoT

Radhika K. Kulkarni[1],*, Sarita V. Verma[2]

PG Student, Department of Electronics and Telecommunication Engineering, Maharashtra Institute of Technology, Aurangabad, Maharashtra, India[1]

Professor, Department of Electronics and Telecommunication Engineering, Maharashtra Institute of Technology, Aurangabad, Maharashtra, India[2]

ABSTRACT: This health care scheme is focus on the measurement and monitoring various biological parameters of patient's body like heart rate (pulse monitoring), sweat sensors, emergency Switch and temperature using a WSN and android application where doctor and parent can continuously monitor the patient's condition on his smart phone using an Android application, the patient history will be stored and doctor can access the information whenever needed from anywhere and need not physically present. In this way, it simultaneously improves the quality of care through constant attention and lowers the cost of care by eliminating the need for a caregiver to actively engage in data collection and analysis.

KEYWORDS*:* IoT, , health monitoring, Heart beat sensor, Temperature Sensor, emergency Switch, sweat sensors

I. INTRODUCTION

In this paper, we presented the design and development of a new integrated device for measuring heart rate using heart rate sensor to improve estimating the heart rate. As heart related diseases are increasing day by day, the need for an accurate and affordable heart rate measuring device or heart monitor is essential to ensure quality of health. However, most heart rate measuring tools and environments are expensive and do not follow ergonomics. Our proposed Heart Rate Measuring (HRM) device is economical and user friendly and uses optical technology to detect the flow of blood. Three phases are used to detect pulses on the fingertip that include pulse detection, signal extraction, and pulse amplification. Qualitative and quantitative performance evaluation of the device on real signals shows accuracy in heart rate estimation, even under intense of physical activity.

Fig. 1. User high level system architecture

The Heart Rate Monitoring system is developed using IOT technology with an objective of detecting the heart beat of the patient in order to monitor the risk of heart attack and also the regular checkup. Body health monitoring is very important to us to make sure our health is in excellent condition. One of the vital parameter for this device under

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542

|| Volume 9, Issue 11, November 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0911037 |

consideration is the heart rate (HR). The heart is one of the most important organs in the human body. It acts as a pump for circulating oxygen and blood throughout the body, thus keeping the functionality of the body intact. A heartbeat can be defined as a two-part pumping action of the heart which occurs for almost a second. It is produced due to the contraction of the heart. When blood collects in upper chambers, the SA(Sino Atrial) node sends out an electrical signal which in turn causes the atria to contract. This contraction then pushes the blood through tricuspid and the mitral valves; this phase of the pumping system is called diastole. The next phase begins when the ventricles are completely filled with blood. The electrical signals generating from SA node reach the ventricle and cause them to contract. In today's scenario, health problems related to heart are very common. Heart diseases are one of the most important causes of death among men and women. It claims approximately 1 million deaths every year. Heart rate is a critical parameter in the functioning of the heart. Therefore heart rate monitoring is crucial in the study of heart performance and thereby maintaining heart health.

This paper proposes a heart rate monitoring detection system using IoT. Nowadays treatment of most of the heart-related diseases requires continuous as well as long term monitoring. IoT is very useful in this aspect as it replaces the conventional monitoring systems with a more efficient scheme, by providing critical information regarding the condition of the patient accessible by the doctor. In addition, the nurses or the duty doctor available at the hospital can monitor the heart rate of the patient in the serial monitor through the real-time monitoring system.

II. LITERATURE SURVEY

Ming Dai et.al [1] Fetal heart rate (FHR) is an essential indicator of fetal well-being. The ultrasonic Doppler FHR detector is widely used to monitor the fetus's health due to its advantages of non-invasion, high sensitivity,and good directivity. However, the existing commercial Doppler FHR detector primarily uses an analog multiplier for demodulation, which has limited functions and insuf_cient sensitivity. The analog demodulation is performed only on a single-sideband signal(in-phase or quadrature) (IQ), which is impossible to derive the fetal heart movement's vector velocity. Moreover, repetitive recognition of the mitral valve's positive and negative motion easily causes the measured FHR twice the actual one (FHR doubling). Although the traditional digital demodulation FHR detector can obtain in-phase and quadrature demodulation signals, it needs a high-level _eld-programmable gate array chip and therefore cannot meet low-power consumption requirements in battery-powered situations. Herein we proposed a novel digital demodulation FHR algorithm using time-domain windowing. Then, we applied the algorithm into a low-power complex programmable logic device to achieve low-cost acquisition of vector velocity and suppress FHR doubling and _nally designed a hand-held, noninvasive digital Doppler FHR detection system for continuous perinatal detection. In this work, the comparison curve between the TREND curve generated by the simulator and the measured curve of our FHR detector was obtained.

Ahmed Bashar Fakhri et.al [2] In the disease diagnosis field, vital signs have an important effect to detect illness type of the human body. The measurement accuracy of patient vital signs plays an important part in medical applications. Consequently, the performance of these vital signs must be measured with high system accuracy.
This paper introduces an accurate measurement of the proposed patient vital signs monitoring system. A Wireless sensor network (WSN) for patient monitoring has been proposed to monitor three medical parameters; heart rate, SpO2, and temperature. The suggested system relies on ZigBee wireless standard connected with the Arduino Pro mini was able to monitor the patient parameters with high accuracy. Probability density function (PDF) is one of the common statistical analysis was used to confirm the performance of our proposed system. The system accuracy is achieved based on PDF relative to the benchmark devices. The measurement results revealed that the limits of agreement m±2sd of PDF are more than 99.4% for three parameters, which indicates that the proposed design is a reliable system.

Ambresh G. Biradar et.al [3] In this paper the primary motivation is to continuously monitor the health vitals of elderly in old age homes. In old age homes, the elderly residents generally have health issues, and it is critical to monitor their vitals in real time. In this regard, the development of an OpenThread based mesh system was carried out. The OpenThread mesh system of connected devices in which nodes were represented using Particle Xenon and Particle Argon which also doubled up as a capillary gateway/access point. All the nodes continuously monitored the bpm/pulse of the person and the data was communicated to the cloud client directly via capillary gateway. If a particular node was not in direct range of the capillary gateway, then the data which would hop over other nodes until it reached the capillary gateway. An android application was developed to fetch the data from the cloud database and display it in real-time. This application was developed such that an abnormal bpm value would trigger the application to notify an alert Message. A medication reminder is also implemented in the application to remind the residents when to take their medication.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542

|| Volume 9, Issue 11, November 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0911037 |

Hafida Saidi,et.al [4] The majority of older persons are challenged by chronic illnesses, so more innovations are needed for geriatric care. Therefore, technological and modern techniques have been adopted to improve the elderly's health. Different computing solutions have been deployed to store and process the health data such as cloud computing which provides powerful computing resources. However, connecting different kind of things directly to the cloud is inefficient. Fortunately, fog computing has emerged as a new computing solution to complement cloud, it allows computation and data storage closer to the IoT devices. However, managing health data stored in fog computing presents a major issue. It is necessary to consider the importance of performance, availability, storage, and privacy of data in fog computing. In this paper, we propose architecture based on Fog to Cloud computing which is a novel solution and innovative approach that contribute to enhance the synergy between the cloud and fog computing to facilitate the management of elderly health data. To analyze the performance of our model in Fog to Cloud environment, FogWorkflowSim toolkit has been used.

Mustafa F. Mahmood1,et.al [5] Wireless power transfer (WPT)–based magnetic resonance coupling (WPT-MRC) is an encouraging technique for medium-power medical devices and other similar applications. Most wearable medical devices are operated based on several batteries. Generally, the batteries of such devices cannot be used for an extended time and typically involve a replacing or recharging process. WPT-MRC is a candidate technology that can resolve the charging of such batteries or it can directly supply power to the medical device. This paper aims to design and implement WPT based on the spiral–spider coils (WPT-S/S) for transferring high power over different air gaps to address the power problem. A heart rate measurement unit (HRMU) was implemented practically to confirm the functionality of the presented WPT-S/S. The proposed system comprises three main parts: monitoring, measurement, and power. The power unit contains receiver/transmitter coils, a capacitor resonator, and a rectifier. The measurement part contains an Arduino Nano platform (microcontroller), an nRF24L01 wireless technology for transmitting the HR measurement to the monitoring unit, and the biomedical sensor (HR sensor). The WPT-S/S system achieved 87% transfer power efficiency and 10 W DC output power over a 5-cm distance between the source coil (transmitter) and destination coil (receiver) when a resistance load of 200 Ω was employed. Also, the spiral–spider configuration succeeded in achieving adequate DC output voltage (i.e., 5 V) for supplying the HRMU at a distance of 20 cm between the coils.

B Sumathy et.al [6] Patients and old age people suffering from Chronic, systemic diseases like heart diseases, asthma diseases, Alzheimer and dementia, Kidney diseases etc. needs regular health monitoring and extra care during any emergency. During the world of pandemic, those people suffered a lot and needed more attention from expert/ specialists. Due to the difficulty in consulting the expert specialists in person, wearable technology plays an important role, which evolved for ease of use and advancements for monitoring patient's health status. So, a wearable health monitoring system using IOT is proposed to monitor the regular health parameters periodically. The proposed system is a single integrated device consists of sensors for measuring vital physical parameters like pulse rate, respiratory rate, and temperature. Those data and initial predictions are sent via IOT cloud platform and expert opinions are received for further action as remote monitoring. If any critical changes are found, the same has been transmitted to doctor end and closest people of contact. If temperature changes are found below or above the standard value about 97 to 99 F, along with any respiratory difficulties with abnormal values are brought immediately to the notice of the specialist, due to the recent treats in covid. The sensor values are monitored time to time and connected to Arduino with GSM module for alert message. The proposed patient health monitoring system based on IOT helps the doctors and family members to keep track of the patient's health. The covid pandemic period also made us realize to monitor even normal healthy person, which is the need of the hour. Also, the unit is wearable, small in the form of belt/collar, light weight and cheap. The aim of the study is fulfilled, to prognosticate the possibility of unidentified or untreated health effects and monitor the patient health.

JIE LI, et.al [7] The elderly community has their particular needs and challenges with different routines. In the care institution, the elderly demand reliable medication services because of geriatric issues. However, the fact is medicine mismanagement potentially troubles them in terms of accidental and overdosed medicin intake. Also, any act of forgetting or delay in medicine delivery by the caregivers or family members would impact the medication safety of the elderly. This paper aims to propose a Medication Management System (MMS) to regulate medication mismanagement and automate medicine restocking procces using the drone. Int his case, the researchers proposed a design of medicine case powered by Internet of Things (IoT), which assists multi-user medication at the institutional level. For the medicine restocking purpose , the drone is used as in the pinpoint delivery approach to reload medicine once it runs out of usage from elderly residents. Hence ,MMS reinforces medication management and automates the medicine delivery in the elderly centres. Consequently, the proposed system contributes to the adoption of the latest IoT technologies for the elderly community.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542

|| Volume 9, Issue 11, November 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0911037 |

MING DAI et.al [8] Fetal heart rate (FHR) is an essential indicator of fetal well-being. The ultrasonic Doppler FHR detector is widely used to monitor the fetus's health due to its advantages of non-invasion, high sensitivity, and good directivity. However, the existing commercial Doppler FHR detector primarily uses an analog multiplier for demodulation, which has limited functions and in sufcient sensitivity. The analog demodulation is performed only on a single-sideband signal(in-phase or quadrature) (IQ), which is impossible to derive the fetal heart movement's vector velocity. Moreover, repetitive recognition of the mitral valve's positive and negative motion easily causes the measured FHR twice the actual one (FHR doubling). Although the traditional digital demodulation FHR detector can obtain in-phase and quadrature demodulation signals, it needs a high-level eld-programmable gate array chip and therefore cannot meet low-power consumption requirements in battery-powered situations. Herein we proposed a novel digital demodulation FHR algorithm using time-domain windowing. Then, we applied the algorithm into a low-power complex programmable logic device to achieve low-cost acquisition of vector velocity and suppress FHR doubling and nally designed a hand-held, noninvasive digital Doppler FHR detection system for continuous perinatal detection. In this work, the comparison curve between the TREND curve generated by the simulator and the measured curve of our FHR detector was obtained. The comparative experiment between the commercial FM-3AFHR detector and our proposed FHR detector was performed, and the relative error and standard error of the obtained FHR data were used to evaluate the two FHR detectors' detection accuracy.

Ahmed Bashar Fakhri et.al [9] In the disease diagnosis field, vital signs have an important effect to detect illness type of the human body. The measurement accuracy of patient vital signs plays an important part in medical applications. Consequently, the performance of these vital signs must be measured with high system accuracy. This paper introduces an accurate measurement of the proposed patient vital signs monitoring system. A Wireless sensor network (WSN) for patient monitoring has been proposed to monitor three medical parameters; heart rate, SpO2, and temperature. The suggested system relies on ZigBee wireless standard connected with the Arduino Pro mini was able to monitor the patient parameters with high accuracy. Probability density function (PDF) is one of the common statistical analysis was used to confirm the performance of our proposed system. The system accuracy is achieved based on PDF relative to the benchmark devices. The measurement results revealed that the limits of agreement m±2sd of PDF are more than 99.4% for three parameters, which indicates that the proposed design is a reliable system.

George Azzopardi et.al [10] The sustainability of the current healthcare system is being challenged by the growing percentage of the aging population. In addition to the financial sustainability entailed by such a trend, other challenges include the long delays in servicing patients, the consequent late detection of serious health issues, and the necessity of hospitalization. Despite certain risks, the majority of elderly people prefer to age in their own homes. As a matter of fact, studies show that elderly people who choose to keep living independently have longer life expectancies than those who join elderly homes. All these put together emphasize the need to develop technological solutions that autonomously monitor and enhance the well-being of the elderly in their homes.

Ambresh G. Biradar et.al [11] In this paper the primary motivation is to continu-ously monitor the health vitals of elderly in old age homes. In oldage homes, the elderly residents generally have health issues, an dit is critical to monitor their vitals in real time. In this regard, the development of an Open Thread based mesh system was carried out. The Open Thread mesh system of connected devices in which nodes were represented using Particle Xenon and Particle Argon which also doubled up as a capillary gateway/access point. All the nodes continuously monitored the bpm/pulse of the person and the data was communicated to the cloud client directly via capillary gateway. If a particular node was not in direct range of the capillary gateway, then the data which would hop over other nodes until it reached the capillary gateway. Anandroid application was developed to fetch the data from the cloud database and display it in real-time. This application was developed such that an abnormal bpm value would trigger the application to notify an alert Message. A medication reminderis also implemented in the application to remind the residents when to take their medication.

Sakil Ahammed et.al [12] Nowadays, most of the elder people get heart failure because they are not aware of their current heart rate when resting or doing some activities. Body temperature needs to be monitored remotely, even in the rural areas for diseases like COVID-19. IoT technology enables these facilities eliminating limitations of current healthcare system. The aim of this paper is to develop a remote health monitoring system that can be made with locally available sensors with a view to make it affordable, easy and accessible patients from rural areas. The proposed system is a real-time patient health monitoring system in which a patient’s heart rate, peripheral oxygen saturation (SpO2) and body temperature can be monitored remotely, 24 hours in a day. This IoT based remote viewing of the data enables a doctor or guardian to monitor a patient’s health condition away from hospital grounds.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542

|| Volume 9, Issue 11, November 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0911037 |

III. PROPOSED SYSTEM

We use four sensors: heat sensor, temperature sensor, sweat sensor and emergency switch monitoring sensor the block diagram of this hardware circuit is illustrated in Fig. 1. Sensor data are wirelessly transmitted to the MPU (Microprocessor Unit) Arduino for processing. The heat sensor can provide information about heart rate and the temperature related sensor provides the real-time temperature of body and if any type of emergency condition press emergency button . The interface for communication with other device is implemented by WIFI Module and for the storage on cloud, it has 64KB RAM, 512KB ROM, and 4MB Flash. Besides, the MPU collects these sensors' data and calculates the basic vital sign, such as heart beats, temp etc. And the MPU transmits theses sensors' data and the calculated values to the smartphone.

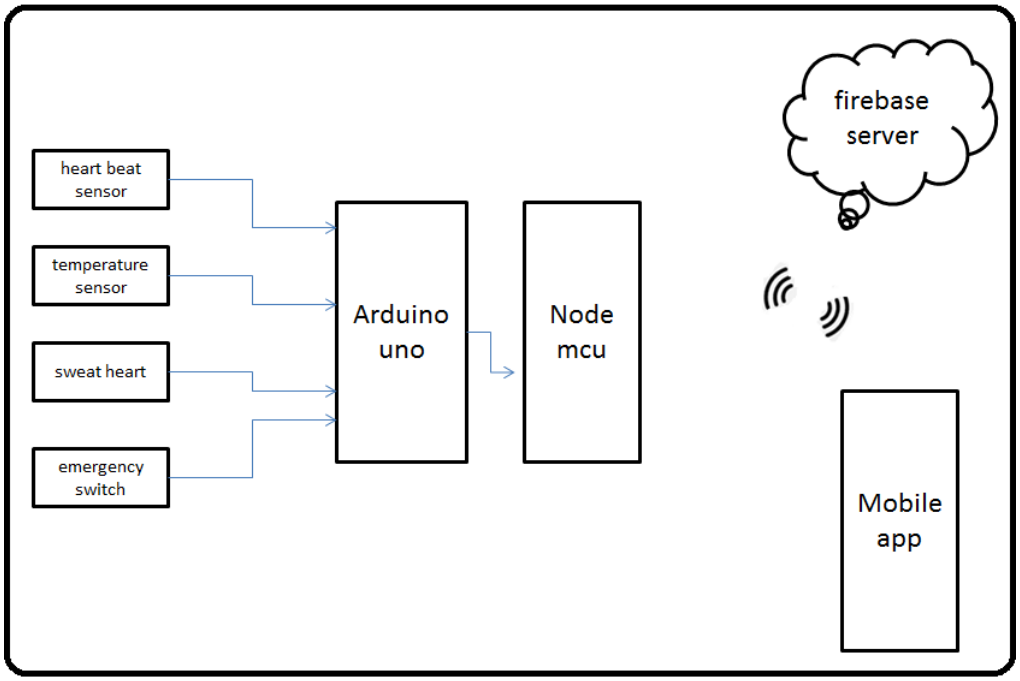

Fig 1 Block diagram of proposed system

To monitor user's health condition, we develop a software application base on the health monitoring system, which shows health related data on Android app. We use MIT App Inventor to design Android app.

IV. 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. The mobile personal health management system in this study includes study devices on hardware and with the management program as the software. The devices studied include a device for heart, sweat sensors, emergency switch and temperature measurement, Mobile devices and Wifi transceiver. The software management programs include 1. Data sensing and a decision makes system, 2. Send data to cloud) 3. Health and medical information system (android App).

REFERENCES

1. Ming Dai 1,2, Kai Zhan3, Rongchao Peng4, Jinfeng Xu1,5, Hui Luo 1,5, Yingying Liu1,5, Liangping Luo6, Huiying Wen7, And Siping Chen7 " A Novel Ultrasonic Doppler Fetal Heart Rat Detection System Using Windowed Digital Demodulation" Received April 16, 2021, accepted May 16, 2021, date of publication May 25, 2021, date of current version June 7, 2021.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542

|| Volume 9, Issue 11, November 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0911037 |

2. Ahmed Bashar Fakhri1, Sadik Kamel Gharghan1, Saleem Latteef Mohammed1, and Salah L. Zubaidi2 " Measurement Validation of Patient Vital Signs Monitoring System Using Wireless Sensor Netwo" 2020 IEEE 13th International Conference on Developments in eSystems Engineering (DeSE)
3. Ambresh G. Biradar_, Shubhang Johariy, Samarth S. Kulkarniz, Ameya Maheshwarix and Katam Venkatesh "OpenThread Based Mesh Enabled IoT Smart Device Cluster for Health Monitoring of the Elderly in Old Age Homes" Authorized licensed use limited to: University of Gothenburg. Downloaded on December 21,2020 at 12:31:56 UTC from IEEE Xplore.
4. Hafida Saidi *STIC Lab University of Tlemcen* Tlemcen 13000, Algeria hafida.saidi@univ-tlemcen.dz Djelloul Bouida *Faculty of Science University of Tlemcen* Tlemcen 13000, Algeria Nabila Labraoui *STIC Lab University of Tlemcen* Tlemcen 13000, Algeria nabila.labraoui@univ-tlemcen.dz Ado Adamou Abba Ari *LI-PaRAD Lab, University of Versailles* Saint-Quentin-en-Yvelines, France *LaRI Lab, University of Maroua,* Maroua Cameroon adoadamou.abbaari@gmail.com djelloul.bouida@univ.tlemcen.dz "Remote health monitoring system of elderly based on Fog to Cloud (F2C) computingAuthorized licensed use limited to: Middlesex University. Downloaded on November 02,2020 at 16:34:42 UTC from IEEE Xplore.
5. Mustafa F. Mahmood1, Saleem Latteef Mohammed1, Sadik Kamel Gharghan1, and Salah L. Zubaidi2 *1Department of Medical Instrumentation Techniques Engineering, Electrical Engineering Technical College, Middle Technical University, Baghdad, Iraq 2Department of Civil Engineering, Wasit University, Wasit, Iraq* musiraq86@gmail.com (M.F.M.); saleem_lateef_mohammed@mtu.edu.iq (S.L.M.); sadik.gharghan@ mtu.edu.iq (S.K.G.); salahlafta@uowasit.edu.iq (S.L.Z.) "Wireless Power Transfer based on Spiral–Spider Coils for a Wireless Heart Rate Sensor" 2020 IEEE 13th International Conference on Developments in eSystems Engineering (DeSE)
6. B Sumathy1*, S Kavimullai1, S Shushmithaa1, S Sai Anusha "Wearable Non-invasive Health Monitoring Device for Elderly using IOT" IOP Conf. Series: Materials Science and Engineering 1012 (2021) 012011 IOP Publishing doi:10.1088/1757-899X/1012/1/012011
7. Jie Li, Wei W. Goh, N. Z. Jhanjhi A "Design Of Iot-Based Medicine case For The Multi-User Medication management Using Drone In Elderly Centre" Journal Of Engineering Science And Technology Vol. 16, No. 2 (2021) 1145 - 1166© School Of Engineering, Taylor's University
8. Ming Dai 1,2, Kai Zhan3, Rongchao Peng4, Jinfeng Xu1,5, Hui Luo 1,5,Yingying Liu1,5, Liangping Luo6, Huiying Wen7, And Siping Chen7a "Novel Ultrasonic Doppler Fetal Heart Rate detection System Using Windowed Digital Demodulation "Received April 16, 2021, Accepted May 16, 2021, Date Of Publication May 25, 2021, Date Of Current Version June 7, 2021
9. Ahmed Bashar Fakhri1, Sadik Kamel Gharghan1, Saleem Latteef Mohammed1, And Salah L. Zubaidi "Measurement Validation Of Patient Vital Signs Monitoring System Using Wireless Sensor Network" 2020 Ieee 13th International Conference On Developments In Systems Engineering
10. George Azzopardi Dimka Karastoyanova Marco Aiello And Christos N. Schizas "Editorial: Autonomous Health Monitoring And Assistance Systems With Iot' Published In 18 March 2021
11. Ambresh G. Biradar∗, Shubhang Johari†, Samarth S. Kulkarni‡, Ameya Maheshwari§ And Katam Venkatesh "Open Thread Based Mesh Enabled Iot Smart Device Cluster For Health Monitoring Of The Elderlyin Old Age Homes" Authorized Licensed Use Limited To: University Of Gothenburg. Downloaded On December 21,2020 At 12:31:56 Utc From Ieee Xplore
12. Sakil Ahammed1, Nazmul Hassan2, Sheikh Hasib Cheragee3 And Abu Zafor Md. Touhidul Islam " An Iot-Based Real-Time Remote Health Monitoring System" Volume 8 Issue 3, 23-29, May-June, 2021.

INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 7.542

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details