

A Comparative Paper on Remote monitoring Emergency Medical System

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ABSTRACT— We are living in the era of innovative medical science there is lots of improvement did medical science, but still there are some issues are there where we are not able to resolve those problems. We have fast ambulance service with high tech based hospitals but still there we are lack in remote monitoring systems where patients can monitor remotely from the doctors. Individuals now a days are paying attention to wellbeing which help in anticipation as well as location of medical problem at introductory stage. Likewise, cutting edge advanced cells and clever devices like savvy and such have incredible effect on our lives. Different sorts of Sensors like for ECG Monitoring, estimating systolic weight and diastolic weight and heartbeat rate estimating sensors are being utilized in the devices, but all these system are lack in remote monitoring. Internet of Things gives stage to improvement of numerous wise devices & applications. IoT infrastructure gives base of availability and innovation. IoT intelligent gadgets can actualize the offices of checking wellbeing remotely and advising any medical problems in crisis. In this paper we did the comparative analysis based on the existing remote monitoring system. In terms of result analysis, we use two parameters which are time complexity and accuracy.

Key Words: Internet of things, SPO2, ECG, Heart Rate, Pulse Rate.

I. INTRODUCTION

Presently a days, wellbeing related issues are mounting at an extremely rapid. High death rate is a major worry for some nations. Subsequently, today there is necessity of time to overcome high death rate. We, thusly, are demonstrating a framework having a few remote sensors which will quantify wellbeing related data like internal heat level, pulse, saline level, heart beat rate, and so forth and transmit over web to be gotten to by other client at remote area. Consistent schedule patient's wellbeing database is made and recorded and the equivalent can supportive in examination by specialist, if necessary. This paper proposes a wellbeing looking at framework which is having capacity of breaking down different parameters and finding medical problems. Edge esteems are set dependent on past perusing from the database. At time of earnest circumstance when edge esteems are crossed, cautions will be created naturally which specialist can likewise observe for taking vital activities. Individuals now a days are paying attention to wellbeing which help in anticipation or potentially recognition of medical problem at introductory stage. Likewise, cutting edge advanced cells and clever contraptions like savvy and such have incredible effect on our lives. Different kinds of Sensors like for ECG Monitoring, estimating systolic weight and diastolic weight and heartbeat rate estimating sensors are being utilized in the contraptions. Monstrously effective work has been done in wellbeing assessment utilizing Raspberry Pi just as IoT. Here, in our paper, we are giving inserted idea of both. By utilizing blend of these, the

proposed model will be progressively successful. In this paper, we researched ongoing papers identified with wellbeing assessment frameworks &IoT. The idea of IoT is association of gadgets which will consequently bring and procedure to create clever information which will be helpful to give a superior life. This paper will show the advancement in clinical science innovation, and would be valuable in sparing patients from emerging medical problems and furthermore help specialists in taking important activities at a perfect opportunity to ensure patient's wellbeing isn't weakened.

India is the second most crowded nation on the planet. In spite of a few development situated human services arrangements embraced by the Government, monetary and territorial inconsistencies bring about deficient appropriation of medicinal services benefits in country zones [1]. The low financial status that wins in such zones keeps those individuals from bearing great quality clinical administrations. Absence of mindfulness about legitimate wellbeing rehearses and lacking access to clinical offices are two extra factors that lead to an expanded death rate in provincial territories. Moreover, Public Health Centers (PHCs) in country and remote regions have inadequate clinical professionals and clinical framework. The proportion of clinical experts to patients is alarmingly low contrasted with that in urban regions. It has been noticed that basic infirmities regularly lead to genuine wellbeing conditions in these regions. Along these lines, there exists a pressing need to offer far reaching mindfulness with respect to wellbeing [2], preventive consideration, self-checking and legitimate sanitation and cleanliness [3] so as to lift wellbeing principles among the country poor. Engaging residents and patients to deal with their own wellbeing conditions would bring about a progressively compelling medicinal services framework in rustic India. The ongoing past has seen significant increments in appropriation of innovation in social insurance due principally to mechanical forward leaps in the field of ease sensors, progressions in the field of Body Area Networks (BAN) [4] and presentation of the Internet-of-Things (IoT). Research and huge venture of assets have prompted the improvement of items that help screen individual wellbeing maternal wellbeing [5] and body wellness. Wearable minimal effort sensors and social insurance stages are presently promptly accessible for customized utilize and have been drifting for a long while [6-8]. Information recorded by these sensors is gathered in the cloud and clients are given helpful bits of knowledge by means of online frameworks. These clinical gadgets have demonstrated to be successful in improving wellbeing through consistent checking, convenient mediation of qualified specialists and simple access to wellbeing related administrations. Besides, they have the ability to rise above geological hindrances, offering a few viable wellbeing administration applications in rustic territories. One such application is the remote wellbeing checking of patients, which helps wellbeing laborers in better observing their patients and lessens acceleration of clinical issues even in areas with decreased access to inaccessible clinical offices. Remote observing permits clinical professionals to in a flash access present or chronicled wellbeing information whenever, empowering improved finding and proper treatment in an ideal manner. An advancement of this sort can possibly change the whole medicinal services industry as it arrives at zones that have little access to wellbeing focuses. The rate that such stages have been received in clinical/clinical parts is lower in provincial zones than in urban territories. Numerous variables, including reasonableness, absence of wellbeing related abilities and mindfulness, ignorance, and low infiltration of innovation, add to these low reception rates. This clarifies why such frameworks have so far had insignificant impact in clinical/clinical parts of provincial India. This paper depicts the idea of Amrita Jeevanam, which means to give a unique social insurance stage those objectives the necessities of rustic populaces. The segments that follow present an easy to-use framework which can be utilized for individual wellbeing observing in zones that have constrained or zero access to social insurance administrations. The stage takes care of human services needs, yet in

addition offers patients critical training and mindfulness with respect to ailments, medicines, and individual cleanliness. Web of-Things (IoT) offers the chance of interfacing numerous articles on this planet to a solitary worldwide system. In the IoT worldview, information can be gotten to by means of the Internet from each associated element. An element can be anything with a sensor that can give data about its physical environmental factors when associated with a system, subsequently rising above geological limits and making information internationally open. In the human services setting, IoT can get to information from sensors that measure essential wellbeing related parameters, for example, pulse, and blood glucose level [9-11]. Wellbeing sensors associated with the patient's body will stream information live to the system. Colossal volumes of information amassed along these lines over some undefined time frame can be utilized to give important experiences to specialists and clinical specialists miles away [12]. Amrita Jeevanam use the intensity of IoT, offering a stage for remote wellbeing checking and clinical intercession. Minimal effort wellbeing sensors are utilized to gather indispensable information from patients, which are then handled by a Medical Interface Unit. This insight is then used to foresee the nearness of any obsessive conditions in the patient's body. These expectations lead to arrangement of customized clinical direction to the patient for generally speaking improvement of wellbeing just as improved mindfulness and avoidance of future inconveniences. In this manner, Amrita Jeevanam is explicitly intended to be a simple to-utilize wellbeing stage, which can be worked by the semi-educated country populace in India.

Which can be portrayed as interconnection of exceptionally distinguished brilliant articles and gadgets. IoT is encircled by numerous items which are undetectably implanted in nature around us. Also, IoT gives wanted answers for tremendous applications, for example, traffic blockage, industry the executives, crisis administration, and medicinal services. To adequately screen remote patient wellbeing, IoT based social insurance applications are picking up force day by day. With the ceaseless advancement in Information and Communication Technology (ICT), clinical sensors give an answer for some clinical applications like patient action observing at remote side, diagnosing interminable sicknesses, and giving senior medicinal services. Also, the accessibility of clinical IoT gadgets lead to a superior route for determination the sicknesses. Likewise, the utilization of clinical gadgets, sensors, and demonstrative gadgets can be seen as savvy gadgets shaping a clinical IoT condition. IoT clubbed with distributed computing turns into a ground-breaking stage for observing patients at remote site giving nonstop wellbeing data to specialists and overseers. Distributed storage offers colossal measure of capacity and preparing abilities in an adaptable structure. Distributed computing headways can deal with asset sharing, equal handling, and information administration coordination with versatile information stockpiling, and security issues without any problem. Additionally, in the current situation, checking based cloud driven models can be utilized for the advancement of uses and administrations valuable in brilliant condition Necessary literature survey related previous research on Remote monitoring Emergency Medical System are given in II detection based previous work are given in section ii whereas section III describes research issue & future scope methodology & IMPLEMENTATION FOR THE PREVIOUS EXISTING APPROACHES. IV describes methodology & IMPLEMENTATION FOR THE PREVIOUS EXISTING APPROACHES. Experimental results and its analysis are given in section V. Finally, section VI concludes the paper.

II. LITREATURE REVIEW

Wellbeing observing stages incorporated with IoT/BAN exploit remote detecting capacities and are effectively reforming the human services space [13, 14]. Wearable sensors are utilized related to such stages to gauge crucial parameters [15, 16] and stream information to an obtaining device utilizing remote advancements, for example, Bluetooth, BLE, and Wi-Fi. Clinical/estimation information, gathered by a middle of the road gadget, for example, a door, is frequently transmitted to a remote server [17]. Transmitted information is put away in the remote server guaranteeing whenever accessibility and openness. Comparable stages are executed utilizing cloud-based frameworks to store the gathered clinical information [18]. Such wellbeing observing stages give an assortment of uses. One such application, for instance, performs investigation on the clinical information put away in servers to distinguish patients with high-hazard heart conditions [19]. Lee et al. [20] portrayed another model including bio-signal observing utilizing brilliant cell phones. Clinical investigation distinguishes trademark examples or patterns dependent on the gathered information. Enormous information clinical investigation in wellbeing stages [21, 12] gives important bits of knowledge to professionals that help distinguish appropriate analyses. Clinical information examination can likewise recognize varieties in clinical examples or foresee the chance and likelihood of fast approaching threat. Such an application, utilizing a wellbeing stage and omnipresent portable innovation as a ready framework, has been investigated in certain frameworks [22]. These stages rely upon Internet advancements and make direct mediation by qualified clinical professionals conceivable. With regards to remote and country Indian populaces that have low proficiency rates, need innovation, have little access to clinical focuses and are carefully cut off from rest of the world on account of no or conflicting web access, utilization of such a wellbeing framework has, as of not long ago, not been reasonable. The essential point of this venture is to address this test by executing an ease answer for provincial wellbeing observing and mindfulness. AmritaJeevanam is a coordinated, tolerant driven, medicinal services framework that enables country networks and improves in general soundness of residents by offering them open preventive consideration, wellbeing mindfulness, and self-observing. It encourages a framework and technique for gathering wellbeing data of patients, deciphering symptomatic readings and giving customized wellbeing input. This wellbeing checking stage is a mix of various ease wellbeing sensors, a Medical Interface Unit, and related multi-lingual, insightful programming. It fills in as a fringe medicinal services framework that can offer data on basic ailments. The framework bolsters network wellbeing laborers in the demonstrative, the executives, and announcing of country patients, and capacities well even with just discontinuous access to Internet. Key favorable circumstances of AmritaJeevanam incorporate that general society has boundless access to the framework and that normal checking of wellbeing can distinguish side effects of different regular conditions even at a beginning time. Besides, it permits patients to find out about their wellbeing, track their conditions occasionally and remotely record and transmit the information to their doctors. It additionally permits patients to get to their recorded wellbeing profile on the off chance that they have lost remedies or potentially directions.

Tushar[23], In this advancement gives straightforwardness to the patient shaving different sicknesses. Thus, visit of patients to the specialists continually has brought down on the grounds that different sorts of reports can be produced remotely and remotely at specialist's end at standard time frame. As a result of this ongoing improvement in logical innovation, specialists are sparing a few lives.

Yang[24], Here creator propose a lightweight break-glass get to control (LiBAC) framework that underpins two different ways for getting to scrambled clinical documents: trait based access and break-

glass get to. In typical circumstances, a clinical laborer with a characteristic set fulfilling the entrance approach of a clinical record can decode and get to the information. In new circumstances, the break-glass get to component sidesteps the entrance arrangement of the clinical record to allow timely access to the information by crisis clinical consideration or salvage laborers. LiBAC is lightweight since not many computations are executed by gadgets in the social insurance IoT arrange, and the capacity and transmission overheads are low. LiBAC is officially demonstrated secure in the standard model and broad examinations are directed to show its proficiency.

Prema[25], Here creator present a wearable wellbeing gadgets has made it simpler to screen wellbeing conditions and to interface specialists and patients in urban regions. Be that as it may, existing activities have not prevailing with regards to giving sufficient wellbeing observing to country and low-educated patients, as present techniques are costly, require steady availability and anticipate proficient clients. Our plan contemplations address these worries by giving minimal effort clinical gadgets associated with an ease wellbeing stage, alongside customized direction dependent on tolerant physiological parameters in nearby dialects, and cautions to clinical professionals if there should arise an occurrence of crises. This patient-driven coordinated social insurance framework is intended to deal with the general strength of residents with continuous wellbeing observing of patients, to offer direction on preventive consideration, and to expand wellbeing mindfulness and self-checking at a moderate cost.

Chao[26], Here creator present a framework is fundamentally made out of two sections: the information obtaining part and the information transmission part. The observing plan (checking parameters and recurrence for every parameter) is the key purpose of the information securing part, and we structured it dependent on meetings to clinical specialists. Numerous physical signs (circulatory strain, ECG, SpO₂, pulse, beat rate, blood fat and blood glucose) just as a natural marker (patients' area) are intended to be inspected at various rates consistently. Four information transmission modes are introduced facing patients' challenge, clinical investigation needs, requests for correspondence and registering assets into thought. At last, an example model is actualized to introduce a diagram of the framework. Prabal[27], In this structure figures the understudy ailments seriousness by foreseeing the potential ailment with its level by transiently mining the wellbeing estimations gathered from clinical and other IoT gadgets. To successfully examine the understudy human services information, a compositional model for savvy understudy medicinal services framework has been structured. For our situation study, wellbeing dataset of 182 presumed understudies are reenacted to create applicable waterborne diseases cases. This information is additionally examined to approve our model by utilizing k-cross approval approach. Example based determination conspire is applied utilizing different characterization calculations and afterward results are processed dependent on exactness, affectability, explicitness and reaction time. Naser[28], Here creator present the constant remote checking of patients is a significant issue in telemedicine. In the arrangement of social insurance administrations, quiet prioritization represents a huge test as a result of the mind boggling dynamic procedure it includes when patients are considered 'huge information'. As far as anyone is concerned, no investigation has featured the connection between 'large information' qualities and constant remote medicinal services checking in the patient prioritization process, just as the intrinsic difficulties included. Therefore, we present extensive bits of knowledge into the components of large information qualities as indicated by the six 'Versus': volume, speed, assortment, veracity, worth and changeability. Every one of these components is introduced and associated with a related part in the investigation of the association between quiet prioritization and realtime remote medicinal services checking frameworks.

Ananm[30], This paper centers around the improvement of a novel, fast and financially savvy tele-observing engineering dependent on an Arduino gadget equipment framework. The prime objective was to structure a model that could fill in as a solid patient observing framework, with the goal that social insurance experts can screen their patients continuously, who are either hospitalized in basic conditions or unfit to play out their ordinary day by day life exercises. In this work we have introduced an Arduino based financially savvy Tele-checking framework that can give continuous data about physiological states of a patient. Karthik[31], Here creator examine about the expanded utilization of Mobile Technologies and Smart Devices in the zone of wellbeing has caused incredible effect on the world. Wellbeing specialists are progressively exploiting the advantages these advancements bring, in this way producing a huge improvement in human services in clinical settings and out of them. In like manner, endless common clients are being served from the benefits of the M-Health (Mobile Health) applications and EHealth (social insurance bolstered by ICT) to improve, help and help their wellbeing. The point of this paper is to build up an engineering dependent on a philosophy equipped for checking the wellbeing and exercise routine suggestions to patients with incessant maladies. Priyan[32], Here creator proposed design comprises of two primary sub models, to be specific, Meta Fog-Redirection (MF-R) and Grouping and Choosing (GC) engineering. MF-R engineering utilizes large information innovations, for example, Apache Pig and Apache HBase for assortment and capacity of the sensor information (huge information) produced from various sensor gadgets. The proposed GC engineering is utilized for protecting reconciliation of haze processing with distributed computing. This design likewise utilizes key administration and information classification work (Sensitive, Critical and Normal) for giving security administrations.

III. RESEARCH ISSUE & FUTURE SCOPE

In this section basically we talk about research gap which need to be solved, As per the current era every things is smart but still our medical domain is not smart in terms of real time patient tracking system in terms of parameters like ECG, SPO2, temp, blood Oxidation %. In this field many research work on this but there is lots of research gap which needs to be solved , those research gap are followings:

- Connectivity issue due to use of GPRS technology as GPRS is work on 2G which is not good for this kind of application
- In Existing system, there is need of GPRS based connectivity.
- Mistake on hardware selection
- Heavy hardware:
- Cost is very high
- Accuracy is very poor
- Proper live tracking facility is not available
- No any emergency alert message send to doctor

As per the previous research there is lots of research gap which need to be solved in near future.

Future Scope on Remote monitoring Emergency Medical System

As per the previous research there is lots of research gap which need to be solved so in this work these are our objects which we will solve:

1. Reduction in Device Cost
2. Reduction in Hardware complexity
3. Reduction in Device Form factor complexity
4. Improvement in patient monitoring parameters through calculation of other parameters by using of real parameters.
5. Fast data transfer rate
6. We will use web platform
7. Our system will not face the connectivity issue.
8. Emergency alert message send to doctor
9. We will use WiFi Connectivity so power consumption will be less and it can work on the 4G technology
10. Blood pressure measurement through SPO2 parameters

So this is the future scope of this Remote monitoring Emergency Medical System which will give a new direction to the researchers.

IV. METHADODOLOGY

In this section we talk about the basic Remote monitoring Emergency Medical System, what kind of basic algorithm was used and what are the advance research is there. Here we did the complete comparative study and implementation of those approaches.

4.1 Tushar [23]:

As per this paper author proposed an approach for remote monitoring of some medical parameters which are:

1. SPO2
2. Blood Pressure
3. ECG
4. Heart Beat

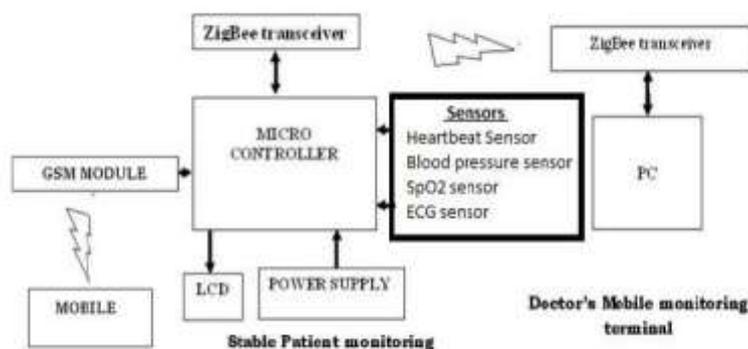


Fig. 4.1 Block Diagram

In this approach for communication point of view author use the zigbee and GSM technology. Here author create two section which are receiver & transmission , using zigbee they receive data and through GSM they send data to web server.

4.2 Chao [26]:

In this paper, author proposed an IoT-based coronary illness observing framework for unavoidable medicinal services administration. This framework screens the patients' physical signs, for example, pulse, ECG, SpO₂, just as applicable natural markers consistently, and gives four unique information transmission modes that balance the medicinal services need and interest for correspondence and processing assets. We additionally executed a model to introduce a review of the framework.



Fig. 4.2 Prototype System

4.3 Arman [29]: In this paper author create a system which is based on early stage wiring system, and alert will send to direct hospital. As we can see in fig. 4.3 it shows the architecture of there system.

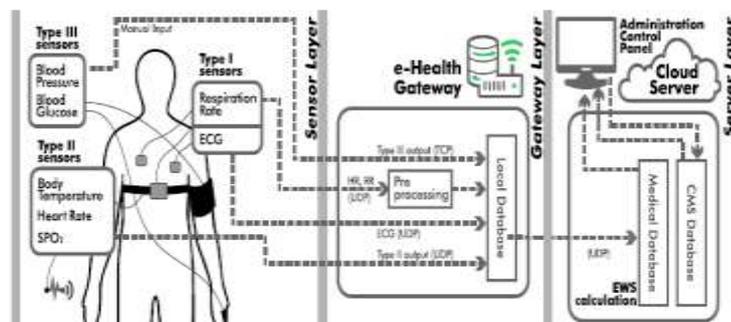


Fig. 4.3 IoT Architecture

4.4 Anam [30]:

In this paper author proposed a state-of-the-art, solid and savvy ongoing tele-checking framework for remote territory patient's utilizing Arduino UNO r3 equipment framework. they structured our own equipment circuits for getting the physiological boundaries (ECG, SPO₂ and temperature) from home-site. These equipment circuits were interfaced with Arduino UNO r3 based equipment framework for transmitting the obtained information to remote human services area.

V. RESULT & ANALYSIS

In this section we introduce the relative investigation of all with past existing methodology. Here we did the analysis of followings approaches:

1. Cost
2. Features
 - a. SPO₂
 - b. Blood Pressure
 - c. ECG
 - d. Heart Rate
3. Size

4. Efficiency

Table 5.1 Error Analysis

Process	Cost	Size	Feature	Efficiency
Tushar	High	Big	SPO2, ECG, Heart Rate	High
Chao	Low	Medium	SPO2	High
Arman	Very High	Big	SPO2, ECG, Heart Rate, Blood Pressure	Very High
Anam	Very Low	Medium	ECG, SPO2, Temperature	Low

As we can see in table 5.1 we did the comparative analysis based on some of the parameters as per the comparison we found that Arman approach is far better than in comparison of all others but still there is lots of improvement is require which research can target in future.

VI. CONCLUSION

These days, heart maladies cause in excess of 17 Million death in worldwide every year and are currently the main source of demise in the nation. For the most part, patients with heart infections

live at home and request social insurance administration when they feel wiped out. Be that as it may, for the most part they won't feel wiped out until the late phase of the ailment, and it is late to the point that the harms have just turned irreversible. What's more, a large portion of the patients bite the dust before they get any treatment. In this manner, the way to improve heart ailments medicinal services execution and diminish the demise rate is transforming the uninvolved social insurance mode into an inescapable way. In this paper we did the comparative analysis based on the different parameter and as per the analysis we found there is lots of improvement is require in current existing system.

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