

# A Study on Wireless Medical Support System for Elderly Citizens using Internet of Things

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**ABSTRACT:** Basically elderly citizen is assumed to be alright if he/she performs basic daily activities at regular intervals of time on his own. The elderly people prefer to live independently due to their mental conditions, but the self-regulating way of life involves high risks. Also normally elder people have the most common medical problems that have to be viewed quickly. They also cannot meet the physician more frequently, because some may even be bedridden for a long time.

A number of sensing systems for monitoring and assessing functional abilities of elderly behaviour in a smart home have been developed. Behaviour prediction methods relating to abnormal behaviour with temporal rules have been proposed. Simulation experiments have been conducted with the generic ambient agent-based model and the outcomes have been formally analysed. These methods lead to a high number of false alarms when their behaviour prediction techniques do not satisfy the conditions of the knowledge base. Also they have the capability to monitor the people only when the patient is within the given range.

Therefore we develop a patient monitoring system using Internet of Things for efficient monitoring. This System gathers patient's medical data and sends it using the IoT mechanism for patient monitoring and physician's prescribing. Data's are collected at regular intervals using sensors and the values are verified. These values must be free from errors and have security features so that no problem arises later. Patient can themselves check their own medical data using a bluetooth device, physician can overlook at the patients data from anywhere around the world using a common webpage. Emergency services are provided in case of medical value spiking and abnormalities. This can result in informing family members or local emergency functions at abnormal conditions.

**KEYWORDS:** Internet of Things, Bluetooth, Wireless Sensor Network, Monitoring Device

## I. INTRODUCTION

People are said to be normal and active if they themselves perform their personal duties. This actually means that, that particular person is both physically and mentally fit for a regular life. This tells us that the wellbeing of an individual is abnormal if he cannot perform his daily duties. Generally, people love being independent, free from all restrictions of the society, but when they get old they suffer both physically and mentally from this condition. That too the elder people when lack support, they may face severe situation and even accidents. More researches on these days report that a development of monitoring systems. These monitoring systems are being developed such that they help in unexpected situations for elderly people living alone.

The age span of people is actually decreasing, but leaving people independent is increasing in these days. Since the health condition of people start to get worse by the late forties, they actually suffer major problems both bodily and inwardly. This is evident from the surveys conducted recently all throughout the world. Excess consumption of junk foods and alcohol leads to obesity and other related problems which lead to unhealthy old age. Thus monitoring people at their experienced age is a severe problem that is currently being answered. Thus we are in need of developing solutions

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for the rising problem of elder people monitoring. Thus the wellness factor has to be calculated to whether the person is ok or not.

Thus a resourceful monitoring system is needed to record the daily activities of elderly person at home [1] [2]. The data analysis in actual time help us understand the changes in daily exercise and also will help in identifying if any assistance is required. The precautionary measure will definitely help in reducing the future medical expenses. A number of sensors and monitoring devices to help in analysing the people are available these days.

Behaviour prediction methods are actually more satisfying than preloaded data on a system. Consider a situation when an alarm goes on every time when the system encounters similar data even when not necessary. Thus to assess behaviour of occupant in a resourceful environment Predictive approach is practiced. Data collected are used to resolve the behaviour of inhabitant at different times by using prediction methods.

Remote human monitoring systems using WSN [17] were suggested during these days [14]. Software systems using various machine learning procedures are introduced into the wireless systems [4] [5]. Though these technologies are helpful, they are actually restricted to some activities. That is the necessary feature of an electronic system with low cost, flexibility, intelligent monitoring capabilities and accurate monitoring to be in demand.

This paper intends to present a proper overview of the problem faced by elderly citizens. This presents wireless sensor network related solutions by daily activity checking.

## II. RELATED WORK

The available systems are solutions provided by various technologies like the RFID technology, environmental sensor and so on. The RFID method is the basic method of gathering information at the previous years. But as technology advanced, the resulting usage of technologies also varied [3]. The crucial are the wearable sensors [7] [13] because the when elderly people are considered their pain can be intolerable to elder people. Also few may endure diabetes so blood loss cannot be easily accepted.

The available system proposes a depressed biosignal acceptance and analyzing system in turns of body sensor networks. It contains three main components: 1) for signal acceptance and initialization a high-pass sigma delta modulator related biosignal processor (BSP), 2) a depressed, super-regenerative on-off keying transceiver for short-range wireless transmission, and 3) for electrocardiogram (ECG) classification a digital signal processor (DSP) [6]. The BSP and transmitter circuits, which are the body-end circuits, can be operated for over 80 days using two 605 mAH zinc-air batteries as the power supply [8] [19].

The biosignals are noticed by the BSP circuits and transformed to digital values [18]. The data are then sent out by the transmitter. The values are attained and refined by the receiver and DSP. The receiving-end circuits and body-end circuits are the two main parts of the system. The design goals of the body-end circuits, which are comprised of the BSP and the transmitter, are 1) low power absorption for long-term usage and 2) acquisition resolution that is high enough for ECG signal allocation [9]. Given these two goals, the body-end components should have depressed circuit complexity and require a suitable architecture for the transceiver to achieve the demand for depressed power absorption. For the receiving-side components, the major objectives are 1) Radio Frequency signal recovery and 2) the bio signal classification recovery. However, the receiving-side components is fused into a monitoring and control service (MCS), which can come in the form of a smartphone or a simple computer. Unlike body-end components, recovering-end circuits do not urgently require depressed power usage, as these devices may share the same power source [8].

First, the frequency of biosignals is shifted by the chopper to a high frequency to avoid the injection of low-frequency noises such as flicker noise. Second, the frequency-shifted signals are amplified by the continuous-time feedback

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amplifier until the adequate voltage level for data conversion is achieved. Third, the amplified signal is handed over directly to the HPSDM without shifting the frequency back to the direct current (DC). The signal is inflected with quantization noise by the HPSDM. Finally, the signal with 1-bit stream output passes directly through the transmitter without the serial-to-parallel circuit. As the biosignals are over-sampled and modulated with quantization noise by the HPSDM, the modulated signals are similar to random signals because the depressed frequency noise is modulated in the spectrum. These random signals can go against channel noise during wireless communication. They can even avoid encryption by the encoder and tolerate the high bit error rate (BER) of RF transmission to save the power.

### III. PROPOSED SOLUTION

This paper recommends the design and use of a general architecture that will require minor modifications for a final customized implantable device rather than getting into a particular architectural topology and specifications which could be appropriate for a set of specific applications. This creates an infinite room for flexibility. The observation depends on conception of an event-detector and a True/False detector works as a ZigBee: when the analyzed concentration level exceeds, under or over, a brink value or the system identifies the ZigBee condition.

The intention of this paper is granting an analysis on the various issues involved in the evolution of the yGrand WSN-based solution such as requirements, functionality, hardware architecture, software design, applicable options and performance. Consequently, the most valued donation of the paper is the development, presentation and discussion of a completely new, operational cyber-physical system/application for healthcare support, involving scalable monitoring, sensors, smart phones, and/or other wireless mobile devices, and its field trial evaluation.

The yGrand system is either applicable to foster homes for the senior citizens or to senior citizens living on their own. In this regard, it provides better aspect of life, improves autonomy. Elderly citizens can move freely, either in private or public, carrying a personal monitoring device called Elderly Monitoring Device (EMD) with them. Caregivers can give support and monitor subject's status in real-time, evaluate historic data, confine persons in case they need assistance, and be alerted if something requires their attention. The system provides methods to monitor health conditions, including data gathering for processing and storage, alarm management, localization, remote access, several user profiles, and auto-configuration.

yGrand is reachable through a portal that executes user authentication and provides entry to system functionality according to the user profile. The system can be approached any time, from anyplace with just an Internet connection and using a large number of platforms, such as a computer or a smartphone. The user interface suits itself to the capacities of the device being used for accessing the system. The yGrand portal can be accessed by caregivers and controllers using any of several types of equipment such as smartphones, tablets and notebooks. In conditions if the equipment handled by caregivers has GSM/GPRS capabilities, they will be advised of alarm conditions via an SMS message. If they are logged in the portal, they will also be cautioned via the web user interface.

### IV. SECURITY ISSUES

The common security issues [16] experienced along with this process is listed below:

#### A. Data Privacy:

Data privacy is considered as the most important concern of all. The patient's medical record must be maintained as a secret. Also eavesdropping of this data cannot be permitted.

#### B. Data Freshness:

The collected data have to be fresh and recently collected. This cannot provide already available data for an emergency situation. Every condition is exclusive so must be the data. So only an exclusive data must be attained when collected at that specific condition.

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## C. Data Integrity:

The data collected may be confidential but it is still not free from external modifications. So proper steps must be taken in order to provide permission on who can modify the data. The shortage of one such method is not prudent in critical conditions like medical emergency.

## D. Authentication:

Authentication is mainly the qualification to provide user access. It is one of many essential requirements in a system. Authentication is used to mainly identify the user by finding the connector and server.

## V. BLUE TERM APPLICATION

The Blue term is an application created in the android application developing tool for proper output. This application is adaptable with all devices supporting Bluetooth connectivity. This Blue term application is used in this process because most of the devices support Bluetooth connectivity and the price of these devices is very low compared to other devices. This is just an emulator program that can help in Bluetooth application developments.

The main aim for the use of this emulator in this paper is to construct a self-assessment program for the patient. This service can be utilized by the patient if he is ok enough to overlook his own medical records. Using this application we can provide the patient's medical values continuously. The medical values can easily differentiate normal state with abnormal situations by the patient.

## VI. PHYSICIAN MONITORING

The physician is not always accessible by the patient. This is a practical difficulty faced by all people at all times. This must be considered as an extensive factor in medical monitoring. Consider a situation in which the patient suffers a medical crisis [10] [12] [15] say heart attack. Now the medical values of the patient will show abnormalities in it. This can be considered as an emergency and the physician will be allowed to look into the difficulty leaving things behind.

The physician is able to give medication even when the patient is on the way to the medical center for treatment. The nurse in the ambulance can also follow instructions corresponding to the doctor's advice and can save life of the patient or provide appropriate first aid. According to this method the medication to the patient starts even before arriving to the medical center.

The general condition is that the physician is actually provided with data of updated medical values from the patient every time when the value is recorded. This is furnished by a webpage where the physician can check the medical reports of his patients at short durations. A new web page can be created for this purpose or else it can be implemented in an available webpage. An alert can be given in case of difficulty and the physician can attend immediately. Also when the web page scenario is considered the medical values of the patient is stacked in a secured database. This web database is for the benefit and understanding of the patient's health condition by the physician.

## VII. CONCLUSION

In this method, we have completed mobility based elderly citizens support system by using IOT. In this method, we have used various sensors to know the health status of the elder person. The liberated living of elderly people are intense on accomplishing lives, but the self-regulating approach of life involve with risks, such as weakening, memory loss or impaired verdict and falls that limit mobility [11]. In precise, the daily activities engaging basic behavior like making breakfast or foodstuff, showering, walking, sleeping, watching television, reading books etc., is a fundamental indicator in regulating the performance of elder home activity. Then, the data is moved to the microcontroller. The microcontroller then transfers the data through IOT board to the PC. By providing monitoring, venue, alerting and service request functionality, the system improves the autonomy and status of life of elderly people. Implementing and deploying such a method was a challenging, innovative, and complex task, not only from a technical perspective, but

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also from architectural, functional and performance points of view. Thus, the elder person can move anywhere without have to lie on bed itself and we can monitor their health status through the internet.

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