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A Survey: SOS (Save Our Souls) facility for Elderly People using GPS and IoT

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***Abstract*: In the past few decades the major increment in sudden death due to the lack of prerequisite care and also not proper care of emergency. People are diagnosed with symptoms like body temperature fluctuations, high bp, profuse sweating, improper cardiac pulse and it can cause to sudden death and many peoples are victims of this type of deaths. Sudden death occurs when a heart attack, or sometimes an abnormal rhythm, stops the heart. Provide safety in this type of emergency situation is challenging and necessary. The Save Our Souls facility for elderly people which aims to provide the first aid service to the elderly people who are suddenly suffering from unconsciousness. The aim of this survey is to provide the direction for future research improvements.**

***Keywords*: Health care, Patient monitor, Remote Device, mobile phone device.**

1. Introduction

Health is one of the global challenges for human being. According to the constitutions of World Health Organization (WHO) the highest attainable standard of health is a fundamental right for an individual. A modernized health care system provides you good health care services at any place at anywhere and treats as a friend. Now a days, the health care system is undergoing a cultural shift from a traditional approach to a monitored the patient cantered approach.

For emergency medical care the PMS must also be incorporated with an alarm system. Alarm provides an alert signal so as to analyze the critical patient's data but it should also send alarming messages to the register number (Doctor) through GPS and IOT to the system. And android app is works to send the current location of the patient to the nearest ambulance and doctor. [1] The most innovative aspect of the adoption of a tele-monitoring system is represented by the means by which patients and healthcare professionals communicate and interact. Patients are directly involved in managing their health and wellness. Mobile devices, such as smartphones or tablets, Constitute the perfect instrument to monitor and give alert of a patient to healthcare system. The data coming from these devices to monitor the patient's state of health.

2. Existing system

To protect the ill patients & aged persons by embedded system based real time patient distance monitoring system using GSM/GPS technologies.

Mobile phone helps Patient to inform nearby doctor/ambulance Driver: The Mobile phone takes important role in patient monitoring to receive process and transmit patient details. To provide the first aid service to the elderly people who are suddenly suffering from unconsciousness android app works to sends the current GPS location to the nearest ambulance driver as well as to the doctor for emergency admission at the hospital.

A. Embedded sensing unit

It is a microcontroller interfaced with sensors and Bluetooth module for wireless communication with smart phone of the patient. The smart phone can be used to achieve wireless communication with the medical centre through the internet. Direct communication can be achieved between the patient and his/her authorized doctor. The doctor can communicate with the patient medical case through the internet.

Fig. 1. System architecture

- *Register Kit and patient:* Add the patient information and the kit id for registration of the patient and kit. Patient can add his previous history of medical treatments and prescriptions. The data will be stored on the server in an encrypted format using 128 bit AES encryption key.
- *Press SOS Button For help:* There is a button on a kit as well as on the android app. To call ambulance in emergency situation patient need to press any one of the buttons. This event will fetch the current longitude

and latitude from the GPS module placed on kit and send it on server.

- *Inform nearby doctor/ambulance Driver:* After getting the patients current location search for the nearest ambulance drivers and doctors and send the current location of the patient to driver and schedule the emergency appointment of the patient. Show Patient History: After the appointment scheduled doctor is able to check the previous history of the patient using the 128 bit AES decryption key, which helps him to avoid false treatment to patient.
- *Provide Data Security:* Data will be stored on server in an encrypted format, using 128 bit AES encryption key. While sharing the data with doctor the secret key will be encrypted using the RSA algorithm the public key of the doctor is used to encrypt the secret key. When doctor enters the key to open the data the encrypted secret key is decrypted using private key of Doctor and the data will be decrypted using the secret key and displayed to the doctor.

For embedded design to develop this system, small, reliable, and low power medical sensors should be considered. The number and type of the medical sensors are depending on patient health state.

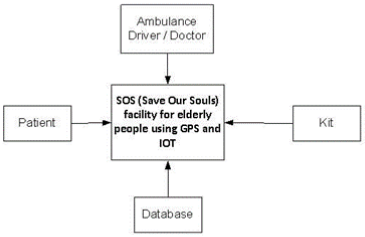

Fig. 2. Data flow diagram

B. Provide data security

Data will be stored on server in an encrypted format, using 128 bit AES encryption key. While sharing the data with doctor the secret key will be encrypted using the RSA algorithm the public key of the doctor is used to encrypt the secret key. When doctor enters the key to open the data the encrypted secret key is decrypted using private key of Doctor and the data will be decrypted using the secret key and displayed to the doctor.

Table 1
Wireless Technologies and their Features

Name	Standard	Frequency	Area Covered
Wi-Fi	802.11a	5.8GHz	<100m
GSN	-	Depends on N/W provider	850/900/1800/1900MHz
GPRS	-	Depends on N/W provider	850/900/1800/1900MHz
Bluetooth	802.15.1	2.4GHz	15-100m
WiMAX	802.16	2-11GHz	<10km
ZigBee	802.15.4	2.4GHz	<75m

Wireless Technologies and their Features:

The list of wireless technologies and also point out their key features such as standards, frequencies that are holding and finally the range covered [8].

3. Literature review

"R. Suji Pramila" et al solves demanding issue of in-home patient monitoring. Here the human body parameters are fetched by different ways through biosensors, wearable medical devices, and smart textiles. Then the collected details are forwarded to the remote server through the internet. Wearability, security, accuracy, outdoor monitoring and ease of use are some of the aspects in in-home patient monitoring system. A variety of system implementations were compared and evaluated to identify the technical shortcomings in the present health monitoring systems.

"Yunzhou Zhang1", et al It gives idea of an end-toend solution; specifically, (1) physiologic parameters, including respiration rate and heart rate, are measured by wearable sensors and recorded by a mobile phone which presents the graphical interface for the user to observe his/her health status more easily; (2) it provides doctors and family members with necessary data through a web interface and enables authorized personnel to monitor the patient's condition and to facilitate remote diagnosis; and (3) it also supports real-time alarming and positioning services during an urgent situation, such as a tumble or a heart attack, so that unexpected events can be handled in a timely manner.

"Amna Abdullah", et al introduced a reliable patient monitoring system so that the healthcare professionals can monitor their patients, who are either hospitalized or executing their normal daily life activities. In this work we present a mobile device based wireless healthcare monitoring system that can provide real time online information about physiological conditions of a patient. The system is designed to measure and monitor important physiological data of a patient in order to accurately describe the status of her/his health and fitness. In addition the system is able to send alarming message about the patient's critical health data by text messages or by email reports. By using the information contained in the text or e-mail message the healthcare professional can provide necessary medical advising. The system mainly consists of sensors, the data acquisition unit, microcontroller (i.e., Arduino), and software (i.e., Lab VIEW). The patient's temperature, heart beat rate, muscles, blood pressure, blood glucose level, and ECG data are monitored, displayed, and stored.

"Sachchidanand Jha" et al describes an Embedded ARM microcontroller connected to a set of medical sensors (related to the patient case) and a wireless communication module (GSM). Each patient is considered as a node in a wireless sensor network and connected to a central node installed at the medical center through an internet connection. The embedded ARM microcontroller checks if the patient health status is going well or not by analyzing the scan need medical signals. If the

analysis results are abnormal, the embedded unit uses the patient's phone to transmit these signals directly to the medical center. In this case, the doctor will send medical advice to the patient to save his/her life.

"Salvatore Naddeo" et al. A real-time monitoring system is introduced. The conceptualized to provide an instrument for patients, by means of whom they can easily monitor, analyze and save their own vital signs using wearable sensors and an Android device such as a smartphone or tablet, offering an efficient solution in terms of a decrease in time, human error and cost.

"N. M. Z. Hashim", et al describes wireless patient monitoring system that allows using in a wide range of area. The efficiency of data transferring led the Zigbee to be used in this study as to compare to the other wireless technology. Furthermore, the personalized Graphical User Interface (GUI) is important for a system to have for a minimal effect on both the patient and the measurement result. Without a convenient wireless patient monitoring system, the doctor cannot give full attention to the patients at all the times.

"Kasim M. Al-Aubidy" et al focuses on embedded microcontroller Connected to a set of medical sensors (related to the patient case) and a wireless communication module (Bluetooth). Each patient is considered as a node in a wireless sensor network and connected to a central node installed at the medical center through an internet connection. The embedded microcontroller checks if the patient health status is going well or not by analyzing the scanned medical signals. If the analysis results are abnormal, the embedded unit uses the patient's phone to transmit these signals directly to the medical center. In this case, the doctor will send medical advice to the patient to save his/her life. The implemented prototype has been tested and the implemented prototype has been tested and calibrated with standard devices.

Table 2
Comparison of various systems

Sr. No.	Paper Title	Journal	Publication Year	Advantages	Limitations
1.	Outdoor Wireless Healthcare monitoring system for Hospital patients based on ZigBee	IEEE	2012	with Z-Stack Designed an outdoor patients' healthcare monitoring system.	Keeping basic monitoring information of the patient with the help backup strategy to give acknowledgment to doctors.
2.	Real-Time Patient Health Monitoring and Alarming Using Wireless-Sensor-Network	IEEE	2016	This system provides real time monitoring and alarming system for patients like ICU	Used only for indoor patients not for emergency system for outdoor people
3.	Managing Comprehensive Wireless Patient Monitoring	IEEE	2007	Helpful for patients as well as disable people who requires autonomous operations with monitoring networks.	Context awareness and traffic management related challenges
4.	Privacy Conscious Architecture for improving Emergency response in smart cities	IEEE	2016	This system provides addresses for critical situations and give fast response	Data privacy and data security issues

"R. Veyilazhagan" monitors the vital signs such as temperature, blood pressure, heart rate, and gas sensor and fall detection. The system design consists of an Arduino controller andGSM900A. The monitored values can be sent through the mobile phones and if it detects abnormal state then it enables the buzzer and the information is passed to the concerned members through the mobile application. In case of monthly check up there is no need for the patient to go and meet the doctor with the proposed system. The patient can send an SMS as CHECK to test the body condition to detect the health condition of the Patient from the ECG signal. It will transmit the healthcare information to the concerned doctor's mobile phone through app.

4. Conclusion

The aim of this survey is to provide the direction for future of SOS system and improvements in this research. The Save Our Souls (SOS) facility for elderly people which aims to provide the first aid service to the elderly people who are suddenly suffering from unconsciousness. By pressing a SOS button it sends the current GPS location to the nearest ambulance as well as to the doctor for emergency admission at the hospital. There are different techniques and embedded sensing units are discussed in this survey paper.

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