Emergency Health Monitoring Assistance for Elderly People

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ABSTRACT
Ubiquitous elderly care has been a central priority for both study and business because of the fast-expanding ageing population and the resulting health and social care challenges. Any remedy must be conceived, executed, and verified utilizing domain expertise, regardless of how critical technology is in attaining these goals. Distant real-time surveillance of a patient's health could be used to predict illness relapses and so allow for early action to address these difficulties. A wearable health monitoring system for the aged is described in this research. To keep track on the elderly, employed wireless wearable sensors and smart phones. It may provide remote management for the elderly at any time and from any location, as well as personalized service for everyone depending on their specific health needs. When the smart phone detects an emergency, it will immediately alert pre-assigned persons, who may be the elderly person's relatives and friends, and summon the emergency center's ambulance. It also serves as a personal health monitoring system and medical guidance, providing a single interaction platform and medical expertise repository so that the served person's family and friends may work with physicians to care for him or her. The system also has certain special features designed to meet the needs of the elderly, such as a frequent notification, a rapid alarm, medical counselling, and so on.

Keywords
Healthcare; Assisted living; Health monitoring; Body sensor; Medical guidance

1. INTRODUCTION
Technology is a vital element of modern life, impacting how all work and live. Since it helps us manage and regulate our everyday activities, technology has a generally positive influence. Technological advances, on the other hand, can assist in overcoming the many obstacles that health and social care encounter in other sectors. Ambient Assisted Living (AAL) is a notion for designing new living spaces that combine social surrounds with cutting-edge technology to generate products and services that enhance the occupant's standard of living dramatically. Assistive solutions are influenced by many disciplines of research and technology, and several experiments have been done to verify their practicality.

To improve and enhance its use of assistive devices at home, several genres have been employed[1-5]. The term AAL, or Ambient Intelligence, refers to the gathering and incorporation of such technologies with the objective of supporting individuals in attaining their everyday goals. The incorporation and implementation of numerous technologies (for example, sensors) and associated fields are the focus of AAL (example - engineering, medical, computer science, etc.). Any system's main purpose is to detect human actions based on the sensory input. This is accomplished through providing context to findings (typically in the form of medical insight).

Older folks have trouble remembering different kinds of drugs. It is also vital to maintain track of health indicators like as heartbeat and spo2 because of uncertain health scenarios. There is presently no system capable of performing all these tasks at the same time. The elderly has trouble reading or interpreting the sort of pill, and they

often forget to consume it. Monitoring their health status, like heart rate and spo2, is also crucial.

Objective is to create a system that has the following features:

1. The technology should be able to identify abnormal heartbeat and spo2 levels and notify the caregiver through SMS.

2. The system should identify whether the individual wearing it trips and transmit a warning to the caregiver.

3. It should contain geofencing technology, so that if someone approaches the safe zone, the caregiver is alerted.

4. It should have a smart medicine reminder function that remind you to take a certain tablet at a specified time.

5. It's easy and affordable to make.

2. BACKGROUND STUDY
It is now simpler for nurses and doctors to work in a wide variety of clinical settings thanks to the usage of IoT technology (e.g., patient experience management, real-time tracking, and treatment management). The Body Sensor Network technology, which enables patients to be tracked using a tiny and lightweight wireless sensing system, is one of the most significant IoT advancements in the healthcare business. This technique will help with both the health program's real-time tracking of senior people's activities. In this approach, information gathered by numerous wearable devices is saved in real - time basis in a central database, linking citizens, doctors, and practitioners in a crisis with the appropriate information. The software will therefore increase an aged person's daily routine's comfort, security, and administration while also improving dependability, flexibility, and health expenses. Established the key network requirements for a conventional remote health monitoring systems, including bandwidth needs, data creation, and real-time incident upcoming[6-10]. Using the intended architecture for authentication and authorization, a hypothetical IoT-based healthcare system is assessed. One of the ways during which IoT applications might considerably enhance the health of

elderly people is health monitoring for positive and healthy living. Provided an IoT architecture that was created with your healthcare needs in mind. Data is collected and sent to the cloud for analysis and processing under the suggested system. SpO2, heart rate, and pulse rate are only a few of the signs that will be provided via continuous sampling at different levels, together with an environmental forecast (patient location)[11-19].

3. METHODOLOGY

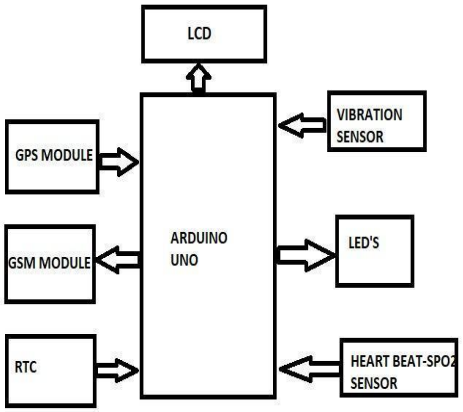

Figure. 1 Block Diagram

A. *Arduino Uno*

The suggested architecture makes use of an Arduino Mega 2560 microcontroller module, which is depended on the ATmega 2560 microprocessor. The microcontroller controls all the modules and works as a reason in achieving the expected result.

Figure. 2 Arduino Uno

B. *GSM Module*

The GSM module makes it easier to transmit and receive information on a cell phone. The GSM module has an antenna for accepting network signals via the user's mobile phone. For interaction, this GPS system is configured with AT instructions. The Transmitter (TX) and Receiver (RX) pins which is employed to communicate serially with the microcontroller. SIM state, signal strengthening, and connectivity are all checked via AT instructions.

Figure. 3 GSM Module

C. *GPS Module*

GPS stands for Global Positioning System, and it is a navigation process that monitors the precise location of the device or a location. GPS enables us to pinpoint the exact position of the gadget, reducing the risk of robbery.

Figure 4 GPS Module

D. *Vibration Gyro Sensor*

A vibration sensor is an electronic device that detects the frequency and magnitude of vibration in a structure, machine, or piece of machinery. These metrics may be used to spot asset imbalances or other problems, as well as anticipate future failures.

E. *RTC Module*

RTC is an electrical device that exists as an Integrated Chip (IC) that may be packaged in a variety of ways. The objective of a real-time clock, often known as an RTC, is to give exact time and date that may be utilized in a wide range of applications.

F. *Heart rate – SPO2 Sensor*

It's a sensor that includes a pulse oximeter and a heart rate monitor. It's an optical sensor that gets its measurements by producing two wavelengths of light – red and infrared – from two LEDs, then detecting the absorption of pulsating blood using a photodetector. This LED combination of colors is ideal for reading data with the tip of one's finger.

G. *Interfacing GSM Module to Arduino*

GSM modules may be connected to Arduino in two different methods. In any event, the GSM module and Arduino communicate serially. Consequently, must use Arduino's serial pins (Rx and Tx). You may thus link the Tx pin of the GSM module to the Rx pin of the Arduino and the Rx pin of the GSM module to the Tx pin of the Arduino if you choose to use this way. Now link the ground pins of the Arduino and GSM modules. Three connections later, the wiring is complete! You may now load a variety of apps to connect to the GSM module and get it to operate.

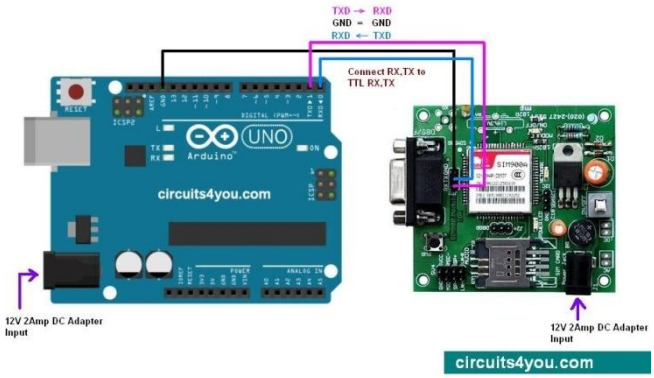

Figure. 5 GSM Module with Arduino

H. *Interfacing RTC module to Arduino*

Only 5 pins are present: 5V GND, SCL, SDA, and QW.

When you wish to ask the RTC chip for the time, you need to supply it with 5V of power.

•Attach GND to the shared power/data ground.

•Connect your Arduino's SCL pin to the I2C clock SCL pin. This is also referred as A5 on an Arduino UNO & '328-based board, digital 21 on a Mega, and digital 3 on a Leonardo/Micro.

Connect your Arduino's SDA pin to the I2C data SDA pin. This is also referred as A4 on Arduino UNO & '328-based boards, digital 20 on Mega, and digital 2 on Leonardo/Micro boards.

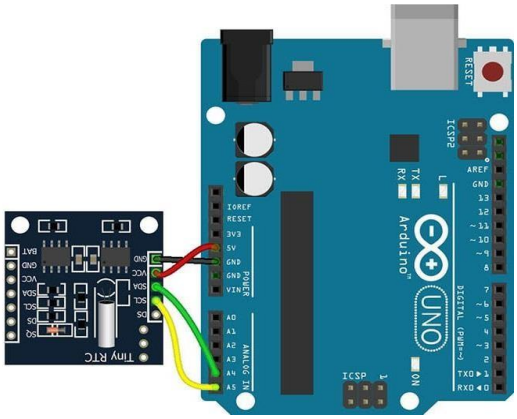

Figure. 6 RTC Module to Arduino

I. *Interfacing LED'S and Buzzer*

Inserted a led for illumination into each box. As a result of using three medicine boxes, the led in the first box is linked to the Arduino's pin number 8, the led in the second box is attached to the pin number 9, and the led in the third box is linked to the pin number 8. The Arduino's 7th pin is linked to a standard buzzer. To show if the heart rate data is read or not, another led is attached to the SPO2 D0 pin.

J. *Interfacing Heartbeat SPO2 to Arduino*

Supply, ground, and data pins are the three pins on the heart rate module. The ground of the module is linked to the ground of the Arduino, while the data pin is linked to the A 0 pin of the nodemcu. It's a sensor with a heartbeat monitor and a pulse oximeter. It is an optical sensor that gathers data by generating two light wavelengths—red and infrared—from two LEDs, and then using a photodetector to find the absorption of pulsing blood. The color scheme of this LED is perfect for receiving information with the tip of the finger.

4. IMPLEMENTATION

The system's brain is an atmega328 microprocessor, to which all the sensors are connected. The GSM module delivers SMS messages or contacts the caregiver, while the GPS module calculates the user's present position. Heart rate and spo2 sensor module is employed to monitor the user's condition, and if any irregularities in heart rate or spo2 module is identified, an SMS with the user's current position is sent to the caregiver. The caregiver can determine the range within which user can move. The caretaker will get an alert notification with the person's current position and a buzzing audio if the user exits the restricted area. The smart medibox uses an RTC (real-time clock) to remember you to take your prescription at a certain time. When a fall is noticed, a vibration sensor alerts the caregiver. In addition, the user is provided an SOS button that may be hit in an emergency. This will deliver the caregiver an SOS text with a live location.

5. RESULT

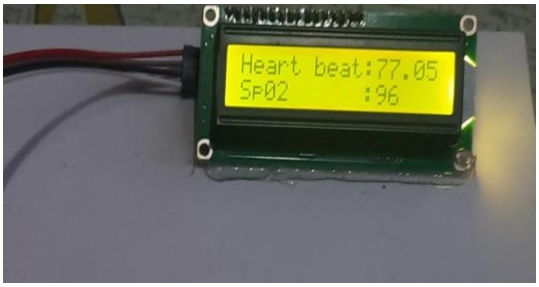

Figure. 7. Detection of SpO2 and heart rate

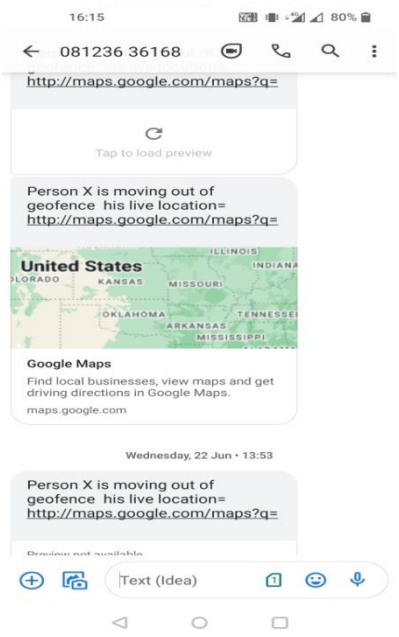

Figure. 8. Geofencing

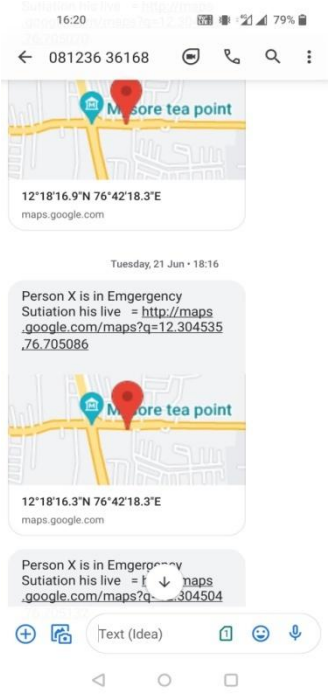

Figure. 9. GSM

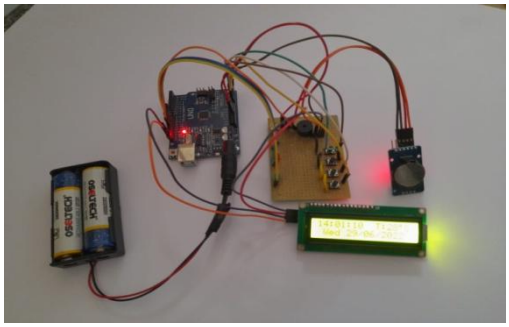

Figure. 10. Medibox

6. CONCLUSION

Created a mobile health surveillance system for the aged that will not only dynamically track them anywhere at any time and automatically alert the emergency service in the event of an emergency, but also operate as a live helper. As a live assistant, it performs supplementary duties such as frequent reminders and rapid alarms. At the same time, it serves as a personal health information system, allowing clinicians to observe current and previous conditions of the elderly, establish sensor thresholds, and provide remote advice, all of which are critical components of tele-monitoring of the elderly. Furthermore, the medical guidance, which incorporates a communication platform and a medical knowledge database, is intended to provide real-time medical advice to the elderly. Furthermore, approach recognizes the importance of friends and family, allowing them to collaborate with doctors to better care for the elderly. As a result, the technology will not only aid in daily life but will also contribute to healthcare advancement. The system is still in its early stages. The system's fundamental functionality has been implemented. There is still a plenty of work needs to be done in addition to enhance the present system. The following aspects will be the primary focus of future effort. To begin with, the application's user interfaces are clumsy. Depending on the peculiarities of the elderly, will design user interfaces more welcoming and predictable. In addition, the medical advice function, particularly the medical knowledge database, should be strengthened. Similarly, even if medical expertise records are obtained from medical professionals and an evaluation mechanism is created, it may experience a knowledge database bottleneck. To refine and improve this function, usually apply additional artificial intelligence technologies. Finally, while just the emergency center is created in the first stage, attempt to offer the concept of a regional emergency service. When the system detects an emergency in one subject, it notifies the regional crisis center whereby the subject corresponds. The rescue effort can be more efficient since the regional emergency is close to the issue and realizes the task-sharing of the urgent care center. However, the regional emergency response team must meet two requirements. The location tracking feature must be enhanced, and the local emergency response team is reliant on excellent community work. Furthermore, more unique features catering to the needs of the elderly will be investigated, as this system's distinctiveness is that it concentrates primarily on assisted living services.

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