

# International Journal of Innovative Research in Science, Engineering and Technology

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## Health Monitoring System for Elderly People using Internet of Things (IoT)

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**ABSTRACT:** In today's world where population is growing, we need to develop a solution for old age people regarding their medical conditions. The Internet of Things is a new reality that is completely changing our everyday life, and promises to revolutionize modern health care by enabling a more personalized, preventive and collaborative form of care. By combining this to things we provide IoT base health monitoring system for elderly people and provide them medical assistance in case of emergency. Using this system, we monitor some vital parameters of the elderly people such as Body Temperature, Heart Rate and sudden fall movement of a person. It required less power and has wireless characteristics, so it can be used anytime, anywhere and by anyone. The system is also able to store physiological data of patients for 24 hours a day and seven days a week.

**KEYWORDS:** Internet of Things, Heart rate and body temperature measurement.

### I. INTRODUCTION

The Internet of Things (IoT) is a concept which provide us the system of anyone, anything, anytime, any place, any service and any network. IoT is a megatrend in next-generation technologies that can impact the whole business spectrum and is the interconnection of smart objects and devices within today's internet infrastructure. Benefits are the advanced connectivity of these devices, systems, and services that goes beyond machine-to-machine (M2M) scenarios. Therefore, automation is introduced in every field. The IoT provides solutions for a wide range of applications such as smart cities, traffic congestion, waste management, structural health, security, emergency services, logistics, retails, industrial control, and health care.

According to this system, we can monitor the vital parameters of elderly people with the help of sensors and obtaining their information on the mobile phone of their loved ones or medical staff. The Parameters we measured with this system are **Heart rate, Body Temperature** and **the sudden fall movement** of an elderly people.

The system was developed taking in consideration the low-power and low-cost requirements, turning the solution suitable to be used by everyone at the comfort of their homes. Our solution is different from others by considering its easy interaction and integration with IoT-enabled networks, which offers a low-cost system that can be affordable by everyone.

### II. SYSTEM ARCHITECTURE

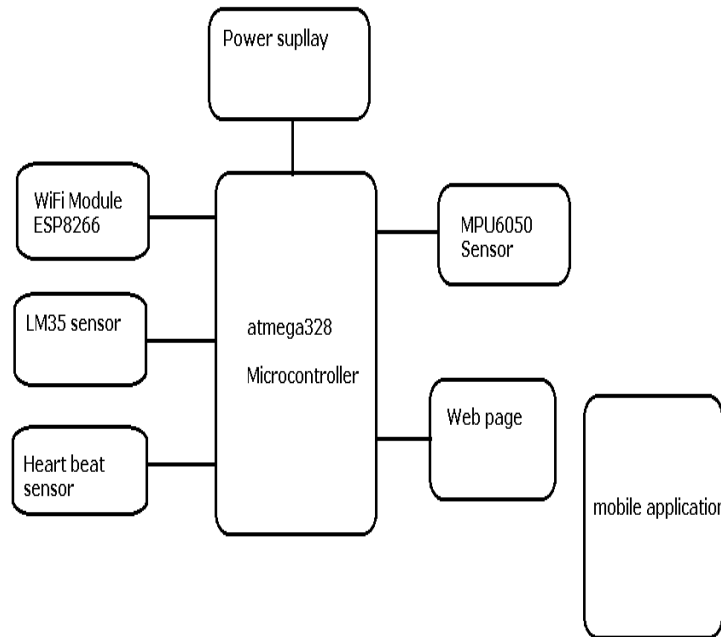
The implanted system is used to monitor the vital parameters of the elderly people. We monitor the Heart rate, body temperature and the sudden fall movement of the elderly person. For measuring the pulse rate we are using the Heart beat sensor, for body temperature LM35 temperature sensor, for detecting sudden fall movement MPU 6050 sensor (Gyroscope) is used. Monitoring parameters Information is obtained on mobile application or on the web page. Microcontroller ATmega 328 is centralised processor. Power supply is +5V regulated power supply with maximum current rating 500mA.

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**Fig 1: Block Diagram of a System.**

## III.HARDWARE DEVICES

### A.Atmega 328:-

The ATmega48P/88P/168P/328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. It achieves throughputs of 1 MIPS per MHz by executing powerful instructions in a single clock cycle, allowing the system designed to optimize power consumption versus processing speed.

The instruction set of AVR core has 32 general purpose working registers. All these registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. This architecture is more efficient in coding while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

### B.Wi-Fi Module(ESP8266)

The **ESP8266** is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by manufacturer Espressif Systems in Shanghai, China. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands.

The very low price and the fact that there were very few external components on the module, attracted many hackers to explore the module, chip, and the software.

### C.LM35 Temperature Sensor

LM35 is a 3 pin temperature sensor which requires a VCC and GND and the remaining third pin gives us an analog output. This output is then provided to the ADCs present in ATmega 16 IC which according to a formula calculate the temperature in °C format.

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The LM35 is precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors which are calibrated in ° Kelvin.

## D.Heart Bit Sensor

The heartbeat sensor is based on the principle of photo phlethysmography. The change in volume of the blood through any organ of the body is measured by this sensor which causes the change in light intensity through that organ. When heart pulse rate is to be monitored, the timing of the pulses is more important. The heart rate is decided by the flow of blood volume. As light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.

## E. MPU 6050

This sensor is a combination of a 3-axis MEMS gyroscope and a 3-axis MEMS accelerometer, and it is capable of processing complex 9-axis algorithms, captures the x, y, & z channel at the same time. It is very accurate due to the 16-bits analog to digital conversion hardware for each channel. The cross-axis alignment problems that can occur on discrete parts is removed by this sensor. It is very useful for some motion detecting. This small module integrate the logic level converter circuit (makes it compatible with 3.3V-5V voltage level) together with the MPU6050 sensor, you can integrate it to your project conveniently.

## IV.SOFTWARE DEVICES

### A.Arduino

Arduino is an open-source electronics platform which is flexible and it is easy-to use with hardware and software. It's use is intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments.

Arduino will receive the input from various sensors to sense the environment and can affect its surroundings by controlling lights, motors, and other actuators. Arduino programming language is used to develop code into the microcontroller. Arduino projects can either be stand-alone, or they can communicate with software running on a computer.

### B.Android

Android is Linux-based Operating System for mobile devices such as smartphones and tablet computers. Android offers a unique approach to application development for mobile devices according to this developers need to develop only for Android, and their applications should be capable to run on different devices powered by Android.

### Linux kernel

Linux Kernel handles basic system functionality like process management, memory management, device management like camera, keypad, display etc. Also, the kernel handles all the things such as networking and a vast array of device drivers.

### Libraries

Above Linux Kernel there is a Library layer which includes open-source Web browser engine Web-Kit, well known library libc, SQLite database which is a useful repository for storage and 26 sharing of application data, libraries to play and record audio and video, SSL libraries responsible for Internet security etc.

### Android Runtime

This section provides an important component called Dalvik Virtual Machine which is a kind of Java Virtual Machine specially designed and optimized for Android. The Dalvik VM has some features of Linux core like memory management and multi-threading.

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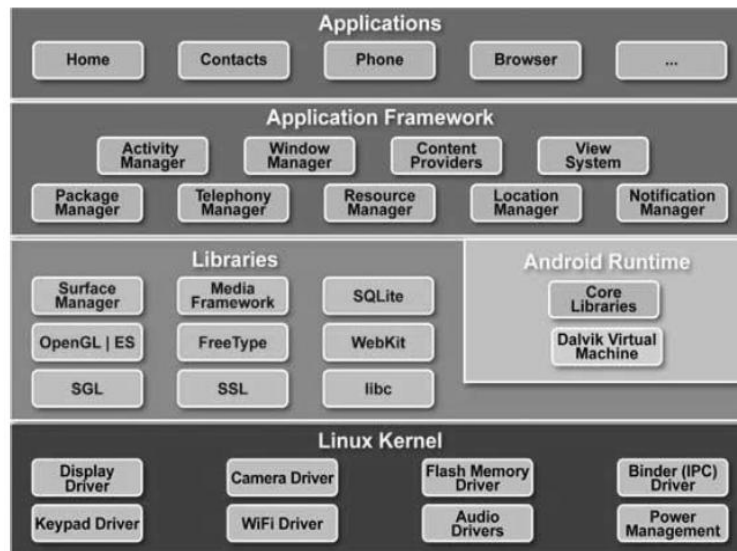


Fig 2: Android Architecture.

### Application Framework

The Application Framework layer defines many higher-level services to applications which are in the form of Java classes. Application developers make use of these services in their applications.

### Applications:-

Application layer is at the top of the architecture. Applications to be installed are written on this layer only. Application layer contains Contacts Books, Browser, Games, etc.

### C.Web Page Designing

Designing is a process of creating a plan and originating the development of a specific product. Once the product design is completed, it is used to start the production. Web design is the process of creating a web page's appearance in terms of the choice of a right colour scheme, page layout, fonts and much more. Every web page in a website has different content wise, but all the pages uses a similar graphic design.

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## V.RESULTS AND ANALYSIS

Fall detection of a person can be monitored with the help of gyroscope. Its axis helps to detect sudden fall of a person.

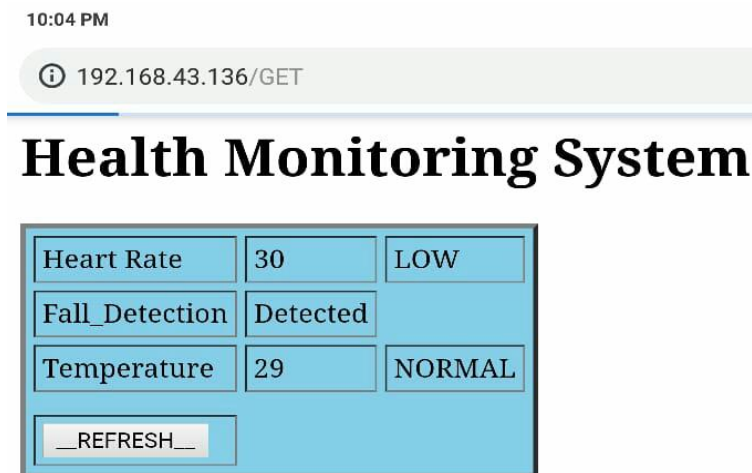


Fig 3: Detected fall movement.

We record the heart rate in the normal and low range. Pulse rate is varied according to the body movement of the person.

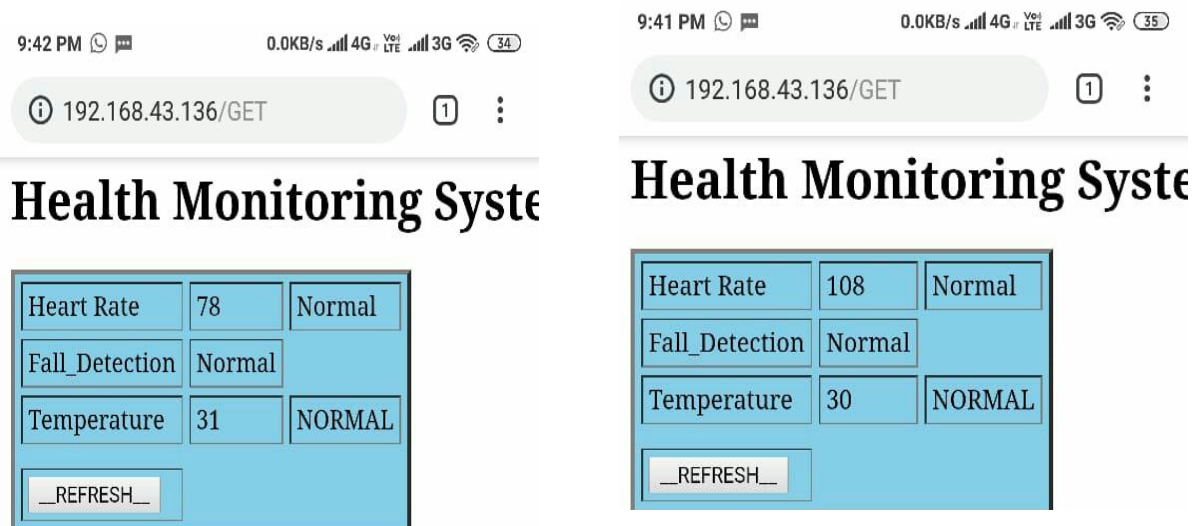


Fig 4: Normal Heart Rate.

We record the temperature values in the range of 27°C to 32°C. This readings are vary from person to person or from day to night. Sometimes the temperature may be varied according to climate.

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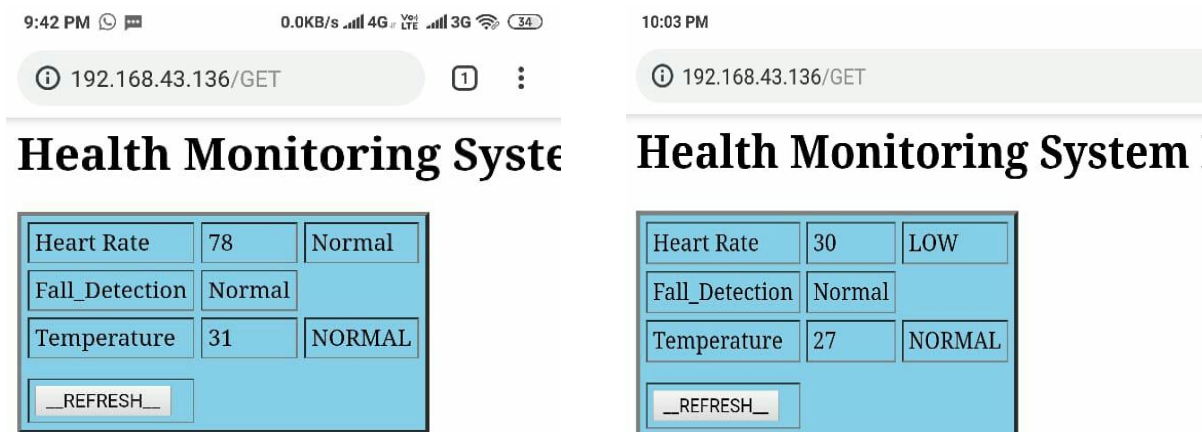


Fig 5: Result showing normal body temp.

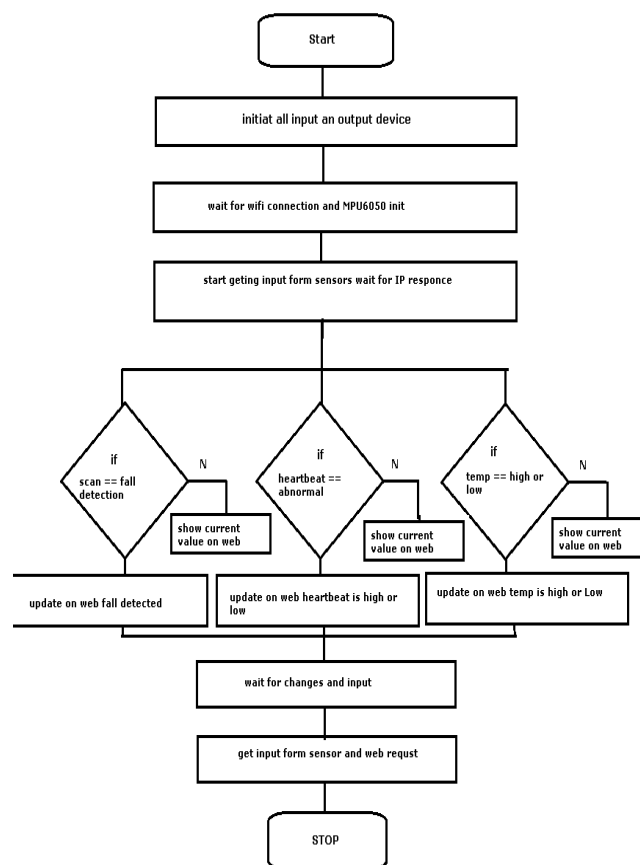


Fig 6: Flowchart.

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## VI.CONCLUSION

A reliable wireless healthcare monitoring system has been designed and successfully implemented in this work. The system has been field tested. The test results show that the system is able to monitor the body temperature, heart pulse rate, and sudden fall movement of the person with enough accuracy. Since the system is based on Internet of Things(IoT), we can conclude that it is a low power and low cost system. Moreover, major part of the system has been implemented in using Arduino software. Hence, the system is easily Reconfigurable and it can be connected to the Internet easily. The system is also able to store physiological data of patients for 24 hours a day and seven days a week.

Using this system we monitored vital parameters of a body and provide medical solution if parameters monitored are beyond the normal range. The data is real time. It is obtained on a web-page over the Wi-Fi. This system can assist the family members to maintain their lifestyle.

## VI.FUTURE SCOPE

Work in the near future will focus on the addition of new sensors to the system in order to collect data from other vital parameters such as the blood pressure and the sugar level sensor for diabetic patients. This will be particularly helpful to determine the evolution of patient's medical condition as well as to find patterns that may indicate the evolution of some disease. More experiments shall be conducted in order to evaluate the systems behaviour, in terms of performance and connectivity, both at the MAC and transport layers. From a different perspective, we will after look at the privacy and security issues relating to medical data, and as it flows from the connected 'things' to the cloud. We will focus on the low-end devices and develop a Trust Zone based solution.

## REFERENCES

- [1] G. Kortuem, F. Kawsar, V. Sundramoorthy, and D. Fitton, "Smart objects as building blocks for the Internet of things," IEEE Internet Computing, vol. 14, no. 1, pp. 44–51, Jan 2010.
- [2] L. Tan and N. Wang, "Future internet: The Internet of Things," in 2010 3rd International Conference on Advanced Computer Theory and Engineering(ICACTE), vol. 5, Aug 2010, pp. V5–376–V5–380.
- [3] A. Zanella, N. Bui, A. Castellani, L. Vangelista, and M. Zorzi, "Internet of Things for Smart Cities," IEEE Internet of Things Journal, vol. 1, no. 1, pp. 22–32, Feb 2014.
- [4] S. M. R. Islam, D. Kwak, M. H. Kabir, M. Hossain, and K. S. Kwak, "The Internet of Things for Health Care: A Comprehensive Survey," IEEE Access, vol. 3, pp. 678–708, 2015.
- [5] J. Ko, C. Lu, M. B. Srivastava, J. A. Stankovic, A. Terzis, and M. Welsh, "Wireless Sensor Networks for Healthcare," Proceedings of the IEEE, vol. 98, no. 11, pp. 1947–1960, Nov 2010.
- [6] D. Metcalf, S. T. J. Milliard, M. Gomez, and M. Schwartz, "Wearables and the Internet of Things for Health: Wearable, Interconnected Devices Promise More Efficient and Comprehensive Health Care," IEEE Pulse, vol. 7, no. 5, pp. 35–39, Sept 2016.
- [7] W. Lutz, W. Sanderson, and S. Scherbov, "The coming acceleration of global population ageing," Nature, vol. 451, no. 7179, pp. 716–719, 2008.
- [8] W. Suntiamorntut, S. Charoenpanyasak, and J. Ruksachum, "An elderly assisted living system with wireless sensor networks," in 2011 4th Joint IFIP Wireless and Mobile Networking Conference (WMNC 2011), Oct 2011, pp.1–6.