

ARM Controller based Remote Health Monitoring and Home Automation System

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Abstract:- The aim of the project is to come up with a Remote Health Monitoring System and Home Automation System that can be made with locally available sensors with a view to make it affordable. Hence the proposed architecture collects the sensor data through ARM7 microcontroller and the data is displayed through the website that helps Doctors or the guardian to assess the condition of the patient and it enables the doctor or the guardian to control the Home automation system.

The first part being, detection of patient's vitals using sensors, second for sending data to server and the last part was providing the detected data for remote viewing. Remote viewing of the data enables a doctor or guardian to monitor a patient's health progress away from hospital premises. Thus, with the use of sensors, we can reduce human errors as well as the occupied space in the room is also reduced due to the size of the system.

Keywords: ARM controller; Alarm; ECG; Pulse Sensor; temperature Sensor; Accelerometer Sensor; Home Automation; Appliance Control; GPS; MEMS;

1. INTRODUCTION

Internet-connected devices are acquiring vast potential as it pushes our daily life forward towards automation, and the rapid drop in price for typical components allows people to innovate new products. It is the combination of embedded systems, sensors, software and this can be also referred to as internet of everything. As health is one of the most important issues nowadays. At the same time, the internet is now easily available for mobile technologies, which makes remote observance in everything more popular. When a patient gets admitted to a hospital or in other location under observation of medical assistant, the relatives of the patients are anxious about his/her health situation throughout all the time. The combination of ARM Microcontroller has solved this situation by a new innovative technology in healthcare system through which it is also possible to monitor the health condition of the patient remotely. ARM Microcontroller is a platform which offers a complete environment on a tiny platform at a very low cost, and it also permits interfacing services and actuators through the general-purpose I/O pins. In this proposed system, patient's ECG, Pulse rate, room body temperature, body movement and home automation appliances are measured. Instant conveyance of the health information of the patient to the relatives will make the hospital management more responsible and liable for their works. Hospital management

typically uses huge machines to measure the health data of the patients. On the other hand, we can be able to measure the health data using e-Health Sensor Platform in ARM Microcontroller. This might be employed in the hospitals yet as home. Moreover, it will additionally decrease the cost of health observance and the space of the room. We have tried to develop a health monitoring system to acquire the data and share the information with the health units and relatives by remotely monitoring through the internet. To do this, Advanced RISC Machines, ARM7 TDMI LPC 2148 Microcontroller collects the health data of the patients from the sensors and it is displayed on the website. For the security and safety issues, a role-based user authentication system is also available in the system to access the information.

2. HARDWARE SYSTEM

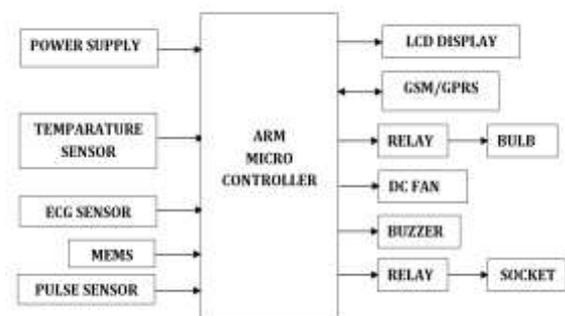


Fig 1: Block diagram

2.1 Power Supply

This section is meant for supplying Power to all the sections mentioned above. It basically consists of a Transformer to step down the 230V ac to 9V ac followed by diodes. Here diodes are used to rectify the ac to dc. After rectification, the obtained rippled dc is filtered using a capacitor Filter. A positive voltage regulator is used to regulate the obtained dc voltage.

2.2 ARM7TDMI

ARM is a family of instruction set architectures for computer processors based on a reduced instruction set computing (RISC) architecture developed by British company ARM Holdings. A RISC-based computer design approach means ARM processors require significantly fewer transistors than typical processors in average computers. This approach

2.7 GSM

Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service.

The network is structured into a number of discrete sections:

- Base Station Subsystem – the base stations and their controllers explained
- Network and Switching Subsystem – the part of the network most similar to a fixed network, sometimes just called the "core network"

GSM was intended to be a secure wireless system. It has considered the user authentication using a pre-shared key and challenge-response, and over-the-air encryption. However, GSM is vulnerable to different class of attacks, each of them aiming a different part of the network.



Fig 5: SIM800L GSM / GRPS module

2.8 DC fans

DC technology has become much more sophisticated in recent years, and it can now be applied to both residential and industrial ceiling fans. DC fans have motors that rely on permanent, built-in magnets in order to attract and repel a rotor around an axis joined with invertors. DC technology is much newer than AC technology, which means there are fewer options available.

3. CONCLUSION

In this paper, we have successfully proposed a remote health monitoring system and home automation system by offering alarm notification. It could reduce the human error. The most important feature in this system is that the health condition of the patient could be monitored from the home as well and necessary action could be taken during semi-major ailment. The probability of human error while acquiring the data could be effectively reduced as sensors are used for health data measurement. The proposed system would also provide automatic appliance control which makes the environment comfortable for the patient. Another beneficial part is the alert notification to the respective authority of the patient, and health data monitoring through the website which allows performing their regular task.

4. REFERENCES

- [1] Jayeeta Saha¹, Arnab Kumar Saha², Aiswarya Chatterjee³, Suyash Agrawal², Ankita Saha⁴, Avirup Kar², Himadri Nath Saha¹ Advanced IOT Based Combined Remote Health Monitoring, Home Automation and Alarm System, 2018 IEEE 8th Annual Computing and Communication Workshop and Conference (CCWC)
- [2] Freddy Jimenez, Romina Torres; Building an IoT – aware healthcare monitoring system, 2015 34th International Conference of the Chilean Computer Science Society (SCCC)
- [3] He, D.; Chan, S.; Guizani, M.; Yang, H.; Zhou, B. Secure and distributed data discovery and dissemination in wireless sensor networks. IEEE Trans. Parallel Distrib. Syst. 2015, 26, 1129–1139.
- [4] Ghayvat, H.; Liu, J.; Mukhopadhyay, S.C.; Gui, X. Wellness sensor networks: A proposal and implementation for smart home for assisted living. IEEE Sens. J. 2015, 15, 7341–7348.
- [5] Poon, C.C.Y.; Zhang, Y.T.; Bao, S.D. A novel biometrics method to secure wireless body area sensor networks for telemedicine and m-health. IEEE Commun. Mag. 2006, 44, 73–81.
- [6] Mandal, S.; Chaki, R. A secure encryption logic for communication in wireless sensor networks. Int. J. Cryptogr. Inf. Secur. 2012, 2, 78–82.
- [7] A. M. Khan, Y.-K. Lee, S. Lee, and T.-S. Kim, "Accelerometers position independent physical activity recognition system for long-term activity monitoring in the elderly," Medical & Biological Engineering & Computing, vol. 48, no. 12, pp. 1271–1279, 2010.
- [8] Rashidi, P.; Cook, D.J. Com: A method for mining and monitoring human activity patterns in home-based health monitoring systems. ACM Trans. Intell. Syst. Technol. 2013, 4, 64. [CrossRef]

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