DESIGN AND IMPLEMENTATION OF IOT-BASED HEALTH AND HOME MONITORING WITH CONTROL SYSTEM AND SMART METER

N.G.N. Prasad [1], B.V.V.S.R.K.K. Pavan [2], Earni Chaitanya [3]

[1]M.Tech, Asso. Prof., HOD of ECE Dept., Kakinada Institute of Engineering and Technology II, Korangi, Talarevu, East Godavari, Andhra Pradesh, India. Email Id: prasad471@gmail.com

[2]MTech, Asst. Prof., Kakinada Institute of Engineering and Technology II, Korangi, Talarevu, East Godavari, Andhra Pradesh, India. Email Id: bhavaraju.pavan5@gmail.com

[3] PG student in ECE Dept, Kakinada Institute of Engineering and Technology II, Korangi, Talarevu, East Godavari, Andhra Pradesh, India. Email Id: earnichaitanya@gmail.com

I. ABSTRACT

Internet of Things (IOT) conceptualizes the idea of remotely connecting and monitoring real world objects (things) through the Internet. When it comes to our house, this concept can be aptly incorporated to make it smarter, safer and automated. Home automation is one of the major growing industries that can change the way people live. Some of these home automation systems target those seeking luxury and sophisticated home automation platforms; others target those with special needs like the elderly. Typical wireless home automation system allows one to control house hold appliances from a centralized control unit which is wireless. The IOT has been widely used to interconnect the available medical resources and offer smart, reliable, and effective healthcare service to the elderly people. Health monitoring for active and assisted living is one of the paradigms that can use the IOT advantages to improve the elderly lifestyle. So this paper present combined remote health monitoring and home automation system. By using this system we can monitor patient health as well as we can control home appliances from same system and same place.

Keywords: *Microcontroller (LPC2148), GPRS Module, Temperature, Pulse, ECG, MEMS, IR sensor, LCD, Relay etc.*

II. INTRODUCTION

Homes of the 21st century will become more and more self controlled and automated due to the comfort it provides, especially when employed in a private home. A home automation system is a means that allow users to control electric appliances of varying kind. Many existing, well-established home automation systems are based on wired communication.

So that, we are proposed a system which controls home appliances with wireless by using IOT technology. Also we are adding another application into this system is to monitoring patient health, so this system becomes combined home appliances control and patient health monitoring system. In the proposed system we are using various sensors to measure patient health like temperature, heartbeat, ECG sensor and this sensor data send to the IOT web server, by using IOT we can monitor patient health parameters from anywhere in the world. In this system we are provide alarm system, if health parameters are increases above threshold value then the microcontroller will generate alarm. Also the IOT technology is used for controlling home appliances that means we can turn ON/OFF particular device from anywhere.

III. BLOCK DIAGRAM

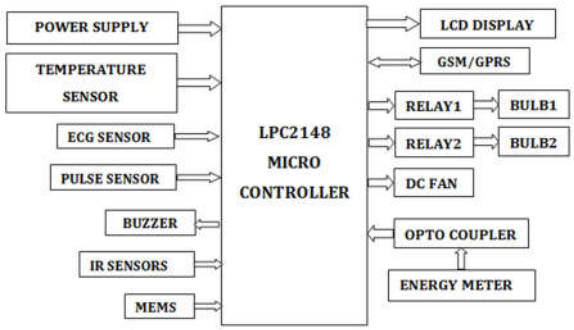

Fig (3.1) System Block diagram

BLOCK DIAGRAM DESCRIPTION

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.

Microcontroller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

LCD Display: This section is basically meant to show up the status of the project. This project makes use of Liquid Crystal Display to display / prompt for necessary information.

Temperature sensor: Thermistors are a temperature sensing devise. It is used to sense the temperature. In this project by depends on the value of temperature the exhaust fan will run.

IR Sensor: The IR LED is used as the IR transmitter, which is connected by using the resistor logic as shown in the schematic. The IR receiver is connected by using the transistor logic whose collector is connected to the base of the transistor. The base of the transistor is connected to the photo diode through the resistor.

MEMS: Accelerometers are acceleration sensors. An inertial mass suspended by springs is acted upon by acceleration forces that cause the mass to be deflected from its initial position. This deflection is converted to an electrical signal, which appears at the sensor output. The application of MEMS technology to accelerometers is a relatively new development.

GPRS: This section consists of a GPRS modem. The modem will communicate with microcontroller using serial communication. The modem is interfaced to microcontroller using MAX 232, a serial driver. The Global Packet Radio Service is a TDMA based digital wireless network technology that is used for connecting directly to internet. GPRS module will help us to post data in the web page directly.

Buzzer Section: This section consists of a Buzzer. The buzzer is used to alert / indicate the completion of process. It is sometimes used to indicate the start of the embedded system by alerting during start-up.

DC Motor: DC motor is an output for this project. And DC motor is connected to microcontroller. And this motor controlled by the microcontroller with the respective inputs given by us. Its speed will be varied according to the speed set by the switches.

DC Fan: Dc fan is the output section. Dc fan needs dc supply. So we can directly add the dc motor to micro controller with transistor logic.

Relay Section: This section consists of an interfacing circuitry to switch ON / OFF the system whenever any unhealthy conditions i.e. overload is detected. This circuitry basically consists of a Relay, transistor and a protection diode. A relay is used to drive the 230V devices.

ECG Sensor Section: This section basically contains the ECG electrodes which are placed on the body of the person. These signals are given to the controller as inputs and are manipulated by the microcontroller to be displayed on the PC using MATLAB.

Pulse sensor: Heart rate data can be really useful whether you're designing an exercise routine, studying your activity or anxiety levels or just want your shirt to blink with your heart beat. The Pulse Sensor Amped is a plug-and-play heart-rate sensor. Simply clip the Pulse Sensor to your earlobe or finger tip.

Optocoupler: Where small size, higher speed and greater reliability are important, a much better alternative is to use an optocoupler. These use a beam of light to transmit the signals or data across an electrical barrier, and achieve excellent isolation. Optocoupler typically come in a small 6-pin or 8-pin IC package, but are essentially a combination of two distinct devices.

Energy meter: An electricity meter or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device.

Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establish billing cycles and energy used during a cycle.

IV. RESULT

Fig (4.1) Health parameters and status of appliances displayed on web server

V. CONCLUSION

In this paper, we have successfully proposed an advanced IOT based automated remote health monitoring system by offering alarm notification along with prescribed medicine name and dose display. 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 proposed system would also provide automatic appliance control which makes the environment comfortable for the patient.

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