

A Wireless Fall Detection System for Elder Persons



N.Swathi

PG Student (M.Tech ES),
Dept of ECE,

Mallareddy Engineering College for women,
JNTU Hyderabad, India.



S.Mohammed Rafi

Assistant Professor,
Dept of ECE,

Mallareddy Engineering College for women,
JNTU Hyderabad, India.

Abstract:

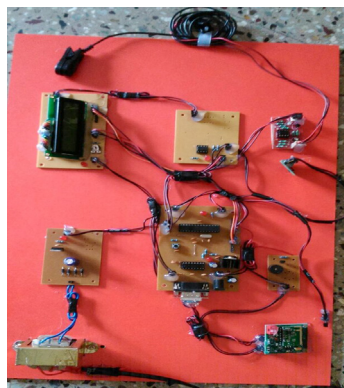
This project describes the design of a simple, low-cost controller based patient health monitoring system. Heart rate of the subject is measured from the thumb finger using IRD (Infra Red Device sensors and the rate is then averaged and displayed on a LCD). This instrument employs a simple Opto electronic sensor, conveniently strapped on the finger, to give continuous indication of the pulse digits. The Pulse monitor works both on battery or mains supply. It is ideal for continuous monitoring in operation theatres, I.C.units, biomedical/ human engineering studies and sports medicine.

Index Terms:

Mems, temperature sensor, Zigbee , GSM.

I.INTRODUCTION:

This application consists of two sections one is transmitter section consists of temperature, mems and heart beat sensor which is interfaced to the patient and this sensors will continuously monitors the patient status and if any critical condition had been occurred then the data will be transmitted to receiver section which is placed in the doctor cabin and parallely this message will be transmitted to the doctors mobile phone if the doctor is in a remote place.



**Fig1: Hardware section
of Transmitter.**

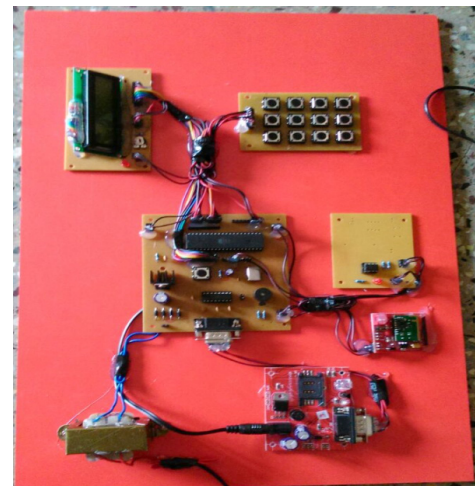


Fig2: Hardware section of Receiver

II.EXISTING METHODS:

Many previous and current research projects use medical sensor networks to identify and track human activities in daily life. With the purpose to successfully detect falls, there are primarily three types of fall detection methods for elderly people, namely wearable device based methods, vision based methods, and ambient based methods.

A.Wearable Based Methods:

Wearable based methods often rely on smart sensors with embedded processing. They can be attached to the human body or worn in their garments, clothing or jewelry. A three-step detection scheme which consisted of an accelerometer, audio, image and video clips. Its innovation was to detect falls by leveraging a tri axial accelerometer, speech recognition, and on-demand video. In this, once the fall event was detected, an alert email was immediately sent and the fall video was uploaded to the network storage for further investigation.

B.Vision Based Methods:

Vision based methods are always related to spatiotemporal features, change of shape, and posture. A vision based fall detection method by applying background subtraction to extract the foreground human body and post processing to improve the result. To detect a fall, information was fed into a directed acyclic graph support vector machine for posture recognition. This system reported a high fall detection rate and low false detection rate.

C.Ambient Based Methods:

Ambient based methods usually rely on pressure sensors, acoustic sensors or even passive infrared motion sensors, which are usually, implemented an acoustic-based fall detection system which used an array of acoustic sensors. The fall detection sensors are linear arrays of electrets condensers placed on a pre-amplifier board. In order to capture the information of the sound height, the sensor array was placed in the z-axis. The limitation of this method was that only one person was allowed in the vicinity. In this particular system, ambient/skin temperatures were measured for real time monitoring. Experiments verified that the proposed classifier outperforms the conventional classifiers in its one-pass training and with higher distinguishing capability.

III.PROPOSED METHOD:

This application consists of two sections one is transmitter section consists of temperature, mems and heart beat sensor which is interfaced to the patient and this sensors will continuously monitors the patient status and if any critical condition had been occurred then the data will be transmitted to receiver section which is placed in the doctor cabin and parallely this message will be transmitted to the doctors mobile phone if the doctor is in a remote place.

TRANSMITTER SECTION:

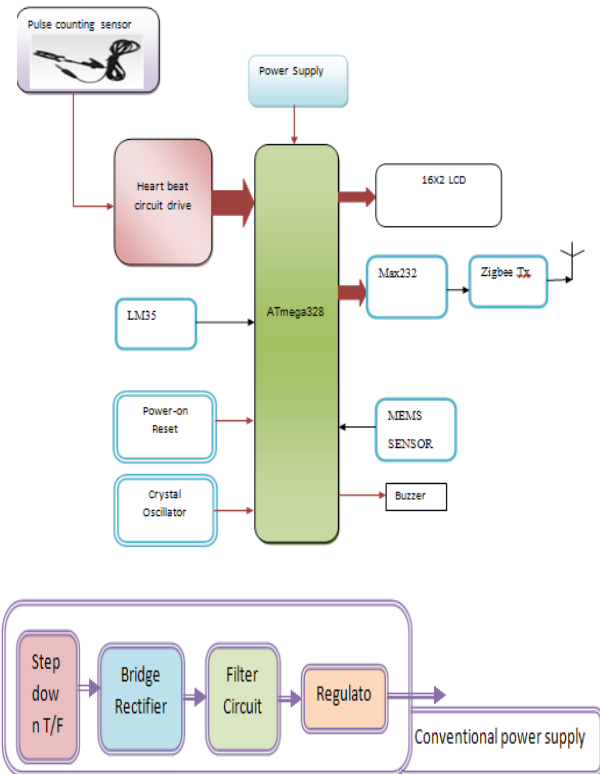


Fig3: block diagram for transmitter

RECEIVER SECTION:

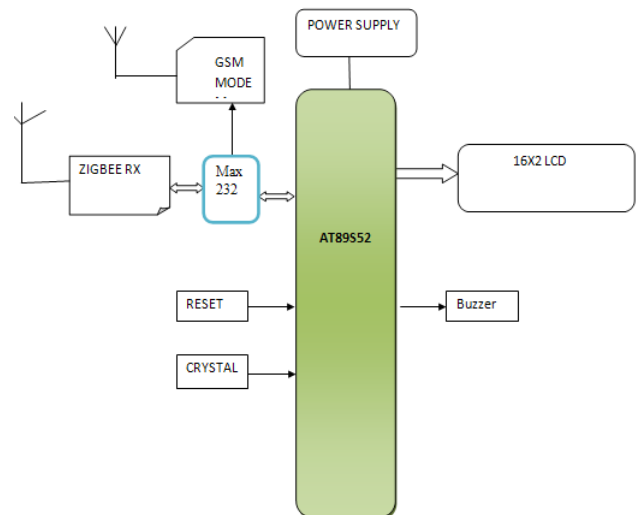


Fig4: block diagram for receiver

IV. HARDWARE IMPLEMENTATION:

A. ATMEGA328:

The ATmega88 through ATmega328 microcontrollers are said by Atmel to be the upgrades from the very popular ATmega8. They are pin compatible, but not functionally compatible. The ATmega328 has 32kB of flash, where the ATmega8 has 8kB. Other differences are in the timers, additional SRAM and EEPROM, the addition of pin change interrupts, and a divide by 8 prescaler for the system clock.

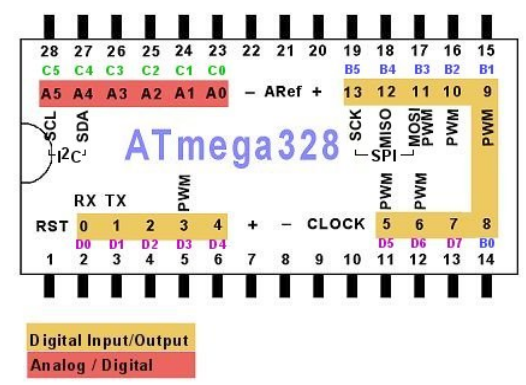


Fig5: ATMEGA328

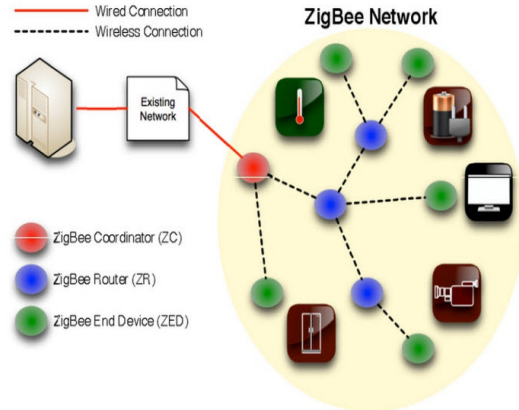
B. AT89S52 MICROCONTROLLER:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out.



Fig6: AT89S52

C. ZIGBEE:



It is the wireless device for transmitting and receiving purpose or simply it called as Transceiver. Zigbee is based on the IEEE802.15.4 protocol. The range of the Zigbee is covered as 100m. Its range is 10 times better than bluetooth device so it can be more preferable one in wireless device. The data rate is very low for transmission while using this device.



Fig7: zigbee

Zigbee is a PAN technology based on the IEEE 802.15.4 standard. Unlike Bluetooth or wireless USB devices, ZigBee devices have the ability to form a mesh network between nodes. Meshing is a type of daisy chaining from one device to another. This technique allows the short range of an individual node to be expanded and multiplied, covering a much larger area.

D. Global System for Mobile Communication (GSM):

Definition: GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area.

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

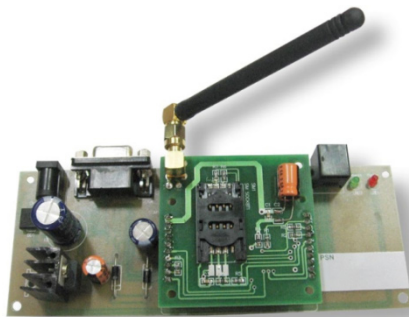


Fig8: GSM

Modem specifications:

The SIM300 is a complete Tri-band GSM solution in a compact plug-in module. Featuring an industry-standard interface, the SIM300 delivers GSM/GPRS 900/1800/1900MHz performance for voice, SMS, data and Fax in a small form factor and with low power consumption.

E. LM35 :

The LM35 sensor series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. To detect the heat produced during fire occurrence we use temperature sensor.

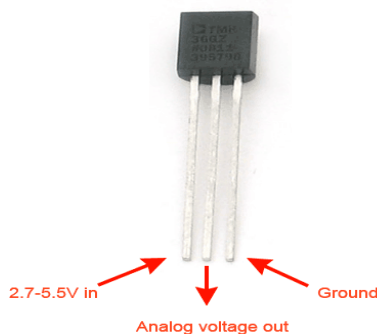


Fig9: LM35

The Temperature Sensor LM35 sensor series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.

F. MEMS :

MEMS stands for Micro-Electromechanically Systems. MEMS techniques allow both electronic circuits and mechanical devices to be manufactured on a silicon chip, similar to the process used for integrated circuits. This allows the construction of items such as sensor chips with built-in electronics that are a fraction of the size that was previously possible.

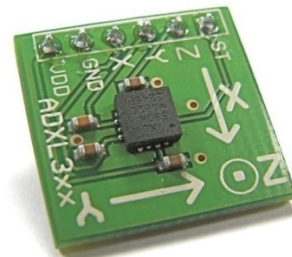


Fig10: MEMS

Micro electromechanical systems (MEMS) are small integrated devices or systems that combine electrical and mechanical components. They range in size from the sub micrometer (or sub micron) level to the millimeter level, and there can be any number, from a few to millions, in a particular system. MEMS extend the fabrication techniques developed for the integrated circuit industry to add mechanical elements such as beams, gears, diaphragms, and springs to devices.

G. PULSE COUNTING SENSOR:

The Point Sensor Pulse Counter 900 wireless transmitter is a battery operated digital counter with a microprocessor controlled 900 MHz. FCC certified radio transmitter. The Point Sensor Pulse Counter 900 has an on board time of day clock that allows it to spend most of the time in a low power quiescent state. At predetermined time intervals the clock will wake up the on-board microprocessor. Unique serial number information is read from a Dallas Semiconductor 1-wire digital device and counter data is read from a 24-bit internal counter register.

This information is combined with a CRC-16 error check and transmitted in a very short data packet that results in a very short transmitter on-time. This architecture allows the Point Sensor Pulse Counter 900 to consume very little energy and a battery life of up to 5 years.



Fig11: pulse counting sensor

V.WORKING PROCEDURE:

Heart rate and temperature are continuously monitored using the ATMEGA328 at the patient. There is also a facility to monitor whether the patient is in normal condition or not using mems sensor which identifies giddiness. The values are sent to the other place using zigbee interfaced to the controller. At other place the zigbee receiver receives the values and the AT89S52 controller verifies and sends a SMS to the pre-stored mobile number through GSM modem connected to it.

VI.ADVANTAGES:

Ease of operation, low maintenance cost, fit and forget system, no wastage of time, durability, accuracy.

VII.APPLICATIONS:

Hospitals, Remote heart rate monitoring applications, local monitoring applications, designed for Home and Clinical Applications

VIII.RESULT:

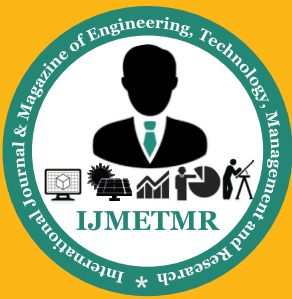
In this project, an enhanced fall detection system based on on-body smart sensors was proposed, implemented, and deployed that successfully detected accidental fall of patients. By using information from an accelerometer, smart sensor and heart beat sensor, the impact of falls can successfully be detected.

IX.CONCLUSION:

The project “A wireless fall detection system for elder persons” has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced controller boards and with the help of growing technology the project has been successfully implemented.

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S.Mohammed Rafi is Assistant Professor, Dept. of ECE, mallareddy engineering college for women, Hyderabad.

Biographies:

N.swathi is a PG Student. she is pursuing her M.Tech degree from Dept. of ECE, mallareddy engineering college for women, Hyderabad with specialization in ES .