

## Biomedical Applications Based on Electronic Equipment for Elderly People

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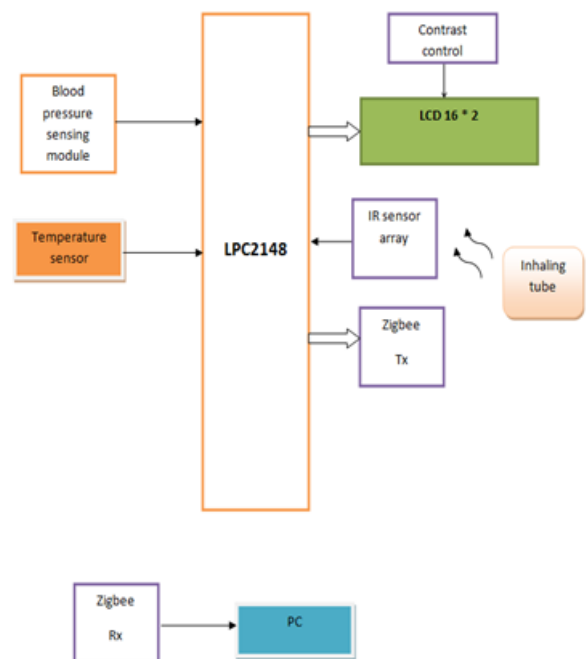
### Introduction:

Elderly people are increasing as a percentage of the population in Ecuador and all over the world. According to population projections, Ecuador will have aged a 12% more than the current index by 2050. Thus, the application of technology to provide remote monitoring and healthcare services at home would reduce the high demand that hospitals currently experience. Under these assumptions, this paper describes the implementation of a prototype to monitor the health status of elderly people. The performance of the system was analysed according to its reliability, average sampling rate at each sensor, and message latency through the mobile network. With this proposal, we look for a significant improvement in the quality of life of elderly people by preventing possible emergencies that may cause the death of patients.

### Existing Method:

In this method, zigbee protocol technology usage is done. By which patient's condition is sent from various transmitter sections to receiver section. i.e The transmitter sections are arranged at each and every patient. At the receiver PC need to be monitored continuously by a doctor/staff in the hospital.

Block Diagram



### Draw backs

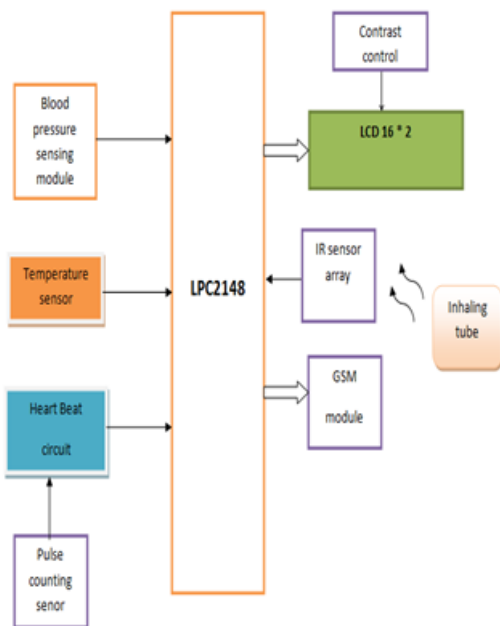
- Limit range
- Requires a computer
- Low efficiency

### Proposed Method:

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). It also detects the abnormal temperature and sends the SMS using GSM modem interfaced to the controller. Lungs condition will also be checked. Firstly we need to select the age by using switches. Then we need to inhale the air, by using the IR sensors we can know the person is healthy or unhealthy.

A Blood pressure sensor is also interfaced to the controller to know about the patient. 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. By reading pulse values continuously from pulse count sensor placed to the fore finger of patient. These values are encoded and sent to remote station using GSM communication. Alpha numeric LCD is provided on receiver end to display the heart rate measurement.

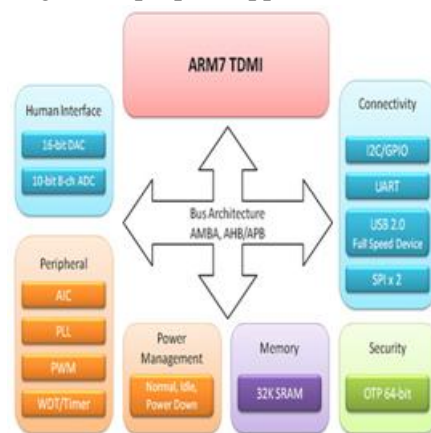
Block Diagram



### Modules used in this project

The **LPC2148** are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64

pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT, PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.



This project uses regulated 3.3V, 500mA power supply. Unregulated 12V DC is used for relay. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

### ARM7TDMI Processor Core

- Current low-end ARM core for applications like digital mobile phones
- TDMI
  - T: Thumb, 16-bit compressed instruction set
  - D: on-chip Debug support, enabling the processor to halt in response to a debug request
  - M: enhanced Multiplier, yield a full 64-bit result, high performance
  - I: Embedded ICE hardware
- Von Neumann architecture

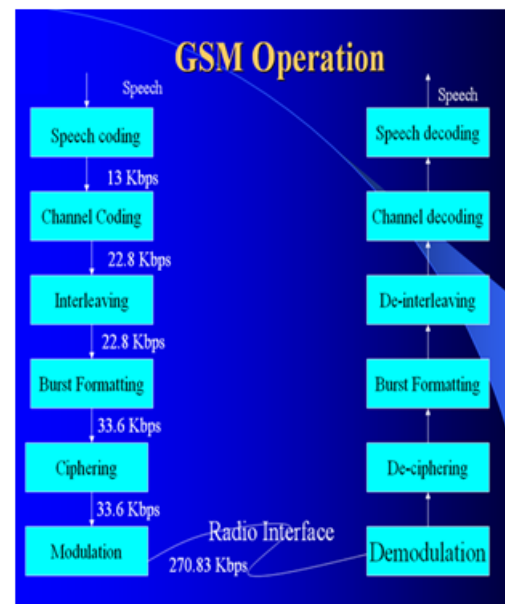
## Global System for Mobile Communication (GSM)

### 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.

### General Features:

- Tri-band  
GSM/GPRS900/1800/1900Mhz
- GPRS multi-slot class 10
- GPRS mobile station class –B
- Complaint to GSM phase 2/2+
  - i. -class 4(2W @900MHz)
  - ii. -class 1(1W @/18001900MHz)
- Dimensions: 40x33x2.85 mm
- Weight: 8gm
- 7. Control via AT commands
- (GSM 07.07, 07.05 and SIMCOM enhanced AT commands)
- SIM application tool kit
- supply voltage range 3.5.....4.5 v
- Low power consumption
- Normal operation temperature: -20 °C to +55 °C
- Restricted operation temperature : -20 °C to -25 °C and +55 °C to +70 °C
- storage temperature: -40 °C to +80 °C



### Blood pressure meter

A sphygmomanometer (blood pressure meter, or blood pressure gauge (also referred to as a sphygmometer) is a device used to measure blood pressure, composed of an inflatable cuff to restrict blood flow, and a mercury or mechanical manometer to measure the pressure. It is always used in conjunction with a means to determine at what pressure blood flow is just starting, and at what pressure it is unimpeded. Manual sphygmomanometers are used in conjunction with a stethoscope. A sphygmomanometer consists of an inflatable cuff, a measuring unit (the mercury manometer, or aneroid gauge), and a mechanism for inflation which may be a manually operated bulb and valve or a pump operated electrically. The usual unit of measurement of blood pressure is millimeters of mercury (mmHg) as measured directly by a manual sphygmomanometer.

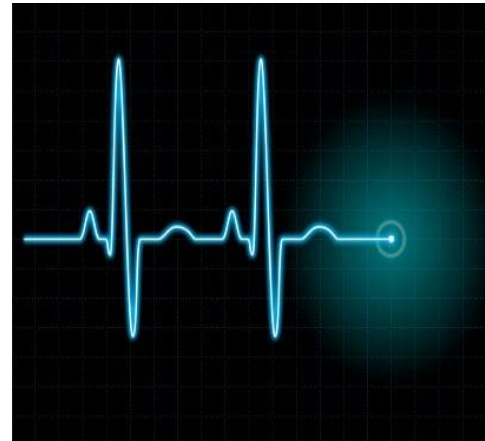


**Pulse counting sensor:**

Heart rate is the speed of people's emotional state, exercise intensity and objective indicator of cardiac function. But most people are very difficult to accurately measure the time and his heart rate values. If the heart rate monitor with me, heart ECG electrodes will be detected by monitoring the signal processing device, the user can at any time that your heart rate changes, changes in heart rate, self-monitoring status.

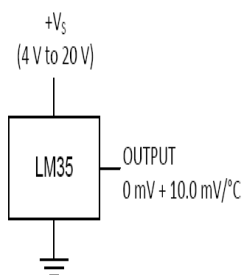


Heart rate monitor for heart rate range (60 ~ 160) / min. Circuit by adjusting the relevant components, in the (60 ~ 160) / min within the audible alarm can change the heart rate range. This heart rate range the width of the design center values  $\pm 20\%$  range. If central values such as emphasis on the 100 / exceptionally, the heart rate signal range (80 ~ 120) / min, if the heart rate exceeds this range, the lower limit, the instrument does not sound, if the heart rate in the range of the instrument ECG is the sound issue.

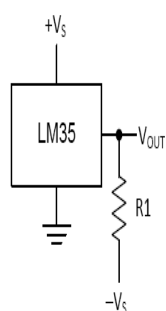


**LM35  
FEATURES DESCRIPTION**

- Clibrated Directly in ° Celsius (Centigrade)
- Linear + 10 mV/°C Scale Factor • 0.5°C Ensured Accuracy (at +25°C) • Rated for Full -55°C to +150°C Range
- Suitable for Remote Applications
- Low Cost Due to Wafer-Level Trimming
- Operates from 4 to 30 V
- Less than 60- $\mu$ A Current Drain
- Low Self-Heating, 0.08°C in Still Air
- Nonlinearity Only  $\pm 1/4^\circ$ C Typical
- Low Impedance Output, 0.1  $\Omega$  for 1 mA Load

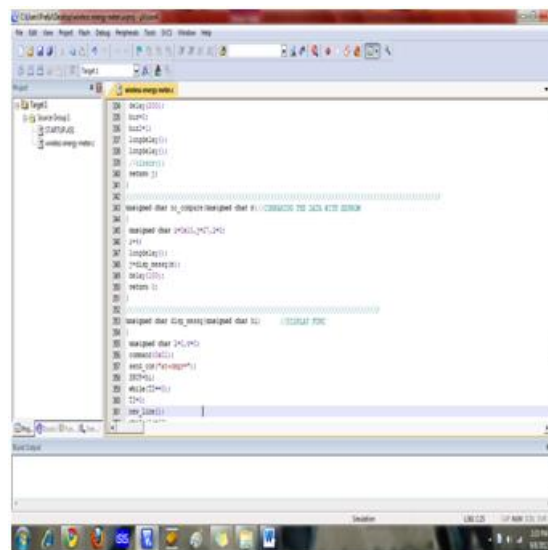


**Figure 1. Basic Centigrade Temperature Sensor (+2°C to +150°C)**

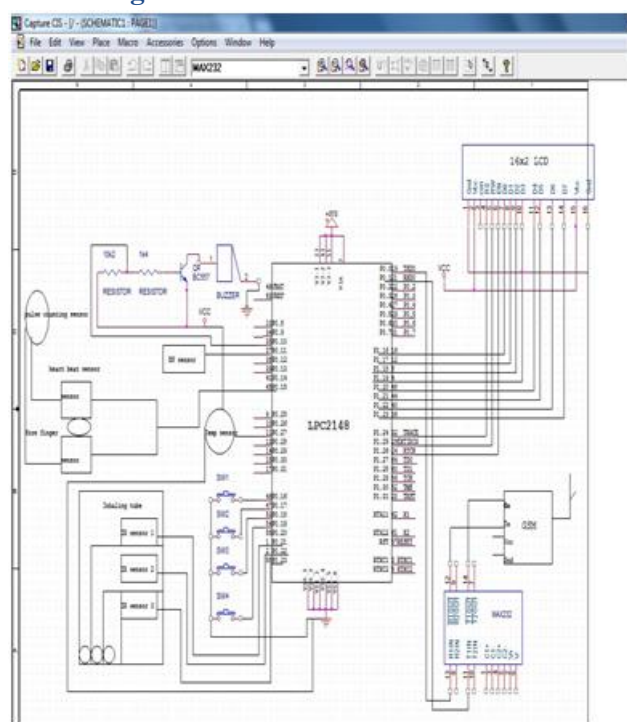


Choose  $R_1 = -V_S / 50 \mu\text{A}$   
 $V_{\text{OUT}} = 1500 \text{ mV at } 150^\circ\text{C}$   
 $V_{\text{OUT}} = 250 \text{ mV at } 25^\circ\text{C}$   
 $V_{\text{OUT}} = -550 \text{ mV at } -55^\circ\text{C}$

**Figure 2. Full-Range Centigrade Temperature Sensor**



### Circuit diagram



### Software tools

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.

### Flash Magic

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller which supports ISP (in system programming) feature. Flash magic supports several chips like ARM Cortex M0, M3, M4, ARM7 and 8051.



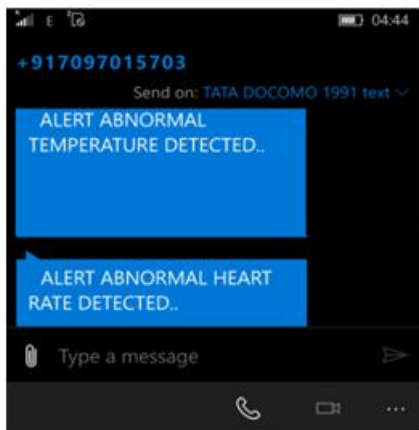
### Advantages:

- Ease of operation
- Low maintenance cost
- Fit and forget system
- No wastage of time
- Durability
- Accuracy

### Applications:

- Hospitals
- Remote heart rate monitoring applications
- Body temperature Monitoring
- Local monitoring applications
- Designed for Home and Clinical Applications

### Project Result shown in mobile with location details



### Future scope

Video monitoring could be used for monitoring patients

### CONCLUSION:

Here we have designed a simple, low-cost controller based wireless A Wireless Tracking System for At-home Medical Equipment during Natural Disasters

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