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An Invisible Tracking System for At-Home Medical Equipment During Natural Disasters

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Abstract:

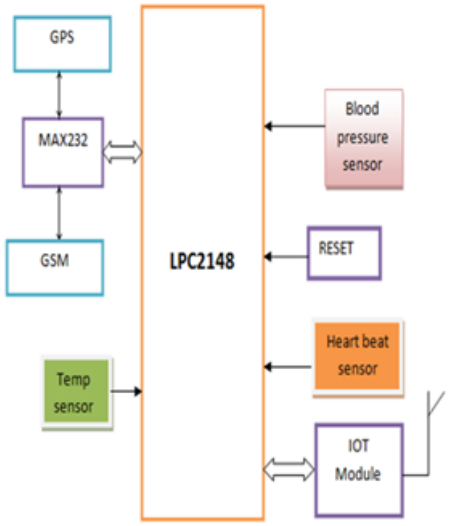
The patient Health monitoring systems is one of the major improvements in the hospitality because of its advanced technology. This project is designed to measure heart beat (pulse count),body temperature, B.P, by using embedded technology. In this project simultaneously we can measure and monitor the patient's condition.

It is to operate and available at an affordable cost. This project describes the design of a simple, low-cost controller based wireless Patient monitoring system. Heart rate of the patient is measured from the thumb finger using IRD (Infra Red Device sensors).

A blood pressure monitoring device and a temperature sensor is also connected to the controller. A heart rate value is sent the remote place using GSM module interfaced to the controller in case of abnormal situation. A GPS module is also interfaced to get the location values of the patient.

So that the patient can be monitored in all the ways using these sensors and also updated in the web server using IOT module connected to the controller. This is to make the status available for each and every minute.

Block Diagram



Existing system:

This project describes the design of a simple, low-cost controller based wireless Patient monitoring system. Heart rate of the patient is measured from the thumb finger using IRD (Infra Red Device sensors). A panic switch is also interfaced to the controller that is to send a signal by the patient if anything is wrong or else if the patient needs some attention then they can press the switch. Heart rate values and the signal through the panic switch is sent the remote place using GSM module interfaced to the controller. A GPS module is also interfaced to get the location value of the patient.

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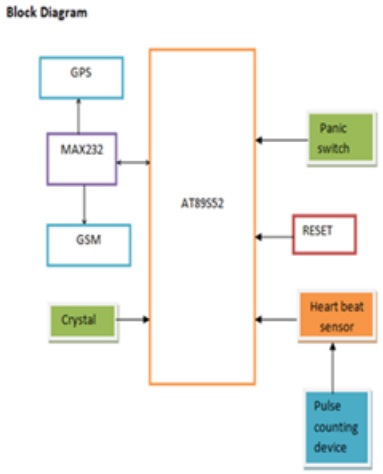


Drawback:

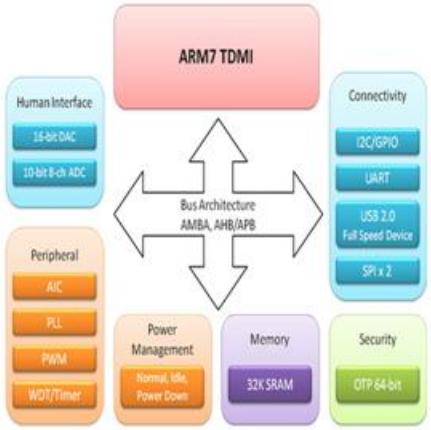
Temperature and BP sensor are not included and there is no IOT module to update in web server.

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.

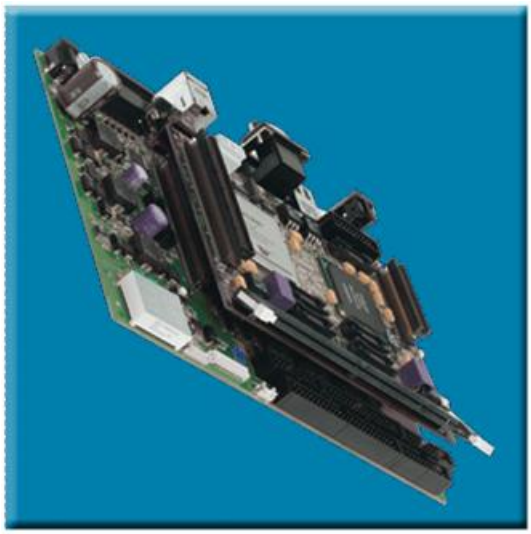
With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale.

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.

ARM PROCESSOR:



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

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- 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.

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/GPRS900/1800/1900Mhz performance for voice, SMS, data and Fax in a small form factor and with low power consumption.

The leading features of SIM300 make it deal fir virtually unlimited application, such as WLL applications (Fixed Cellular Terminal), M2M application, handheld devices and much more.

1. Tri-band GSM/GPRS module with a size of 40x33x2.85
2. Customized MMI and keypad/LCD support
3. An embedded powerful TCP/IP protocol stack
4. Based upon mature and field proven platform, backed up by our support service, from definition to design and production.

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

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Global Positioning System

The **Global Positioning System** (**GPS**) is a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth which has an unobstructed view of four or more GPS satellites. GPS is made up of three segments: Space, Control and User. The Space Segment is composed of 24 to 32 satellites in Medium Earth Orbit and also includes the boosters required to launch them into orbit. The Control Segment is composed of a Master Control Station, an Alternate Master Control Station, and a host of dedicated and shared Ground Antennas and Monitor Stations. The User Segment is composed of hundreds of thousands of U.S. and allied military users of the secure GPS Precise Positioning Service, and tens of millions of civil, commercial and scientific users of the Standard Positioning Service (see GPS navigation devices). GPS satellites broadcast signals from space that GPS receivers use to provide three-dimensional location (latitude, longitude, and altitude) plus precise time.

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. The word comes from the Greek (sphygmos, pulse), plus the scientific term manometer (pressure meter). The device was invented by Samuel Siegfried Karl Ritter von Basch in 1881. Scipione Riva-Rocci introduced a more easily used version in 1896. In 1901, Harvey Cushing modernized the device and popularized it within the medical community. 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.

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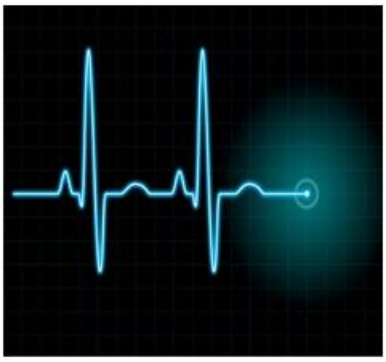


Heart rate monitor for heart rate range (60 ~ 160) / min. Circuit by adjusting the relevant components, in the (60 ~ 160) / min within the audible alarm can change the heart rate range. This heart rate range the width of the design center values ± 20% range. If central values such as emphasis on the 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

• Calibrated 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-µA Current Drain

• Low Self-Heating, 0.08°C in Still Air
• Nonlinearity Only ±¼°C Typical
• Low Impedance Output, 0.1 Ω for 1 mA Load

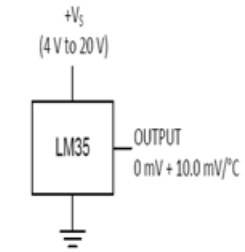


Figure 1. Basic Centigrade Temperature Sensor (+2°C to +150°C)

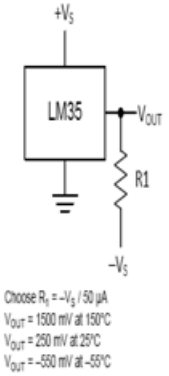
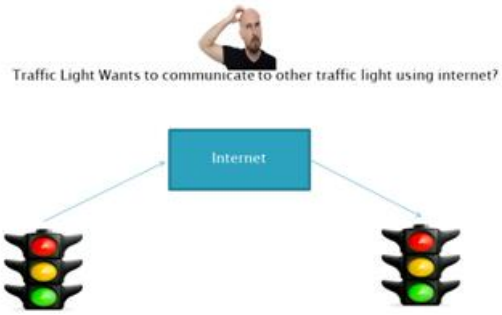


Figure 2. Full-Range Centigrade Temperature Sensor

INTERNET OF THINGS

Internet is helping people to communicate

each other using different applications



Internet of things helps the things to communicate each other using IoT module

ESP8266EX

- The Internet of Things (IoT) is the network of physical objects or "things" embedded with

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electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

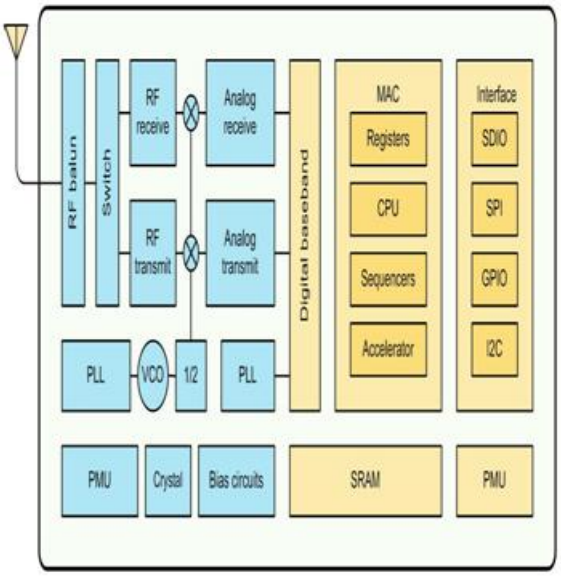
Different Modules

- ESP8266(ESPRESSIF)
- ESP8089
- ESP6203

Wi-Fi module

ESP8266EX offers a complete and self-contained WiFi networking solution; it can be used to host the application or to offload WiFi networking functions from another application processor.

When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to improve the performance of the system in such applications. Alternately, serving as a WiFi adapter, wireless internet access can be added to any micro controller-based design with simple connectivity (SPI/SDIO or I2C/UART interface). ESP8266EX is among the most integrated WiFi chip in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules, it requires minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area. ESP8266EX also integrates an enhanced version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the WiFi functionalities. ESP8266EX is often integrated with external sensors and other application specific devices through its GPIOs; sample codes for such applications are provided in the software development kit (SDK).



Advantages:

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

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Applications:

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

CONCLUSION:

Here we have designed a simple, low-cost controller based invisible tracking system for An Invisible Tracking System for At-home Medical Equipment during Natural Disasters Using IOT.

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