ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Optimizing Data Forwarding from Body Area Networks in the Presence of Body Shadowing with Dual Wireless Technology Nodes

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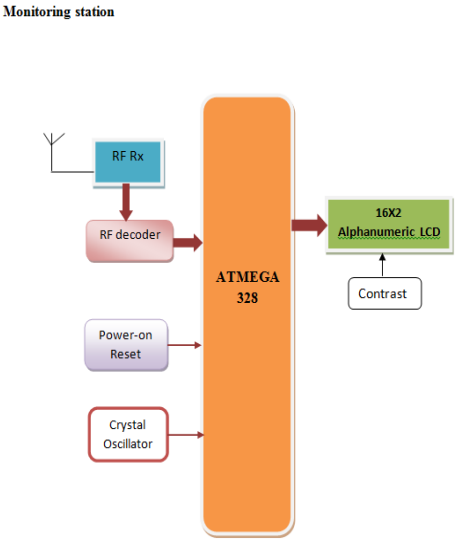
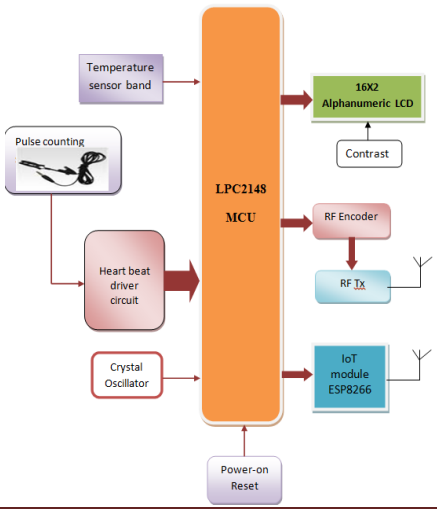
Abstract:

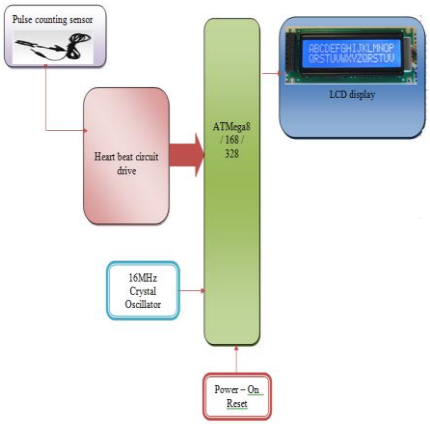
Low power sensor node design has become an important research topic since the measurement of physical quantities became very attractive to the industry, especially for medical applications that implement the concept of Wireless Body Area Networks (WBAN). This project describes the design of a simple, 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). This instrument employs a simple Opto electronic sensor, conveniently strapped on the finger, to give continuous indication of the pulse digits. Patient's temperature is also being monitored using a temperature sensor. Here we are examining patients condition and then sent to the monitoring station using RF communication. An IoT module is interfaced to the controller to make the patient's information available using internet at the remote location. At the monitoring station ATMEGA328 is being used to receive the values through RF communication and then to display it on 16*2 LCD.



Existing system

This project describes the design of a simple, low-cost microcontroller based heart rate with LCD output. 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 text based LCD.).. The device LCD displaying the heart beat rat and counting values through sending pulses from the sensor.





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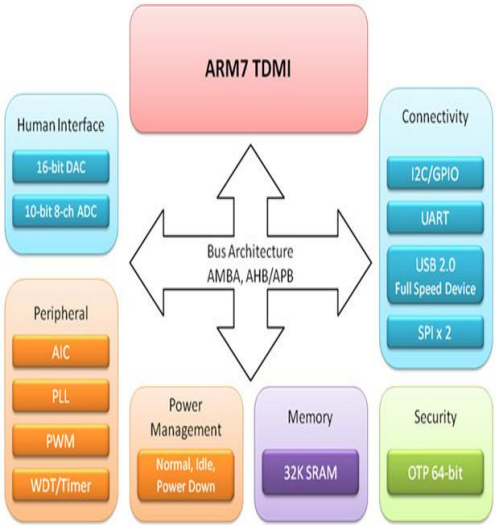
Drawback: Temperature sensor is not included and there is no IoT module to update in web server.

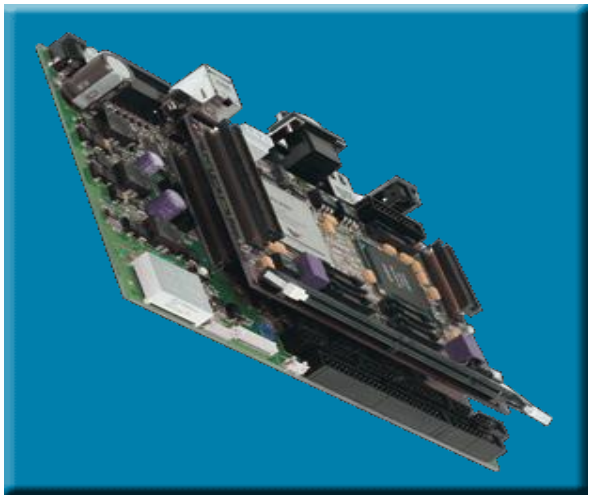
Modules used in this project

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.



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 out put 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
  M: enhanced Multiplier, yield a full 64-bit result, high performance
  I: Embedded ICE hardware
- Von Neumann architecture

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 presale for the system clock.

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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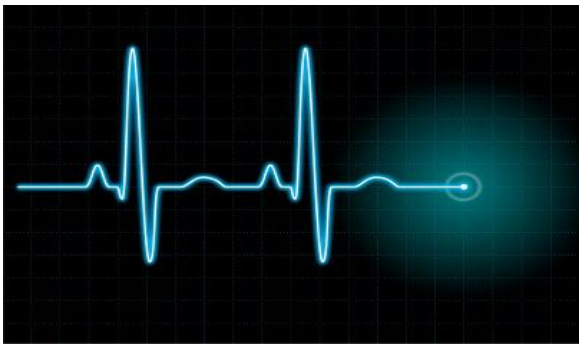


Heart rate monitor for heart rate range (60 ~ 160) / min. Circuit by adjusting the relevant components, in the (60 ~ 160) / min within the audible alarm can change the heart rate range. This heart rate range the width of the design center values ± 20% range. If central values such as emphasis on the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

- 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

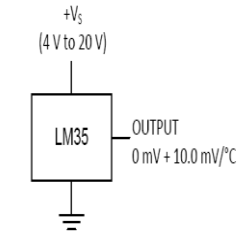


Figure 1. Basic Centigrade Temperature Sensor (+2°C to +150°C)

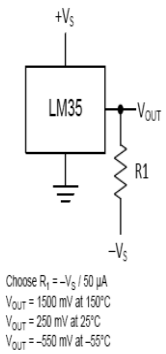
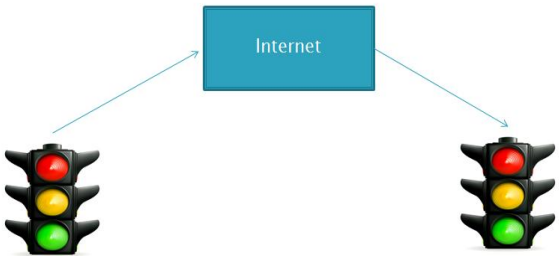


Figure 2. Full-Range Centigrade Temperature Sensor

INTERNET OF THINGS

Internet is helping people to communicate each other using different applications

Traffic Light Wants to communicate to other traffic light using internet?



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

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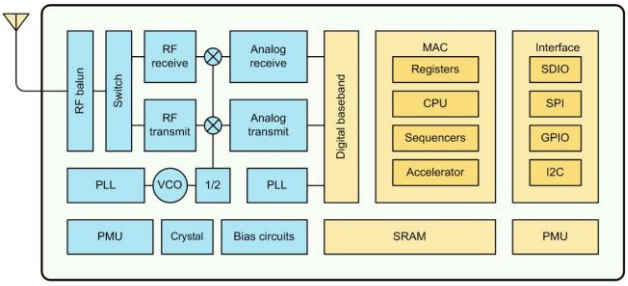
Different Modules

- 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

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 wireless A Wireless Tracking System for At-home Medical Equipment during Natural Disasters

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