

Avant Grade Patient Monitoring Vigilant System

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Abstract: *In health monitoring system in the hospital needs to be continuously monitored by the doctors or other staff of the hospital. These health monitoring systems include heart beat monitoring system, saline monitoring system, temperature monitoring system and many such systems. Where continuous monitoring and parameter checking is required. Most of the current health monitoring systems has interfaces like monitor, LCD display and some control switches. It is impossible for the doctors and other hospital staff to continuously work only for single patient. These interfaces are fixed and connected to the health monitoring system using wires.*

In our project we are providing the display of these interfaces to the doctor using wireless network like Zigbee. The characteristics of Zigbee i.e. low power, low cost, range up to 100 meter and network forming ability make Zigbee technology an ideal choice for wireless monitoring network in the health monitoring systems. In our project we have developed ARM based monitoring system with the Zigbee and GSM for monitoring the sensors i.e. temperature sensor, heart beat sensor, level indicator. Our system continuously sends the information to the doctor terminal which is having the Zigbee enabled system. So that a doctor can monitor patient's health condition by sitting in his chamber itself. In the same way we can send patient health information to their family members as SMS to their mobile phones.

Keywords: *ARM7 Microprocessor, Zigbee, GSM, Sensors, LCD, Power supply, Mobile*

1. INTRODUCTION

Now-a-days, the health monitoring systems need to be continuously supervised in hospitals which increases difficulty to the doctors in monitoring number of patients, so there is a need to invent a sophisticated system which can operate on its own (automatic system). Currently used health monitoring systems consumes more power and cannot transmit the health reports to other terminals i.e. doctor or to the hospital staff. In order to overcome these disadvantages, an advanced health monitoring system is required which can monitor on its own ,along with that it can provide the health report to doctors pc and the same information can be transmitted to the registered number. Such systems can increase the quality of the hospitals, reduces the work of the hospital staff and an effective clinical care can be provided to the patient.

2. ARM PROCESSOR

2.1. Introduction to ARM7 TDMI Core

The ARM7TDMI core is a 32-bit embedded RISC processor delivered as a hard macro cell optimized to provide the best combination of performance, power and area characteristics. The ARM7TDMI core enables system designers to build embedded devices requiring small size, low power and high performance.

2.2. ARM7 TDMI Features

- 32/16-bit RISC architecture (ARM v4T)

- 32-bit ARM instruction set for maximum performance and flexibility
- 16-bit Thumb instruction set for increased code density
- Unified bus interface, 32-bit data bus carries both instructions and data
- Three-stage pipeline
- 32-bit ALU
- Very small die size and low power consumption

2.3. General Description of LPC2148

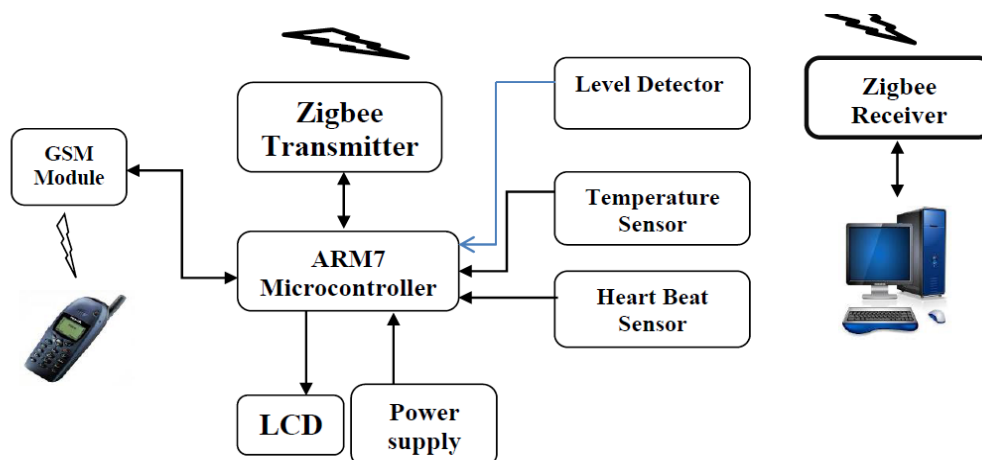
The LPC2148 microcontrollers is based on a 32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontrollers with embedded high-speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power.

2.4. Features of LPC2148 (ARM7) Architecture

Key Features

- 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package
- 8 Kb to 40 Kb of on-chip static RAM and 32 KB to 512 KB of on-chip flash memory; 128-bit wide interface/accelerator enables high-speed 60 MHz operation
- In addition, the LPC2146/48 provides 8 Kb of on-chip RAM accessible to USB by DMA
- One or two (LPC2141/42 vs., LPC2144/46/48) 10-bit ADCs provide a total of 6/14 analog inputs, with conversion times as low as 2.44 ms per channel Single 10-bit DAC provides variable analog output (LPC2142/44/46/48 only)
- Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog.

2.5. Block Diagram of Avant Grade Patient Monitoring Vigilant System



3. ZIGBEE

Zigbee is a low-cost, low-power, wireless mesh networking proprietary standard. The low cost allows the technology to be widely deployed in wireless control and monitoring applications, the low power-usage allows longer life with smaller batteries, and the mesh networking provides high

reliability and larger range. The Zigbee Alliance, the standards body that defines Zigbee, also publishes application profiles that allow multiple OEM vendors to create interoperable products.

3.1. Zigbee Coordinator (ZC)

The most capable device, the coordinator forms the root of the network tree and might bridge to other networks. There is exactly one Zigbee coordinator in each network since it is the device that started the network originally. It is able to store information about the network, including acting as the Zigbee rust Centre & repository for security keys.

3.2. Zigbee Router (ZR)

As well as running an application function a router can act as an intermediate router, passing data from other devices.

3.3. Zigbee End Device (ZED)

Contains just enough functionality to talk to the parent node (either the coordinator or a router); it cannot relay data from other devices. This relationship allows the node to be asleep a significant amount of the time thereby giving long battery life.

4. GSM [GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS]

GSM is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones. The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit-switched network optimized for full duplex voice telephony. This was expanded over time to include data communications, first by circuit-switched transport, then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).

5. SENSORS

A sensor is a device that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. For example, a mercury-in-glass thermometer converts the measured temperature into expansion and contraction of a liquid which can be read on a calibrated glass tube. A thermocouple converts temperature to an output voltage which can be read by a voltmeter. For accuracy, all sensors need to be calibrated against known standards.

5.1. Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.

5.2. Heart Beat Sensor

LM358N is a heartbeat sensor which is used to sense the heart beat by using a high intensity type LED and LDR. The finger is placed between the LED and LDR. As Sensor a photo diode or a photo transistor can be used. The skin may be illuminated with visible (red) using transmitted or reflected light for detection. The very small changes in reflectivity or in transmittance caused by the varying blood content of human tissue are almost invisible.

5.3. Level Indicator Sensor

The level indicator sensor is an IR-LED and IR-diode (or phototransistor). When an object is close to the sensor it reflects the light emitted by the LED to the IR-diode. Using modulated IR-light (A) and filtering (B) the input signal of the IR-diode leads to better results as this blocks (much of) other IR-light. There are ICs that contain both a modulator, IR-diode and filter-circuit.

6. POWER SUPPLY

A variable regulated power supply, also called a variable bench power supply, is one where you can continuously adjust the output voltage to your requirements. Varying the

output of the power supply is the recommended way to test a project after having double checked parts placement against circuit drawings and the parts placement guide.

7. CONCLUSION

The paper has been successfully presented and tested with integrated features of each hardware component for its development. Significance of each block has been resonated out and placed carefully, thus contributing to the best working of the unit. Hence the system is reliable with simple and easily available components, making it light weight and portable.

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