INFANT REMOTE MONITORING SYSTEM USING WIRELESS TELEMETRY

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ABSTRACT

India is a developing country especially in the region of economy as well as in the medical field. In rural areas the medical facilities received by people is of very low quality and as a result the infant mortality rate increases day by day. The new born infants are the ones who suffer without any proper care and medical facilities. In rural areas the facilities and the assistance given to the infants are not adequate due to which Sudden Infant Death (SID) occurs. The main reason for the mortality of infants are Birth Asphyxia which is caused due to lack of oxygen obtained by infant, Infant Respiratory Distress Syndrome, diarrheal diseases, Sepsis, a pathogenic infection.

'NOVEL INFANT MONITORING SYSTEM USING WIRELESS TELEMETRY' is a monitoring system in which the infants in critical conditions are continuously being monitored and in the case of any abnormalities seen in the infant the system would automatically send the message to the doctor's desk and if the doctor doesn't attend the information at his desk the monitoring system will automatically send message to the doctor's numb and also to other people related to the infant through the GSM technology. The main parameters being monitored are SPO2, BP, respiration rate, EEG, temperature & intra venous drip level (IV drip level). zigbee device is used for wireless transmission and also ATmega164 as microcontroller.

Keywords: New born infants, monitoring system, Wireless Telemetry, Sudden Infant Death, Zigbee.

INTRODCUTION

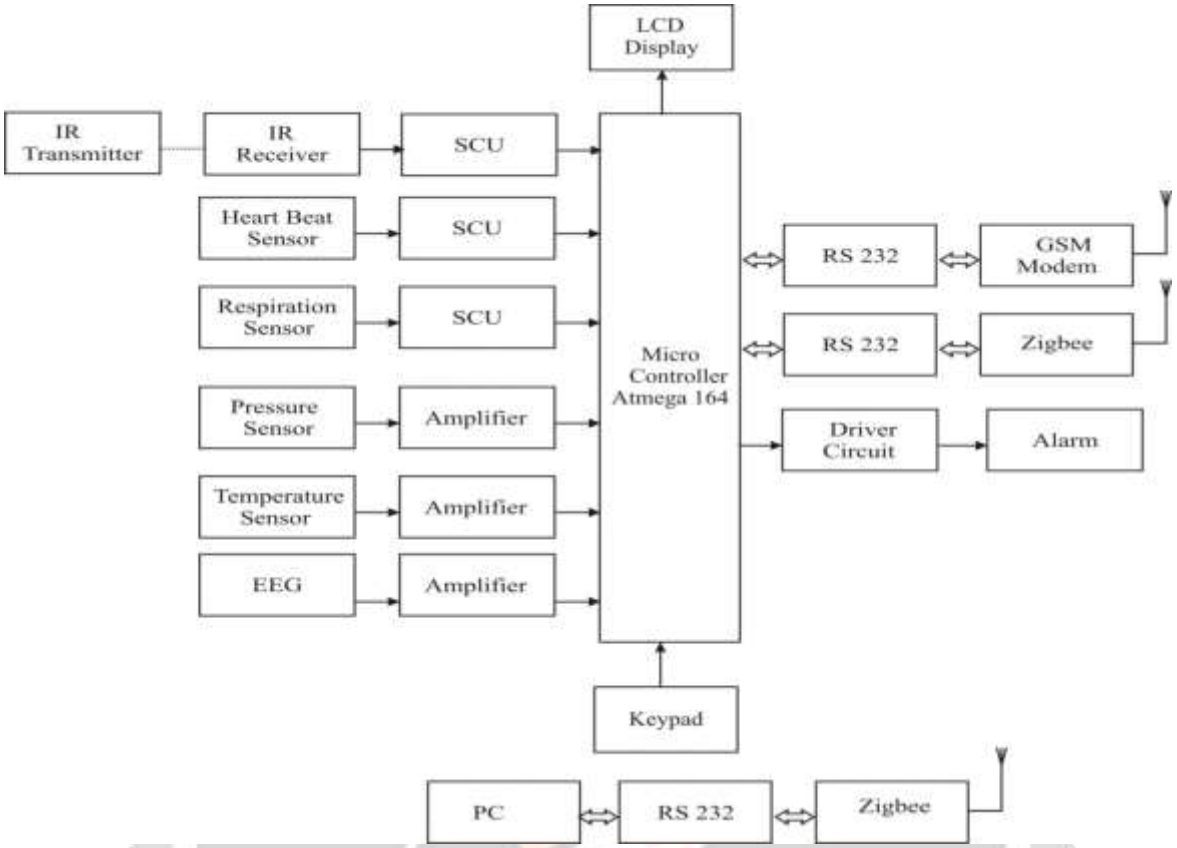
In this present era the medical facilities and medication given to infants in the rural areas is found to be inadequate due to which the mortality rate of infants is been increasing tremendously. In order to reduce the mortality rate of infants Novel Infant Monitoring System Using Wireless Telemetry' based on GSM technology has been proposed here. This device has wide use in the hospitals and other health sectors in the rural areas. Continuous monitoring is possible using this method and thus to identify sudden changes in infants conditions and immediate treatment can be provided to infants in critical situations. If in case the doctor is not at his desk, the system will automatically send the message to the doctor's number through GSM technology.

In this project, temperature, heart rate, oxygen saturation (SpO_2), respiration rate, EEG and intra venous (I.V.) drip level are the parameters assigned to the system to monitor.

This system has different sensors such as NTC, infrared and red LED, and pressure sensitive resistor to find temperature, heart rate, SpO_2 and I.V. drip level respectively and an automated alarm system.

The monitoring system will trace the signals and transmit to the doctor's PC at his desk and in case if he is not on his desk the system will automatically send the message to the concerned doctor and also to the concerned people. ATmega164 has been used as microcontroller as it supports two way series communication when compared to PIC16F877A. Zigbee device has been used for transmission of signals from the system to the doctor's desk. It can transmit and receive signals within a distance of 10-20m and also in one sec 9600 bits of data can be send and received.

BLOCK DIAGRAM



EXPLANATION

Novel Infant Monitoring System Using Wireless Telemetry is a device used for the continuous monitoring of the various parameters such as respiration rate, BP, temperature, EEG, intra venous drip level (IV drip level) & heart beat rate of an infant in a critical condition. The bio-signals are collected by various sensors of the various parameters and are being amplified used amplifiers. These bio-signals are in the form of analog signals, so therefore these signals are supposed to be converted into digital form for which ADC is used.ADC is already inbuilt in the microcontroller. The microcontroller being used here is ATmega164 instead of PIC16F877A. After processing is done the signals are being send to the doctor's desk through zigbee device. Zigbee is a wireless communication device used to transmit the signals from the infant's bed to the doctor's pc. During some critical condition when the doctor is not at his desk the monitoring system will automatically send the message to the doctor's mobile number and to other 2 important people.

MICROCONTROLLER

INTRODUCTION

A microcontroller is a small computer on a single integrated circuit containing a processor core, memory and programmable input/output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on a chip, as well as a typically small amount of RAM. Microcontroller is designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications. It has inbuilt memory and other components.

ATMEGA164

ATMEGA164/324/644 is a low power CMOS 8 bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATMEGA164/324/644 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed.

SENSORS

A pressure sensor measures pressure, typically of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical.

Pressure sensors are used for control and monitoring in thousands of everyday applications. Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude. Pressure sensors can alternatively be called pressure transducers, pressure transmitters, pressure senders, pressure indicators and piezometers, manometers

A thermistor is a type of resistor whose resistance varies with temperature. The word is a portmanteau of thermal and resistor. Thermistors are widely used as inrush current limiters, temperature sensors, self-resetting over current protectors, and self-regulating heating elements. Thermistors differ from resistance temperature detectors (RTD) in that the material used in a thermistor is generally a ceramic or polymer, while RTDs use pure metals. The temperature response is also different; RTDs are useful over larger temperature ranges, while thermistors typically achieve a higher precision within a limited temperature range [usually −90 °C to 130 °C].

A Infrared sensor (IR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall.

All objects emit what is known as black body radiation. It is usually infrared radiation that is invisible to the human eye but can be detected by electronic devices designed for such a purpose.

Electroencephalography (EEG) is the recording of electrical activity along the scalp produced by the firing of neurons within the brain.[2] In clinical contexts, EEG refers to the recording of the brain's spontaneous electrical activity over a short period of time, usually 20–40 minutes, as recorded from multiple electrodes placed on the scalp. In neurology, the main diagnostic application of EEG is in the case of epilepsy, as epileptic activity can create clear abnormalities on a standard EEG study.

ZIGBEE

The mission of the ZigBee Working Group is to bring about the existence of a broad range of interoperable consumer devices by establishing open industry specifications for unlicensed, untethered peripheral, control and entertainment devices requiring the lowest cost and lowest power consumption communications between compliant devices anywhere in and around the home.

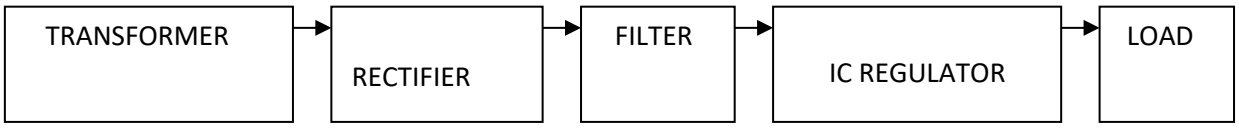
GSM MODEM

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone.

For the purpose of this document, the term GSM modem is used as a generic term to refer to any modem that supports one or more of the protocols in the GSM evolutionary family, including the 2.5G technologies GPRS and EDGE, as well as the 3G technologies WCDMA, UMTS, HSDPA and HSUPA.

POWER SUPPLY

A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.



Block diagram (Power supply)

CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place.

The proposed system based on Atmel microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. Due to the probability of high technology (Atmel microcontroller) used this" NOVEL INFANT MONITORING USING WIRELESS TELEMETRY" is fully software controlled with less hardware circuit. The feature makes this system is the base for future systems.

The principle of the development of science is that "nothing is impossible". So we shall look forward to a bright & sophisticated world.

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