

Design and implementation of newborns neonatal intensive care unit for premature infant based on IOT

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ABSTRACT

We report the design and implementation of an affordable bedside device, Neo is capable of acquiring vital data in real time by integrating with diverse devices connected to newborns in neonatal intensive care units (NICUs). NICUs are equipped with multiple vital sign monitoring devices that are connected to the premature newborn and acquire a few gigabytes of data every day. The continuous vital data from these devices are manually documented every hour.

Keywords

Neo,vital data,networks in intensive care units (NICUs),monitoring devices,premature newborn ,few gigabytes of data.

1.INTRODUCTION

Every year in the United States, more than 300,000 infants are admitted to neonatal intensive care units (NICUs) where, in addition to experiencing life-saving treatments, they are exposed to a chemical-intensive hospital environment during a developmentally vulnerable period. Prematurity, particularly birth at gestational age < 32 weeks and weight < 1500g, is associated with a particular behavioral phenotype characterized by inattention, anxiety, and socialization difficulties. Alterations in the developmental trajectory of the cerebral cortex as opposed to focal brain injury are thought to lead to behavioral morbidities associated with preterm birth.

Whether hospital-based exposure to phthalates influences behavioral development of NICU graduates has not been evaluated previously.

2.RELATED WORK:-

1. A neonatal intensive care unit (NICU), also known as an intensive care nursery (ICN), is an intensive care unit (ICU) specializing in the care of ill or premature newborn infants. The NICU is divided into several areas, including a critical care area for babies who require close monitoring and intervention, an intermediate care area for infants who are stable but still require specialized care, and a step down unit where babies who are ready to leave the hospital can receive additional care before being discharged.

Intensive-care nurses undergo intensive didactic and clinical orientation in addition to their general nursing knowledge in order to provide highly specialized care for critical patients. Their competencies include the administration of high-risk medications, management of high-acuity patients requiring ventilator support, surgical care, resuscitation, advanced interventions such as extracorporeal membrane oxygenation or hypothermia therapy for neonatal encephalopathy procedures, as well as chronic-care management or lower acuity cares associated with premature infants such as feeding intolerance, phototherapy, or administering antibiotics. NICU RNs undergo annual skills tests and are subject to additional training to maintain contemporary practice.

4. The use of the incubator is to maintain the adequate environment for the premature newborn babies. This is because the premature infants have limited immunity and limited thermoregulation. They are more sensitive to the environmental conditions. Even a small change in the surrounding can cause adverse effect in them.

5.The incubator makes the body temperature of the infant to be stable inside a controlled and sterile environment. In case of infant mortality rate, the incubator is a precious device for the infants with prematurity. For example, the Malawi is the highest of the rate of preterm births worldwide. In addition to this, the incubators are more expensive which cannot be affordable for countries under development. Also, the power needed for the incubators are also high. Moreover, there will be a difficulty in the transportation of such a complex machine across the rural areas. Hence the need for a portable, yet durable and alternative powered incubators are much essential for the developing countries. The Ballistocardiograph (BCGs) is a device that captures the hearts mechanical activities.

3. EXISTING SYSTEM

The proposed method uses internet of things for continuous monitoring of the parameters such as temperature, humidity, pulse rate of the neonatal. The body temperature and pulse rate will be detected by temperature sensor and pulse sensor respectively.

3.PROPOSED SYSTEM

In this proposed system , a micro controller used to control and monitoring the sensors for childs health.The position sensor are used to monitoring the child position.In additionally , the vibration sensor are used to recognize the abnormal vibration within the incubator.The proposed system consists of an Arduino UNO microcontroller, which is to be connected directlyto the incubator and several sensors are used to sense the biological signals inside the incubator and in the body of the premature infant . The various sensors used in the proposed model of neonatal incubator for real-time monitoring and control includes, the Temperature and Humidity sensor (DHT11) for sensing the temperature and the humidity in the surroundings of the neonate, the Pulse rate sensor to record the heart rate of the infant, the Gas Sensor to sense the additional gas leakage and the Light sensor to capture the extra light penetration

4. BLOCK DIAGRAM AND WORKING:-

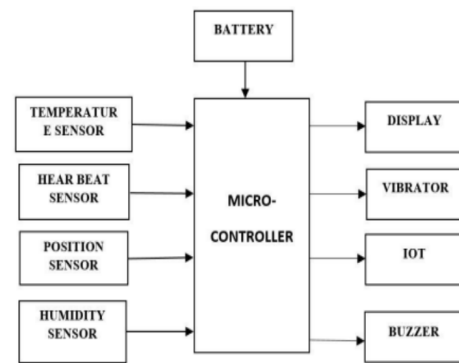


Fig 4. Block Diagram

4.1 TEMPARATURE SENSOR

A temperature sensor is a device that detects and measures hotness and coolness.Sensors are used in medical devices within intensive care units, hospital wards.

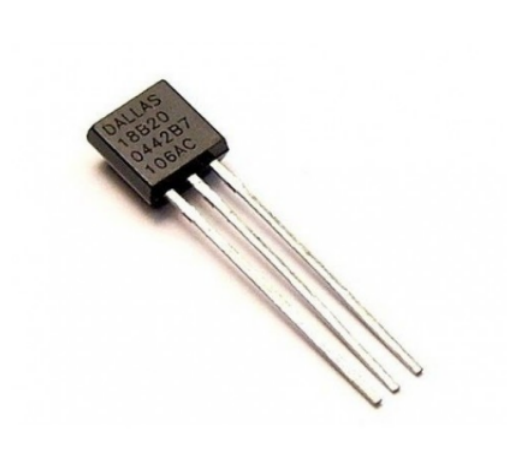


Fig 4.1TEMPARATURE SENSOR

4.2 HEART BEAT SENSOR

Heart beat sensors are designed to give digital output heart beat when a finger is placed on it. When the heart beat detector starts working, the light emitting detector (LED) blinks simultaneously for every heart beat. An alternate name of this sensor is heart beat sensor or heart rate sensor.



Fig 4.2 Heart Beat Sensor

4.3. POSITION SENSOR

A position sensor is a device that can detect a movement of an object. These types of sensors can also be used to detect the presence or absence of an object.



Fig 4.3 Light Sensor

4.4 HUMIDITY SENSOR

Humidity sensor work by detecting changes that alter electrical currents or temperature in the air. The monitor minute changes in the atmosphere in order to calculate the humidity in the air.

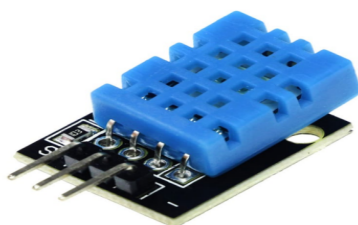


Fig 4.4 Humidity sensor

4.5 VIBRATION SENSOR

A vibration sensor is a device that measures the amount and frequency of vibration. Those measurements can be used to detect imbalances or other issues.

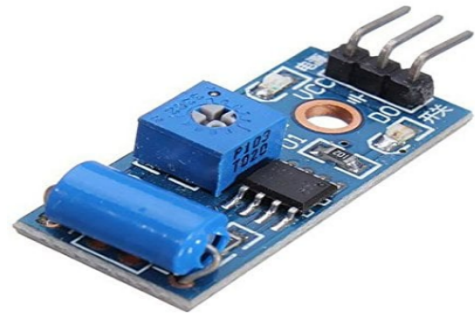


Fig4.3 Vibration sensor

4.6 Microcontroller & Battery

Microcontroller is small computer on a single VLSI integrated circuit (ic chip). Microcontroller has the specification of pic16f887 microcontroller. It can be designed for embedded application.

A battery is a source of electric power consisting of one or more electrochemical cells with external connections for powering electrical device. When a battery is supplying power, its positive terminal is cathode and negative terminal is anode.

4.CONCLUSIONS

However, this design also has some aspects to be improved. For example, the baby incubator may cause excessive noise due to device aging. Under normal circumstances, the noise level in the incubator should not be higher than 55dB. A too high noise affects the normal development of premature baby's auditory sense. Therefore, the design will be further improved by setting suppression device. In this design, the child health information are send to the IOT and will be accessed to mobile, so that the parents can login and access that in the thingspeak.

5. REFERENCES

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