A New Device to Monitors New Born Child Health Conditions in an Incubator with Wireless Technology

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Abstract— Nowadays a newborn child as a immature death is increasing due to not proper monitoring in incubator by the people. if automatic control and monitor system is needed for the hospital to avoid the new born child death. The proposed work is design a new device to monitor baby condition and send alert call to parents, nurses and doctors. The arduino based New Born child incubator helps to all peoples, the cost this proposed works very less than today's New Born child incubator which are used in big hospital. So, everyone which belongs to economical backward also use of it. This proposed work not only used for monitoring and controlling the temperature but also provide number of advantages such as controlling humidity, monitoring weight, detection of sound etc.

Keywords—Component, Formatting, Style, Styling, Insert (key words)

I. INTRODUCTION

There are four million babies worldwide who die in the first month of life, one million die on their first day. Preterm birth is attributed, either directly or indirectly, to at least 25% of neonatal deaths, and low birth weight (LBW) new-borns are at the greatest risk.

About half of the worldwide total, or 1.8 million babies each year, die for lack of a consistent heat until they have the body fat and metabolic rate to stay warm. This paper helps to prevent the death of such babies. The microcontroller based New Born child incubator helps to all peoples, the cost this Proposed works very less than today's New Born child incubator which are used in big hospital.

So, everyone which belongs to economical backward also use of it. This Proposed work not only used for monitoring and controlling the temperature but also provide number of advantages such as controlling humidity, pressure etc. Incubators are attracting interest from the medical profession.

They are glass and metal cases heated to certain Humidity, into which enough air is admitted to maintain life. Until such time as infant is strong enough for Humidity of room. In New Born child incubator

Humidity control is very important. And therefore we are controlling the Humidity according to our requirements.

II. RELATED WORK

1.1 PREMATURE NEW BORN CHILD

Preterm birth are also known as premature birth, is the birth of the New Born child at least 37 weeks gestational age. These babies are also known as preemies. Premature infants are at greater risk for delays in development, hearing problems and problems seeing. These risks are seeing only in the earlier a New Born child is born. Preterm birth is the most common cause of death among infants worldwide. About 15 million babies are preterm each year. I many countries rates of premature birth have increased between 1990s and 2015s. Complications from preterm births resulted in 0.74 million deaths in 2013 down from 1.57 million in 1990.

2.1 NEONATAL INTENSIVE CARE UNIT

Neonatal intensive care unit is known as intensive care nursery especially in the care of premature or ill newborn infants. Newborn babies who need intensive medical attention are often admitted into a special area of the hospital called the neonatal intensive care unit. The NICU combines advanced technology and trained health care professionals to provide specialized care for the tiniest patients.

2.2 EXISTING SYSTEM

Single chip microcontroller, incubator monitoring system that can be integrated with existing incubator monitoring system. The system consists of temperature sensor, humility sensor, respiration sensor. Temperature sensor is sensing the data from the incubator. Humility sensor is

sensing the data from the incubator. Respiration sensor is sensing the data from the New Born child. The single chip microcontroller reads and frames the surrounding temperature, humility, respiration along with the sensor. All the values are display on LCD. Single chip microcontroller can analyse all the three sensor data and the any variation is occurred on that alert Messages is displayed in the screen. Fig 1 shows the Existing System


Fig 1 Existing work Design

III. METHODOLOGY

Relevant details should be given including experimental design and the technique (s) used along with appropriate statistical methods used clearly along with the year of experimentation (field and laboratory).
Arduino, incubator monitoring system that can be integrated with existing incubator monitoring system. The arduino reads and frames the surrounding temperature, humidity, weight, sound detection along with the sensor.

All the recorded values are stored in the computer storages and send alert call to the parents as well as doctor and nurses .From computer system to parents, nurses and doctors connection is through Internet call or WhatsApp call or it may be any other social economic path etc... Fig 2 Shows the Architecture Diagram of Proposed Work
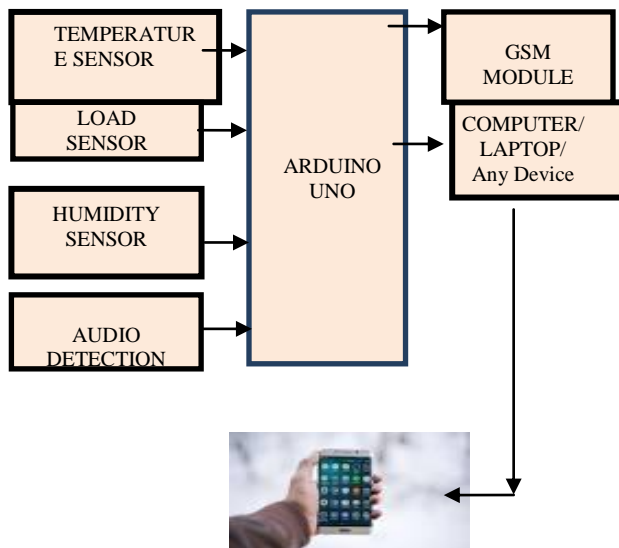
Fig2 Architecture Diagram

2.3 DHT11 SENSOR
DHT11 sensors detect the relative humidity of the immediate environments in which they are placed. They measure both the moisture and temperature in the air and express relative humidity as a percentage of the ratio of moisture in the air to the maximum amount that can be held in the air at the current temperature. As air becomes hotter, it holds more moisture, so the relative humidity changes with the temperature. Most humidity sensors use capacitive measurement to determine the amount of moisture in the air. This type of measurement relies on two electrical conductors with a non-conductive polymer film laying between them to create an electrical field between them. Moisture from the air collects on the film and causes changes in the voltage levels between the two plates. This change is then converted into a digital measurement of the air's relative humidity after taking the air temperature into account.

2.4 LOAD CELL SENSOR
A load cell is a transducer that is used to create an electrical signal whose magnitude is directly proportional to the force being measured. The various load cell types include hydraulic, pneumatic, and strain gauge.

Strain gauge load cells are the most common in industry. These load cells are particularly stiff, have very good resonance values, and tend to have long life cycles in application. Strain gauge load cells work on the principle that the strain gauge (a planar resistor) deforms when the material of the load cells deforms appropriately. Deformation of the strain gauge changes its electrical resistance, by an amount that is proportional to the strain. The change in resistance of the strain gauge provides an electrical value change that is calibrated to the load placed on the load cell.

A load cell usually consists of four strain gauges in a Wheatstone bridge configuration. Load cells of one strain gauge (quarter bridge) or two strain gauges (half bridge) are also available. The electrical signal output is typically in the order of a few millivolts (mV) and requires amplification by an instrumentation amplifier before it can be used. The output of the transducer can be scaled to calculate the force applied to the transducer. Sometimes a high resolution ADC, typically 24-bit, can be used directly.

The gauges themselves are bonded onto a beam or structural member that deforms when weight is applied. In most cases, four strain gauges are used to obtain maximum sensitivity and temperature compensation. Two of the gauges are usually in tension can be represented as T1 and T2,and two in compression can be represented as C1 and C2, and are wired with compensation adjustments. The strain gauge load cell is fundamentally a spring optimized for strain measurement. Gauges are mounted in areas that exhibit strain in compression or tension. When weight is applied to the

load cell, gauges C1 and C2 compress decreasing their resistances. Simultaneously, gauges T1 and T2 are stretched increasing their resistances. The change in resistances causes more current to flow through C1 and C2 and less current to flow through T1 and T2. Thus a potential difference is felt between the output or signal leads of the load cell. The gauges are mounted in a differential bridge to enhance measurement accuracy. When weight is applied, the strain changes the electrical resistance of the gauges in proportion to the load. Other load cells are fading into obscurity, as strain gauge load cells continue to increase their accuracy and lower their unit costs.

2.3 SIM GSM MODEM
The GSM modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantages of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS control, data transfer, remote control and logging can be developed easily. The modem can either be connected to pc serial port directly or to any microcontroller through MAX232. It can be used to send and receive SMS or make/receive voice calls. It can also be used in GPRS mode to connect to internet and do many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging.

2.5 Advantages of Proposed System
1. Phone call and SMS based remote control and alerts to parents/nurses and doctors
2. Baby Emotions also monitored
3. Active and Inactive state of baby is also recorded.

2.5.1 FEATURES
1. Status of modem indicated by LED & Mobile
2. Simple to use and low cost

2.6 ARDUINO
Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board

microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself (DIY) kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or Breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino Proposed workprovides an integrated development environment (IDE) based on the Processing language project.

The Arduino Proposed workstarted in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

2.7 HARDWARE IMPLEMENTATION

Fig 3 Baby is moitered in an Incubator

The given circuit diagram shows interfacing between all components of this project. Here arduino is used to control all operations of the New Born child incubator. Figure 3 shows the result of arduino based premature New Born child incubator. Using the component like temperature sensor, humidity sensor, gsm sim modem etc..,

IV. RESULTS AND DISCUSSION

The Proposed work is designed keeping in mind the medical conditions available in rural areas. This Equipment can be effectively used by technicians in a small health care centre.

It can be a lifesaving machine for low birth weight infants. The components can be easily fixed. The chamber is sufficient enough to accommodate the New Born child comfortably.

As the electronic part is separated from the New Born child's compartment New Born child can be assured safe. The temperature of the system can be understood. This Proposed works simple and efficient in maintaining the temperature of the chamber irrespective of the outside temperature and is designed at a low cost.

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