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WIFI-ENABLED SMART CHILD ISOLETTE

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Abstract: Because of the importance of lowering the infant baby death rate, the demand for innovative advanced controls for incubators is rapidly expanding. A variety of parameters must be monitored in an incubator. This research described an advanced control system for monitoring some critical parameters that affect an infant's life. This technology, which monitors and controls multiple parameters simultaneously with enhanced control and smooth operation, serves to improve the system's accuracy. Two temperature sensors are employed in the proposed system to control the incubator temperature and to monitor the skin temperature. A humidity sensor was utilized to determine whether or not the infant had peed. Measuring BPM with a pulse sensor (Beats Per Minute). The cooling fan and heating bulb areutilized to keep the incubator temperature at an optimal level.

These two are controlled by an Arduino microcontroller based on the temperatureof the incubator. Two push buttons are utilized in this system to check feeding and full body check- up completion. A user-friendly application page was created to ensure that the user could easily monitor the service. The systems are Arduino-based, and the IOT module can be used to control the incubator.

Index Terms: Humidity Sensor, DHT11, Pulse Sensor, EM Reader, RFID Cards, LM35

I. INTRODUCTION

Only urban Indians are familiar with the word, which is virtually unfamiliar in rural and semi-urban areas. Rural locations are difficult to reach, and the technologies offered in tertiary centers and corporate hospitals are unavailable.When compared to the global population in 2008, the number of linked devices is lower.

Expect 50 billion connected things by 2020. The Internet of Things refers to the usage of electronic devices that gather or monitor data and are connected to a private or public cloud, allowing them to trigger activities automatically. Tracking health information, whether via fatal monitors, electrocardiograms, temperature monitors, or blood glucose readings, is critical for someindividuals.

The ongoing monitoring and gatheringof data from patients from health camps, hospital and other locations is known as healthcare surveillance. So, create and design low-cost smart infant incubators for new born babies tomonitor their health state using an IOTenvironment by focusing on the above challenges.In our suggested system, a sensor measures health monitoring parameters, the microcontroller processes the sensor readings, and the processed values are subsequently recorded in the online server via the IOT module. Furthermore, data can be accessible from anywhere at any time via the IOT ecosystem.

II. EXISTING SYSTEM

The temperature and other data are displayed ona screen that is fixed to the incubator system in many of the incubator structures. Doctors or nursesin the maternity ward should check on the health ofinfants once per hour or vice versa. A doctor or nurse must always be there, and they must constantly examine the health status of a newborn in an incubator.

This Fig 1 shows that , will not always be accurate interms of taking care; death can occur due to humanneglect. In addition, current incubator systems cannot send accumulated sensor statistics to remotelocations, and the incubator device cannot alter dataremoteplaces.

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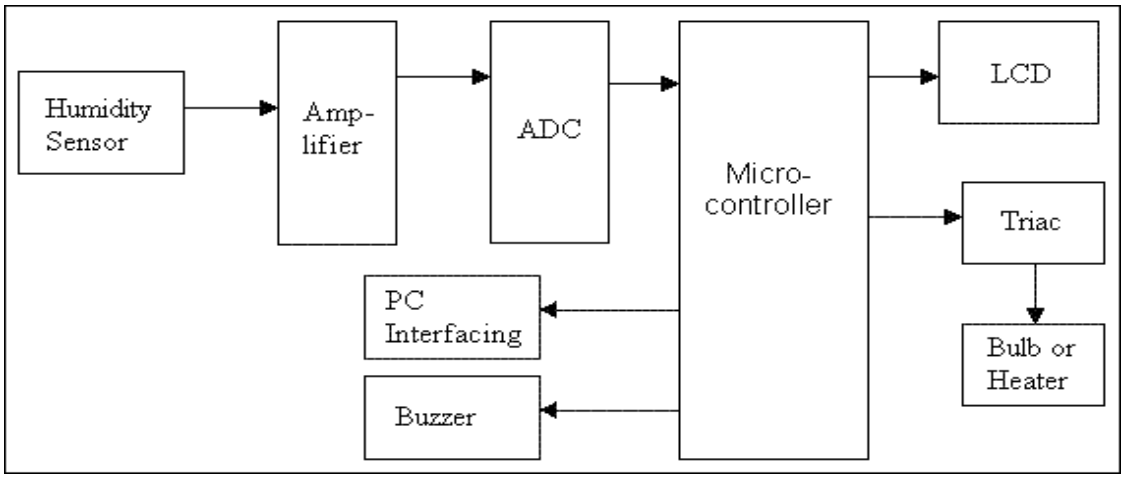

Fig 1: Incubator Using Microcontroller

III. SYSTEM DESIGN

The suggested system uses the Internet to monitor several data such as the child'stemperature, humidity, and heart rate. If the monitored data reaches the threshold level, thedoctor, nurse, or any other concerned person will be notified via e-mail or SMS. Here, provided an RFID tag of the person in question. This is when the EM readings come in handy, as they aid in scanning the RFID tag of the person entering the incubator chamber.

An Arduino UNOcontroller can control the entire process. An incubator's temperature is controlled by a cooling fan and a heating lamp. The system is made up of a Node MCU that is linked to the incubator. The Node MCU is set up to collect data from sensors. The Node MCU is designed to obtain and Fig 2 show thereadings from these sensors, allowing for reading monitoring. These sensors' values are updated on the IOT platform. The temperature and humidity sensor detects the ambient temperature as well as the relative humidity in the neonate's environment.

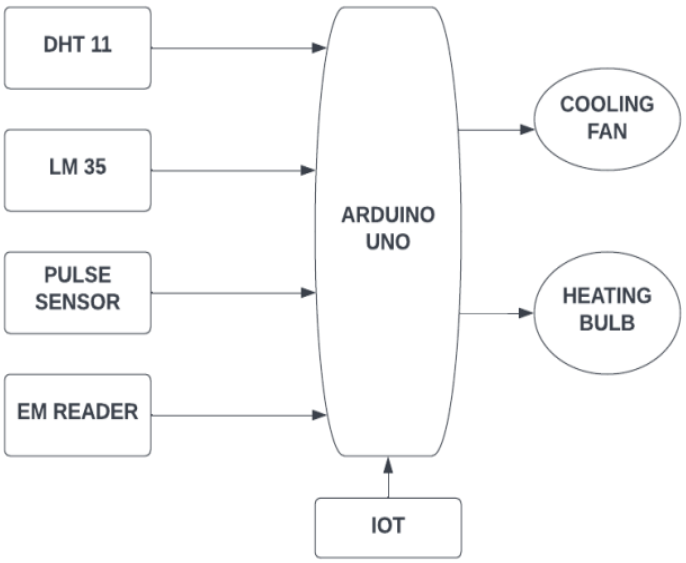

Fig 2; Incubator Using IOT

When the temperature and humidity levelsare outside of the prescribed range (36.5-37.2°C), or when the presence pulse rate is reduced. Then itis detected by the appropriate sensors, which are monitored by a controller, and a message or emailis sent to the baby's doctor and nurse, as well as others with the information.

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The Arduino UNO controller can monitor continuous readings of key factors such as temperature, humidity, and pulse. This ensures that the neonates are kept in a comfortable environment. Furthermore, any changes in the parameters are sent to the hospital staff so that they can take prompt action and prevent a newborn from harm.

IV. HARDWARE USED

a. ARDUINO UNO

A microcontroller is a miniature computer with a CPU core, memory, and programmable input/output peripherals on a single integrated circuit. This kit includes a microcontroller as well as all of the necessary components to make building anddebugging projects a breeze.

b. DHT11

The DHT11 Temperature & Humidity Sensor has a temperature and humidity sensor complex with a calibrated digital signal output. This DHT11 Sensor isproperly calibrated and offers serial data, making installation simple. To provide the highest level of humidity accuracy, each DHT11 element is rigorously calibrated in a laboratory. The calibration coefficients are saved as programmes in the OTP memory, and the sensor's internal signal detectionalgorithm uses them.

c. LM 35

The LM35 is an IC temperature
sensor with a Celsius output. The sensor is resistant to oxidation and other chemical reactions. Temperature can be measuredmore precisely with the LM35 than with a thermistor. It hasa modest self-heating capability and causes a temperature rise of less than 0.1 degree C in still air. It can operate at temperatures ranging from -55 to150 degrees Celsius.

d. BLOOD PRESSURE

Blood is pumped through the human body and squeezed into the capillarytissues when a heartbeat begins. A light on the pulse sensor module aids in the measurement of the pulse rate. The volume inside the capillary blood vessels will be high during a heartbeat. This has an effect on light reflection, and the light reflected during a heartbeat will be less than during aperiod when there is no heartbeat. The output of a pulse sensor can be used toacquire this fluctuation in light transmission and reflection as a pulse.

e. EM READER

The EM18 RFID Reader is a modulethat reads the ID data from RFID tags. EveryTAG's ID information is unique and cannotbe replicated. First, select the communication mode between theMODULE and the CONTROLLER. Thecontroller will then be programmed to receive data from the module, display it, andpower the system. When a tag comes close to a MODULE, it scans the ID and sends thedata to the controller. The controller gets the data and executes the actions.

f. ESP8266 NODEMCU

Node MCU is an open sources firmware and developing kit for prototype and building IOT solution.

Itcan function as an access point and/or station, host a website, and connect to the internet to download or upload data. The processor runs at 80 MHz. It has a maximumfrequency of 160 MHz. Through its GPIOs,the ESP8266EX is frequently connected to external sensors and other specialised devices.

g. HEATING BULB

Heat lamps are incandescent lights that are primarily used to generate heat.They are available in various wattages, voltages, and sizes. Heat lamps work in the same way that conventional incandescent bulbs do, but they emit more more infrared radiation. This produces more radiant heat, making the heat lamp far more useful as a heat source than a standard lamp.

h. COOLING FAN

Fans are used to cool these components by moving heated air away from them and drawing cooler air over them. Fans attached to components are typically used in conjunction with a heat sink to increase the area of heated surface in contact with the air and so improve coolingefficiency. Fan control isn't usually a fully automated procedure.

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ADVANTAGES

i. Every second, the values can be checked. Itwill provide precise values that are synchronized every second.
ii. Doctors can quickly examine the health of the infant and prevent health problems in the future.
iii. The incubator protects the newborns from allergens, pathogens, loud noises, and otherfactors.
iv. The ability of an incubator to control humidity inhibits its capacity to preserve a baby's skin from losing too much moistureand becoming brittle or breaking.

V. CONCLUSION

The Internet of Things (IoT) in a Rural areas, underdeveloped cities, and towns, on the other hand, are not like this. Many IoT applications, such as this one, will bring aboutsignificant changes in rural areas and the medical business by delivering a more affordable and effective smart incubator. Created this using open-source resources like Arduino, so if this open- source technology improves or updates, improve the efficiency and capability of this mechanism. Each component is designed to fit intoonly one spot, making assembly simple for any health worker. As a result, the target health facilitywill be able to expand incubator capabilities without incurring additional costs. The incubator will be built with locally available materials and easily replacement parts. Finally, continuous monitoring will be available, with the temperatureof one or more incubators simply changed via the app rather manually.

More rural locations willbe able to use this technique in the future to providesafe incubation for preterm newborns and create aconnected environment in hospitals without havingto spend more money on more expensive smart incubators. It's still on the runway, and its haven't seen many of the breakthroughs in thehealthcare field that IOT practitioners have been anticipating. IOT provides a superb platform for real-time monitoring of metrics from patients and also improves the quality of life by overcoming some of the constraints.

FUTURE SCOPE

- The incubator power supply is can be replaced by solar power supply.
- Capability of the sensor may be increased
- IOT may be implemented by GSM.

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