Abstract - Today, technology is advancing in all possible directions, especially in the field of health and care products especially where the requirements are supporting life. Additional care is taken when it comes to babies. A design of a Baby Incubator System based on the PIC Microcontroller is a prototype which is developed which gives a reliable and efficient baby monitoring system that can play a vital role in providing better infant care. This system is monitor and control vital parameter such as Temperature, Humidity, Heartbeat, and Sound of incubator for the continuous controlling and monitoring the clinical condition. All these parameters are continuously monitored by system & will display the status on LCDs or gives alarm.

Keywords – Baby Incubator, PIC Microcontroller, Heartbeats, Temperature, Humidity, Infants, LCD.

I. INTRODUCTION

In the efficient baby Incubator system, an incubator is an infant-stimulating system used for intensive care of the newborn, premature or sick baby. It provides a safe and clean environment, which has fresh air, clean and sterile ambient conditions for the babies. There are four million babies worldwide who die in the first month of life, one million die on their first day. New-born are at the greatest risk. This paper helps to prevent the death of such babies. Everyone which belongs to economical backward also use of it.

1.1-Literature survey

- Smart Jacket Design for Neonatal Monitoring with Wearable Sensors[1], Sibrecht Bouwstra, Wei Chen, Loe Feijis Sidarto Bambang Oetomo has designed the smart Jacket which aims for providing reliable health monitoring as well as a comfortable clinical environment. for neonatal care and parent-child interaction. In this paper explore a new solution for skin-contact challenges. different sensors stitched in patches. this patches are mounted on jacket. Whenever smart jacket ware by baby body signal collected and makes signal conditioning. Drawback of this system is that in this module different sensors are mounted on the jacket for that the jacket must be in contact with the body.

- NEONATAL INTENSIVE CARE UNIT[2]

Karthik Hiremath has designed a Neonatal Intensive Care Unit; is designed to provide an atmosphere that limits stress on the infant and meets basic needs of warmth, nutrition, care and protection to assure proper growth and development. This paper’s focus is on presenting a completely automated version of the same, using the PIC 18F4520 and ZigBee technology.
Drawback of this system is that it only counts the pulse rate and sense the temperature of infant and incubator.

- **Development of Wireless Monitoring System for Neonatal Intensive Care Unit [3]**
  N.S. Joshi, R.K. Kamat, P.K. Gaikwad has designed a system which shows Development of a Wireless Monitoring System for NICU. This system is maintaining a stable body temperature is essential to ensure optimal growth of premature and weak infants. The system deploys a set of suitable sensors for the system development, and information is collected using PIC microcontroller, GSM module and AT commands. Drawback of this system is that it uses the GSM module, if there is no range the information cannot be send to the parents which can be dangerous. Cost also increases.

- **Design of Embedded Device for Incubator for the Monitoring of Infants [4]**
  Prof. Kranti Dive*, Prof. Gitanjali Kulkarni has designed a system which shows design of embedded device for real time monitoring of infants. The Embedded device includes sensors for Door Security, Light Intensity, Voice detection of incubator for the continuous monitoring of infants under clinical and home conditions. It will allow the early detection of potential life threatening events. The device would involve DSPIC microcontroller. Drawback of this system is that it only concentrates on the security of the room and does not provide sufficient parameters related to the baby health.

- **Intelligent Baby Monitoring System [5]**
  Savita P.Patil, 2Manisha R. Mhetre has designed an Intelligent Baby Monitoring System is designed to gives a reliable and efficient baby monitoring system that can play a vital role in providing better infant care. This system monitor vital parameters such as body temperature, pulse rate, moisture condition, movement of an infant and using PIC microcontroller and GSM network this information is transferred to their parent. Drawback of this system it does not log the history of baby health.

- **PIC Microcontroller based Baby Incubator [6]**
  Harshad Joshi, Dattu Shinde has designed a microcontroller based baby incubator which control and monitor vital parameters like oxygen, temperature, humidity, heartbeat using microcontroller and GSM module.

### 1.2 Proposed System:

This system monitor vital parameters such as body temperature, heartbeats, humidity, sound of an infant and using PIC Microcontroller. This information is transferred to their doctors. Measurements of this vital parameters can be done and under risk situation conveyed to the doctors with alarm triggering and serial communication system to initiate the proper control actions. As the electronic part is separated from the Baby’s compartment baby can be assured safe.
II. BLOCK DIAGRAM

![Block diagram of the system](image)

**Figure 1. Block diagram of the system**

III. SYSTEM ARCHITECTURE IN DETAIL

In this project we are using PIC 16F876a controller. It operates on dc-20Mhz. To this PIC we have connected different sensors which will allow us to measure different types of conditions which we need to measure. In this system we need to calculate many parameters like temperature, humidity, heartbeats, sound[6] and they are being calculated with different sensors. The sensors are connected as an input to the controller and at the output side we have different devices to display the readings of the same. Each sensor has different device to show the output of the temperature sensor, humidity sensor is displayed on LCD screen.[2] RS232 cable is used to send the data of the sensors to the doctors computer. Heart beat sensor is designed to give digital output of heart beat, when a finger is placed on it. The LED flashes in unison with each heartbeat. It works on the principle of light modulation by blood flow through finger at each pulse. The sensor calculates the average value of the heartbeat and displayed on the LCD. Temperature and humidity sensor module is used to control the relative humidity and temperature inside the incubator and that of baby, and we are controlling the proper action using different output module such as humidifier (bulb), fan if humidity or temperature are not as their set points. And keeping the baby under proper clinical environment.
IV. RESULT

<table>
<thead>
<tr>
<th>SR NO</th>
<th>YEAR</th>
<th>SYSTEM NAME</th>
<th>TECHNIQUE USED</th>
<th>CONTROL PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2009</td>
<td>Smart Jacket Design for Neonatal Monitoring with Wearable Sensors</td>
<td>Microcontroller, smart jacket with sensors</td>
<td>Any 6 type of clinical conditions.</td>
</tr>
<tr>
<td>2</td>
<td>2012</td>
<td>Neonatal Intensive Care Unit</td>
<td>PIC 18F4520 and Zig Bee technology</td>
<td>Temperature, Pulse rate</td>
</tr>
<tr>
<td>3</td>
<td>2013</td>
<td>Development of Wireless Monitoring System for Neonatal Intensive Care Unit</td>
<td>PIC microcontroller GSM module and AT commands.</td>
<td>Temperature, Humidity</td>
</tr>
<tr>
<td>4</td>
<td>2013</td>
<td>Design of Embedded Device for Incubator for the Monitoring of Infants</td>
<td>DSPIC microcontroller</td>
<td>Door Security, Light Intensity, Voice detection</td>
</tr>
<tr>
<td>5</td>
<td>2014</td>
<td>Intelligent Baby Monitoring System</td>
<td>PIC microcontroller and GSM network</td>
<td>Body temperature, pulse rate, moisture condition</td>
</tr>
<tr>
<td>6</td>
<td>2015</td>
<td>PIC Microcontroller based Baby Incubator</td>
<td>PIC microcontroller GSM module</td>
<td>Oxygen, temperature, humidity, heartbeat</td>
</tr>
<tr>
<td>7</td>
<td>2016</td>
<td>Proposed system</td>
<td>PIC microcontroller, Visual Basics</td>
<td>Temperature, sound humidity, heartbeat</td>
</tr>
</tbody>
</table>

As observed from the above result table we have concluded that in all the systems listed above has certain disadvantages like some can only measure Heartbeats, Temperature and some use GSM module to report their data. Working on these system disadvantages we are designing a system in which Heartbeat, Temperature, Humidity, Sound are controlled in one system and the data is logged on the doctors PC using visual basic software, due to this the care of baby is taken properly.

V. CONCLUSION

The project 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 center. 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 baby comfortably. And it is designed at low cost.

IV. REFERENCES


[7] VIDYA DHATRAK, REVATI GHOLAP, SUPRIYA PATIL, NAGAMA BHALDAR, PROF. MANISHA MHETRE “INTELLIGENT BABY INCUBATOR USING LABVIEW”, Vishwakarna Institute of Technology, Pune

[8] www.sunrom.com