Intelligent Infant Guarding System for Enhanced Neonatal Jaundice Treatment and Monitoring System

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Abstract—**In this paper, the development of an infant monitoring system in considered to reduce and prevent the infant death number especially against the sudden infant death syndrome(SIDS).This system can be used for infants at home or in a hospital nursery room. The system consists of carbon dioxide (CO2) sensors and active Radio Frequency Identification (RFID) technology. CO2 sensor was chosen and characterized in sensitivity, selectivity and humidity dependence. The RFID transmission was accomplished with a wireless module at two different operating frequencies. Radio Frequency Identification is a widely used technology it is applied in areas like: precise location, security authentication etc. infant jaundice is a yellow discoloration of baby's skin and eyes caused by the accumulation of unconjugated bilirubin. Phototherapy involves shining fluorescent light from the UV lights on bare skin. A specific wavelength of light can break down bilirubin into a form that the body can get rid of through the urine and stools. The light looks blue.The newborn is placed under the lights without clothes or just wearing a diaper. The eyes are covered to protect them from the bright light. IOT based monitoring system which is manually and automatic control concentration of UV light. The baby is turned frequently. The health care team carefully notes the infant's temperature, vital signs, and responses to the light. They also note how long the treatment lasted and the position of the light bulbs.**

Keywords—Infant, SIDS, CO2 Sensor, RFID Technology, Jaundice , UV light.

I.INTRODUCTION

An infant monitoring system to reduce the potential risks for Sudden Infant Death Syndrome (SIDS).Infants may take various sleeping positions and the exhaled air may spread in many directions due to air circulation. Thus, an array of CO2 sensors is placed around to provide sufficient information. With the RFID approach, an identification (ID) signal of the infant will be sent out to correlate the sensing/alarm signals with the ID. A RFID system Consists of three parts a tag ,a reader with its antennas and a computer equipped with a middleware application. A reader communicates with tags by electromagnetic waves. A reader sender sends a command to a tag by modulating a signal into the carrier. The reader receives information from the tag by transmitting a continuous waves RF signal to the tag, the tag responds by modulating the reflection coefficient of its antenna, thereby backscattering an information signal to the reader.bilirubin is generated during the breakdown of haemoglobin the immature liver of an infant cannot breakdown the generated bilirubin quickly enough, infant have higher concentration of haemoglobin than adults. Asaundice. Jaundice is present 84% newborns. Without appropriate treatment ,bilirubin is desposited into the brain, which can leads to brain damage. Permissible bilirubin levels are dependent on the baby's hours after birth and birth weight. Therefore ,it is crucial to measure bilirubin levels continuously in newborns in order symptoms of jaundice as early as posssible. UV lights are a type of light therapy (phototherapy) that is used to treat [newborn](#) [jaundice.](#) Jaundice is a yellow colouring of the skin and eyes. It is caused by too much of a yellow substance called bilirubin. Bilirubin is created when the body replaces old red blood cells. Phototherapy involves shining fluorescent light from the UV lights on bare skin. IOT based monitoring system to control the CO2 sensor,temperature and humidity sensors , UV light controlling action. A specific wavelength of light can break down bilirubin into a form that the body can get rid of through the urine and stools The newborn is placed under the lights without clothes or just wearing a diaper. The eyes are covered to protect them from the bright light. The baby is turned frequently.

The health care team carefully notes the infant's temperature, vital signs, and responses to the light. They also note how long the treatment lasted and the position of the light bulbs. The baby may become dehydrated from the lights. Fluids may be given through a vein during treatment. Blood tests are done to check the bilirubin level. When the levels have dropped enough, phototherapy is complete. Some infants receive phototherapy at home. In this case, a nurse visits daily and draws a sample of blood for testing.

II .RELATED WORK

RFID is an automatic identification technology which has many advantages such as big storage , flexible memory and capable of being programmed. The application of RFID technology to the manufacturing process will enable the possibilities to obtain real time information about the physical items involved in the process.[1]

- *Quality control*

In the modern manufacturing process , the quality of products is tested by a sequence of discrete produce sites. At the end of the produce procedure, the production must receive a sequence of measurements specifically before the final acceptable check with all of the data collector by the produce sites before. The support of RFID tag , the data about the quality obtained at each produce site through the manufacturing process.

- *Flexibility*

The RFID technology makes the controlling of the manufacturing becomes more flexible. The pre configuration process, the setting data to the programmable robots and production equipment will be scanned into the tag loader which will accompany the raw material in the manufacturing process. The RFID technology is very suitable for information capture and process control at the industrial produce sites , its characteristics: water proof, anti magnetic , high temperature resistance, etc,

- *Data security*

It ensures the integrity of data stored in the tag to make an accurate data reading while the wrong data may be found and ignored.

- *System security*

The system security by keeping the data in the produce sites independently instead of the central computer.

CO2 sensor :

Infants exhaled air roughly consist of 79.5% nitrogen (N2)

, 16.5% oxygen and 4% of carbon dioxide. The carbon dioxide is then diffused quickly to a much lower concentration between 2000ppm and 5000ppm in the air.

The working range of carbon dioxide sensors the

exhaled has a saturated humidity, even after diffusion, the relative humidity of the air composition is still high.

Carbon di oxide sensors is a short response time sensors is needed for real time monitoring purpose [2]

The goal of co2 sensors: active low cost and long term system, metal oxide based co2 sensor. Realize the short coming metal oxide sensing, such as humidity and temperature dependence.

DHT 11 Humidity & Temperature Sensor:

DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal- acquisition

technique and temperature & humidity sensing technology, it ensures high reliability and excellent long- term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost- effectiveness. Each DHT11 element is strictly calibrated in the laboratory that is extremely accurate on humidity calibration. The calibration coefficients are stored as programmers in the OTP memory, which are used by the sensor's internal signal detecting process. The single-wire serial interface makes system integration quick and easy. Its small size, low power consumption and up-to-20 meter signal transmission making it the best choice for various applications, including those most demanding ones.

UV Light:

Phototherapy is the use of visible light to treat severe jaundice in the neonatal period. Approximately 60% of term babies and 85% preterm babies will develop clinically apparent jaundice, which classically becomes visible on day 3, peaks days 5-7 and resolves by 14 days of age in a term infant and by 21 days in the preterm infant. Treatment with phototherapy is implemented in order to prevent the neuro toxic effects of high serum unconjugated bilirubin. Phototherapy is a safe, effective method for decreasing or preventing the rise of serum unconjugated bilirubin levels and reduces the need for exchange transfusion in neonates Phototherapy is treatment with a special type of light (not sunlight). It's sometimes used to treat newborn jaundice by making it easier for your baby's liver to break down and remove the bilirubin from your baby's blood. Phototherapy aims to expose your baby's skin to as much light as possible. Beneficial effects of UV radiation include the production of vitamin D, a vitamin essential to human health. Vitamin D helps the body to absorb calcium and UV light has a wavelength of 10 to 400 nm, which is shorter than the visible light but longer than the X-rays and is a form of electromagnetic radiation. They are found in sunlight and produce 10 per cent of the light from the total sunlight. IOT based monitoring system to control the CO2 sensor ,temperature and humidity sensors , UV light controlling action.

- PROPOSED IDEA

The initial stage of the project is dedicated to the development of an infant monitoring system in considered to reduce and prevent the infant death number especially against the sudden infant death syndrome(SIDS). This application holds RFID technology to store the infant personal identifications and details, in order to analyse any situation to handling the doctors and nurses, CO2 sensors to monitoring CO2 level in present surrounding infant environment. the development of this project UV lights are a type of light therapy (phototherapy) that is used to treat newborn HYPERLINK "https://www.mountsinai.org/health-library/diseases-conditions/newborn-jaundice" HYPERLINK "https://www.mountsinai.org/health-library/diseases-conditions/newborn-jaundice"jaundice. Jaundice is a yellow colouring of the skin and eyes. It is caused by too much of a yellow substance called bilirubin. Bilirubin is created when the body replaces old red blood cells. Phototherapy involves shining fluorescent light from the UV lights on bare skin. IOT based monitoring system which is manually and automatic control concentration of UV light. IOT based monitoring system to control the CO2 sensor ,temperature and humidity sensors , UV light controlling action.

CONCLUSION

Monitoring and controlling the UV light presence over this system and CO2 sensor, temperature sensor , humidity sensor through IOT based mobile application .the UV light wavelength   status is crucial for sustaining an optimal level of UV light in the infant body. Currently, there is a effective methods for to reduce the sudden infant death syndromes and the potential risk of jaundice .this method is non invasive, accessibility ,consistence, automatically, manually controlled via this system.

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