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Finger Print Based Protection to New Borns in the Hospitals including Voice Alert System

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Abstract: *Many hospitals, these days depend on the Information Technology (IT) to achieve perfection in the health services and operation management. The said dependency is because of the ability of emerging technologies to solve the problem of different nature. One of the problems where applicability of the IT can produce revolutionary solution is the cradle kidnapping and swapping of newborns in hospitals. It can be achieved with proper usage of the Radio frequency identification (Finger print) technology. The present work is an attempt to explore and then utilize Finger print technology in healthcare to protect the newborns in the hospitals from kidnapping and swapping. Apart from implementing a sample case the present work also characterize the Finger print system in terms of the different elements that it constitutes (readers, tags, software, and security programs).*

Keywords: Finger print, Voice chip, Cradle Swapping, Cradle kidnapping

I. INTRODUCTION

The public hospitals of developing countries are generally very crowded and hence are more prone to cradle swapping and cradle kidnapping. Even in developed countries like United States cradle swapping is one of the major concern. Every year around 1, 00,000 to 5, 00,000 newborns in United States are exchanged (swapped) by mistake, or one out of every eight babies born in American hospitals sent home with the wrong parents. According to a study , out of 34 newborns that are admitted to a neonatal intensive care unit there are 50% chances of incorrect newborns identification only in a single day. In real applies, the biometrics traits that are commonly used in different authentication systems are the face, fingerprint, hand geometry, palm print, signature, iris, voice, etc. But most of these practical biometric systems are developed for adults only and may not be a solution with newborns. Finger print system is very effective in protection of the newborn in such hospitals. A special designed Finger print tags attached with baby and his mother along with tag reader and automated system can manage the above issues.

II. PROPOSED METHOD

In this proposed method, a PIR sensor and baby presence detecting sensor(limit switch), Finger print Reader, Voice Chip and involved in this security system. If we want to lift the infant from cradle, we need to show the authorise ID card to the Finger print reader. The reader will verify the card and asking for the password. The password verification for the Finger print tag the details of the card holder will be provided to the system. The system authentication enables the authorised person to lift the baby. Infant can be accessed if the password matches otherwise the voice alert will be initiated to avoid kidnapping of baby. We also have a protection to give an alarm if anybody trying to bypass the entire system by cutting wires of our system power supply.

This research is an attempt to protect the newborns in the hospitals using the Finger print technology. A wristband active tag can be used for this purpose. The wristband may be tied to child and his mother and the authorized hospital staff. Finger print readers in newborn cradle may be used to read the signals and keep tracking on the activities of children, mothers and authorized staff members present in the hall. With proper automation it will be impossible to swapping and kidnapping of newborns.

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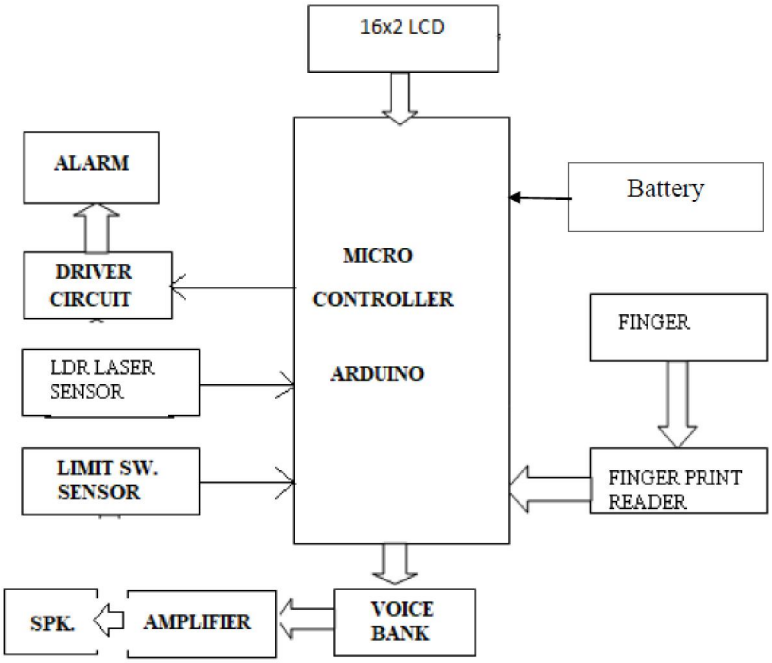

Fig. Block Diagram of Proposed Topology

Block diagram description:

Fingerprint:

Here we are using SRG R305 finger print module. Fingerprints are one of many forms of biometrics, used to identify individuals and verify their identity. The analysis of fingerprints for matching purposes generally requires the comparison of several features of the print pattern. This is a figure print sensor module interface for direct connections to microcontroller through RS232. It is used to scanning the authorized person finger print.

Voice Module Circuit:

Here the IC APR 33 is used as the voice bank. The prerecorded messages can bestored in any location. This can be replayed by selecting the respective signal. The output of this IC is given to the power amplifier circuit.

Limit Switch:

Limit switches are simple mechanical contact switches. it is used to drive a DC motor for gate open and close. This unit is interfaced with micro controller.

Light Detector:

Light sensor is LDR. Here we are using a light sensor which senses the light level emitted from the machines (spark). Light dependent resistor—photo resistor or Cadmium–Sulfide (Cds) cell. As their name suggests, these are resistors whose resistance is a function of the amount of light falling on them. Their resistance is very high when nolight is present and is significantly lower when they are illuminated. Under normal conditions, light falls on LDR and in case of a fault the LDR will be subjected to darkness.

Micro Controller Unit:

The Arduino Mega is a microcontroller board based on the ATmega1280 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support

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the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.

LCD Display:

LCD is mainly used for display the information. Here we are using 2x16 LCD. Operation of the LCD is the declining prices of LCDs. The ability to display numbers, characters, and graphics. This is in contrast to LEDs, which are limited to numbers and characters. The LCDs are light weight with only a few millimeters thickness. Since the LCDs consume less power, they are compatible with low power electronic circuits, and can be powered for long durations. The LCDs don't generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCDs have long life and a wide operating temperature range.

Driver Circuit:

This section contains IC ULN2003driver. The microcontroller gives alogic high output when required and this logic high output has to drive the alarm and LED(red/green) indication.

Alarm Circuit

Refer the figure; the output from a MC is connected to the base of transistor bc547through a resistor 4.7k □ . The transistor collector point connected to the buzzer.

Power Supply:

A power supply circuit is very essential in any project. This power supply circuit is designed to get regulated output DC voltage. The 0- 9volt transformer, step down the main voltage (230v) into9 volts. The secondary voltage of transformer is rectified using bridge rectifier. The rectified unidirectional DC is smoothed by 1000mf filter capacitor. The smooth DC is then fed to the three terminal +ve regulator called 7805 to get 5v DC supply. The power supply section is for supplying voltages to the entire circuit unit .

III. SYSTEM DESIGN

Implementing a fingerprint-based protection system for newborns in hospitals, along with a voice alert system, could enhance security and ensure the safety of infants. Here's a conceptual overview of how such a system might work:

Fingerprint-based Identification:

Each newborn would be assigned a unique identifier linked to their fingerprint. This identifier would be securely stored in the hospital's database along with the baby's medical records and other pertinent information.

Fingerprint Scanning Devices:

Hospitals would install fingerprint scanning devices in designated areas such as the nursery, delivery rooms, and other critical locations. These devices would be used to register and verify the fingerprints of newborns and authorized personnel.

Integration with Hospital Systems:

The fingerprint-based protection system would be integrated with the hospital's existing security infrastructure and patient management systems. This integration would allow for seamless tracking and monitoring of newborns throughout their stay in the hospital.

Voice Alert System:

In addition to fingerprint-based identification, a voice alert system could be implemented to enhance security further. This system would utilize voice recognition technology to identify authorized personnel and issue alerts in case of unauthorized access or potential security threats.

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Alert Notifications:
If an unauthorized individual attempts to access a restricted area or if a newborn is moved without proper authorization, the voice alert system would automatically notify hospital staff and security personnel. This notification could be sent via mobile devices, desktop computers, or through the hospital's central monitoring station.

Training and Education:
Hospital staff would receive training on how to use the fingerprint scanning devices and voice alert system effectively. Additionally, educational materials and resources would be provided to parents and visitors to raise awareness about the importance of infant security and safety protocols.

Privacy and Data Security:
It's crucial to prioritize the privacy and security of newborns' biometric data. The system should adhere to strict data protection regulations and encryption standards to prevent unauthorized access or data breaches.

Continuous Monitoring and Improvement:
The hospital administration would regularly monitor the effectiveness of the fingerprint-based protection system and voice alert system. Feedback from staff, parents, and visitors would be collected to identify areas for improvement and implement necessary adjustments.

IV. HARDWARE DESCRIPTION

Hardware Description

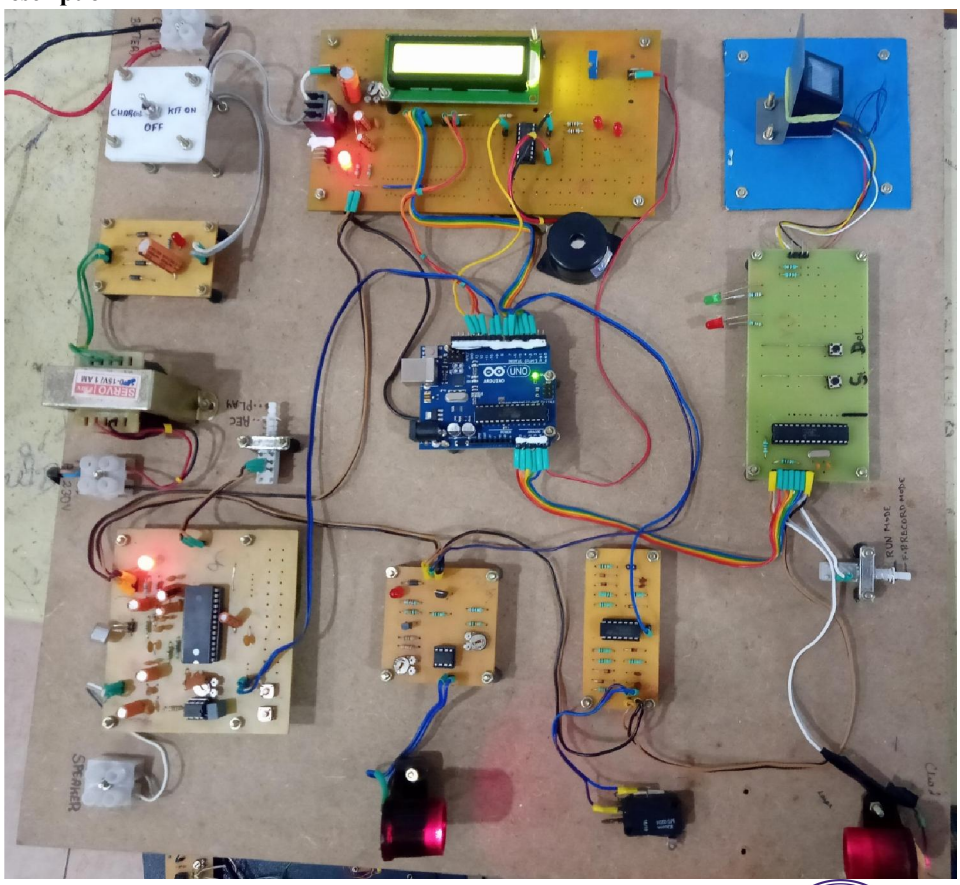

Fig.4.1 Hardware Implementation

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V. CONCLUSION

During the design, as well as during the construction, greater care has been put into avoid hiccups at the final stage. The PCB layouts were prepared with utmost care to incorporate the circuits in a modular manner. The circuit is made as simple as to our knowledge. Also components were selected keeping in mind their availability and cost. It was a very interesting process of developing the prototype, stage by stage and testing the same. We have to go through fairly large pages of data related to the components etc. It was a useful and fulfilling assignment to get the project completed in time. This gave us a sense of satisfaction and accomplishment.

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