Auto Baby Cry Detector And Sleep Music Player With Baby Health Care System

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Abstract

An inventive device called the Auto Baby Cry Detector and Sleep Music Player was created to help parents control their newborns' sleep habits while guaranteeing prompt attention to their demands. The two primary features of the system are the ability to identify a baby's cry and play calming music to aid in sleep. In order to distinguish the unique sound patterns of a baby's cry from other background noise, the baby cry recognition feature makes use of sophisticated signal processing and machine learning methods. The baby's room is continuously monitored by this system, which is usually implemented using microphones and embedded sensors. The device automatically initiates a response when it detects a cry, which might include alerting the parents or other carers or playing calming lullabies or white noise to soothe the baby. In order to help the infant fall asleep, the sleep music player feature plays pre-selected, soothing music or sounds, such lullabies, white noise, or natural sounds. With programmable sound levels and the ability to be activated either manually or automatically whenever the baby falls asleep or a cry is recognised, the music player can possibly be tailored to the baby's tastes.

1. Introduction

The Auto Baby Cry Detector and Sleep Music Player is a clever and creative device that helps parents and other carers with baby care, especially by automating the process of reacting to a baby's screams and encouraging sound sleep with calming music. This system makes use of contemporary technology, such as sound identification, machine learning, and audio processing, to identify a baby's distinct cry patterns and initiate the proper reactions, including playing soothing lullabies or alerting parents. This system's main objective is to make parenting easier, particularly during the first few months of a child's life when sleep patterns are frequently erratic and the baby's screams do not necessarily signal an urgent need for attention.

Sometimes it can be hard for parents to tell the difference between different kinds of cries, to tell when the baby is hungry, when it needs help, or when it just needs to be put to sleep again. By intelligently responding to the baby's demands, an automatic cry detection and music-playing system can greatly lessen the emotional and physical strain on parents. The system has a music player that plays lullabies, white noise, or other calming sounds in addition to recognising screams.

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2. Material

Arduino, Moisture Sensor, Dc power supply, Sound sensor, capacitor, resistor, diode, LED, Connector, Connecting wire, Relay,

3. Block Diagram

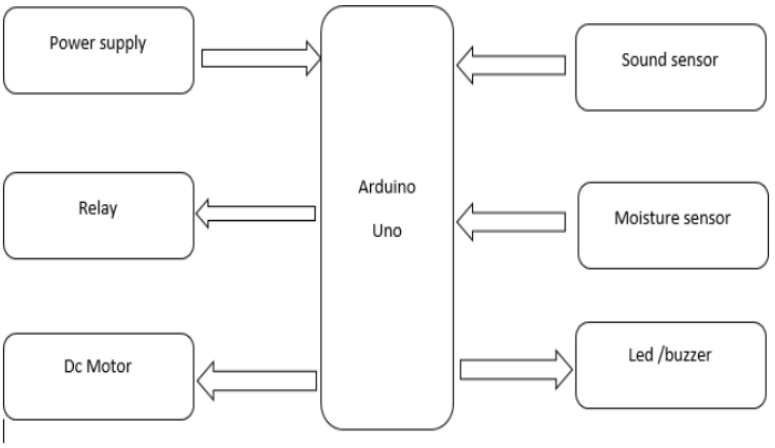

Fig 1: Block Diagram

Sometimes it can be hard for parents to tell the difference between different kinds of cries, to tell when the baby is hungry, when it needs help, or when it just needs to be put to sleep again. By intelligently responding to the baby's demands, an automatic cry detection and music-playing system can greatly lessen the emotional and physical strain on parents. The system has a music player that plays lullabies, white noise, or other calming sounds in addition to recognising screams. After that, the Arduino signals the relay. Music will start playing automatically when the relay turns on. And until the baby stops crying, this process will keep happening.

(i) Arduino Board (e.g., Arduino Uno)
(ii) Sound Sensor or Microphone Module (e.g., KY-037 or MAX4466)
(iii) Speaker/Buzzer
(iv) SD Card Module (Optional, if playing audio from an SD card)

A. Arduion :

- Function: Serves as the system's main processing unit.
- Description: The microcontroller is in charge of deciphering the microphone's processed data and identifying recurring patterns in the sound that match a baby's cries. Basic sound thresholding or pattern recognition based on machine learning may be used by the algorithm. It also regulates the reasoning behind when to play music for sleep.

B. Sleep Music Player (Audio Output):

- Function: Helps soothe the infant by playing calming white noise or sleep music.
- Description: The microcontroller activates the music player (which might be a straightforward audio module, Bluetooth speaker, or a direct connection to a mobile device) when it detects the baby's scream. White noise, lullabies, and other sleep-inducing music are among the soothing noises played by the system.

C. Power Supply:

- Function: Gives each component the power it needs.
- Description: The microphone, microprocessor, and audio player receive the necessary voltage and current from a power supply (such as a battery or AC adapter). This block is necessary for the system to function continuously.

D. Output (Speakers) :

- Function: Provides the surroundings with calming music or sound.
- Description: The music player is connected to a speaker or sound output system

4. Software Design With Simulation

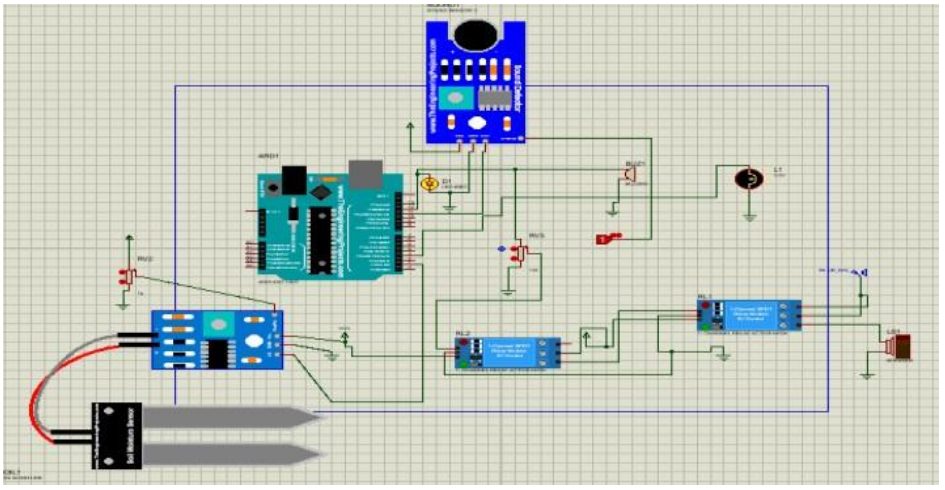

Fig 2: Circuit Simulation

A. Sound Detection: The microphone listens for sounds in the surroundings all the time. An electrical signal is produced upon detection of sound. The sound sensor amplifies the audio signal and transfers it to the microcontroller for further processing.

B. Cry Detection Algorithm: The microcontroller examines the input sound to see if it resembles a baby's cry. The microcontroller can employ a threshold-based detection system for a basic circuit.

C. Playing Sleep Music: The microcontroller signals the MP3 module or Bluetooth device to begin playing relaxing music as soon as it detects the cry. The MP3 module plays calming music files that have been loaded on an SD card through the speaker. When Bluetooth is enabled, the microcontroller either connects directly to a smartphone or partners with a Bluetooth speaker to play music.

D. Audio Output: The speaker, which is intended to produce calming noises (such as lullabies, white noise, or natural sounds) to aid in the baby's sleep, plays the music.

5. Flow Chart

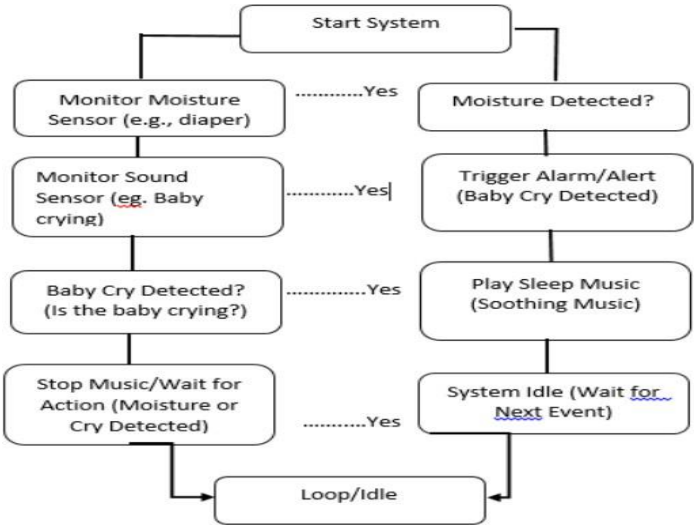

Fig 3: Flow chart

❖ **Complete flow of Program:**

i. **Sound Detection:** The microphone continuously scans the surrounding area for sounds, and when one is detected, it produces an electrical signal. The sound sensor then amplifies the signal and sends it to the microcontroller for additional processing.

ii. **Cry Detection Algorithm:** The microcontroller analyses the sound input to see if it resembles a baby cry; for a simpler circuit, the microcontroller may use a threshold-based detection.

iii. **Triggering Sleep Music:** The microcontroller sends a signal to the MP3 module or Bluetooth device to begin playing relaxing music. The MP3 module reads soothing music files that have been stored on an SD card and plays them through the speaker.

iv. **Audio Output:** The music plays through the speaker, which is designed to create calming noises (such lullabies, white noise, or natural sounds) to help the baby fall asleep.

v. **Repeat Monitoring:** The system keeps an eye on the surroundings, prepared to identify any further sobs and play the music again if necessary. Either a continuous loop or a timeout period can be used for this (for example, if the music plays for five minutes, it stops and waits for another cry). 24 3.7 PCB Design Steps and PCB Layout.

6. Result

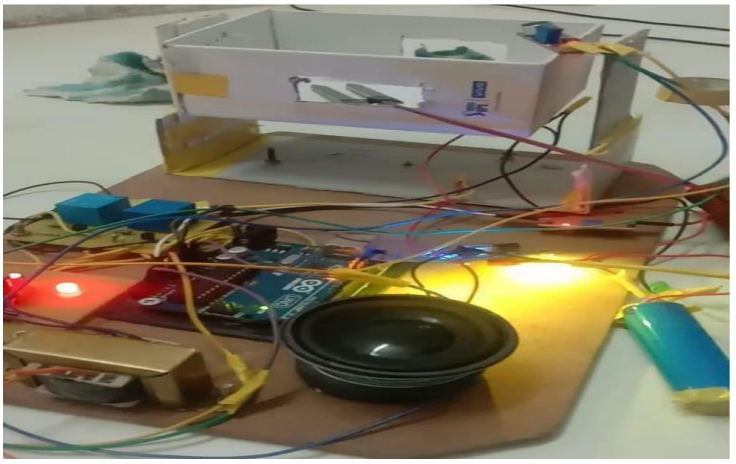

Fig 4 : Result

Our project is helpful for baby sheeter or parents. To care for a baby, you don't have to sit with them all day. We created a pretty basic project that will benefit baby sheeters or parents. The controller uses a microphone to detect the baby's screams, and then it activates the music and sleep mechanism, which produces a calming sound and dim lights that gradually put the baby to sleep again. This study uses a software to identify when a baby is crying. While disregarding other noises like claps, sneezes, fans, etc., it can identify a baby's scream.

7. Conclusion

Babies are the future of society, so caring for them is a difficult problem everywhere. This system highlights the value of child care, and it is cost-effective, easy to use, and very helpful for working parents and nurses who can manage their work effectively. As technology has advanced, day-to-day tasks for parents have become easier, and babies can be cared for in the mother's lap.

8. Future Directions

The suggested system is now using too much electricity because it is always turning on; thus, by making certain adjustments, we can create a system that uses less power in the future. To save electricity, we can put our system to sleep till the baby stops crying. When the baby starts to cry, our system will recognise it and turn on a music player. Additionally, we can install sensors to determine whether the cushion is wet or dry, which will help us notify the parents via a Bluetooth module.

9. Conflict of Interest

The authors declare that they have no conflict of interest.

10. Funding Declaration

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About Author

Ms. Pratiksha Tatya Pawar is currently pursuing a Bachelor's Degree in Electronics and Telecommunication Engineering at Dr. Babasaheb Ambedkar Technological University. Her academic and research interests include automation, Microcontroller (Arduino, Raspberry Pi), Sound signal detection and audio processing techniques and healthcare technologies.

Pratiksha has hands-on experience in C programming and is skilled in Arduino IDE, Proteus, Audacity for project implementation. Aim to design system that improve daily life and solve common parenting challenges with smart technology. Aspires to work in embedded technology, IOT, and smart device development for healthcare and consumer Electronic.