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A Smart Baby Cradle

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Abstract

A small baby needs parents' attention for whole day and 7 days a week, which is impossible due to other priorities like house hold activities, official works and personal works. Day care centre or nanny is the two options available which involves lot of passion. We all live in a world where technologies are sournded all around us. The new generations of parents were raised up with this amazing technology. There are lots of things or items present on these earth that parents will buy to help them care for their baby (Cradle, Crib, Baby Monitor, etc.). So, there is a need for safe and secure place to take good care of the children?s need with minimum human intervention and care, which can be accomplished with the help of a ?Smart Baby Cradle?. A ?Smart Baby Cradle? provides parents a smart automatic cradle system which help these parents monitor and comfort the baby. The Smart Baby Cradle allows them to monitoring their babies, the cradle, play soothing music, even speak to the baby, observing the temperature of the infant, bed wet sensor which will caution the attendants for bunk wetting of the infant. The mother where so ever she is can have a look on the baby through camera inserted in the cradle. All the fittings are done through Arduino and PIR sensor. Additionally, we provide a predefined nutrition food chart to help baby remain healthy.

Index terms— baby cradle, crib, baby monitor.

1 Introduction

enerally, the baby cradle is used for to make sleep and soothe to baby. For example someone have to take care of their child till as they asleep. However, conventional cradle does not electronically equipped such like battery or adapter to automate the cradle automatically. In Addition to that, these kind of conventional cradle is used in villages areas or non developed cities due to its low prices. But the problem of this kind of designated cradle is that you need manpower to take care of your child and your child may not be safe and feel comfortable in the conventional cradle. Thus, we need automatic cradle to take care of child which uses the battery or power source. Besides, there are extra features or function is provided by the newly automatic cradle is beneficial for parents. Because in the present world people are very busy in their professional life so they do not get time to take care of their infants. It will be very difficult control the babies and if someone is hiring professional to take care of their infants. It may increase your expenses from monthly expenditure. Moreover, in today, life it is very hard to even for the home makers (mummy) to sit nearby their babies and sooth them whenever they feel uncomfortable. Though, automatic this application is very useful for the nurses maternity units of hospital. In this project we had made cradle to swing/oscillate without human Intervention /Automatic by the sensor which is actuated by movement or specific action done by the body. It will also contain a sound system or alert arm for the parent as an indication of that baby has waked up if they are away from the baby and in other room. Smart cradle could be a device that pro vides associate aid to swing the baby cradle automatically. This system aims at two main things in assisting parents. Smart cradle movement informs parents when necessary.

2 II.

Literature Survey

) coefficients and short time energy parameters are extracted from the signal. In the second stage, the signal is classified using the kNN algorithm and is later verified as a cry signal, based on the pitch and harmonics information. In order to evaluate the performance of the algorithm in real world scenarios, we checked the robustness of the algorithm in the presence of several types of noise, and especially noises such as car horns and car engines that are likely to be present in vehicles. In addition, we addressed real time and low complexity demands during the development of the algorithm. In particular, we used a voice activity detector, which disabled the operation of the algorithm when voice activity was not present. A database of baby cry signals was used for performance evaluation. The results showed good performance of the proposed algorithm, even at lo w SNR. To train this classifier, we extract features such as Melfrequency cepstrum coefficients, pitch and formants from the recordings. T h second algorithm uses a dedicated convolution alneural network (CNN), operating on log Melfilter bank representation of the recordings. Performance evaluation o the algorithms is carried out using an annotated database containing recordings of babies (6 months old) in domestic environments. In addition to baby cry, these recordings contain various types of domestic sounds, such as parents talking and door opening. The CNN classifier is shown to yield considerably better results compared to the logistic regression classifier, demonstrating the power of deep learning when applied to audio processing.

3) S. Asthana, N. Varma, and V. K. Mittal, "Preliminary Analysis of Causes of Infant Cry," in IEEE International Symposium on Signal Processing and Information Technology, ISSPI December 15-17, 2014, pp. 468-473. Infant crying comprises a rhythmic pattern of cry sounds and inhalation. Unlike in adults, crying is the only means of communication for an infant. Most signal processing tools that work w ell for adults are not adequate in the case of infant cry sounds. Hence there is a need to develop methods for extracting feature s from these sounds, for better understanding. This paper describes a database collected for the analysis of infant cries vis-a-vis their causes, using spectrograms. The fundamental frequency, limited to adults, can go muhigher in the case of infant cries, along with rapid changes in F. Signal processing methods like autocorrelation and linear prediction analysis are used for analyzing the infant cry sounds and extract features like fundamental frequency, energy etc. Spectrograms providing the ground truth and information about the fundamental frequency with harmonics are examined in this preliminary analysis. An attempt is made to classify the infant cries into six categories such as pai n, discomfort, ailments, emotional need for attention, hunger an d cry due to manipulation. We propose a Method using IOT where the sensor value are fed to the microcontroller by means serial communication using UART protocol which is Asynchronous means that data is trans ferred without support from an external clock signal. transmission method is perfect for minimizing the required wires and I/O pins, but it does mean we need to put some extra effort into reliably transferring and receiving data. These sensor values are t hen uploaded on the cloud which are accessed by the concerned person through android application i.e. BLYNK application which is designed for the Internet of Things. It can control hard ware remotely, it can display sensor data, it can store data, vizualize it and do many other cool things anywhere in the world. There are three major components in the platform:

1) Blynk Appallows to you create amazing interfaces for your projects using various widgets we provide. 2) Blynk Serverresponsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your privat e Blynk server locally 3) Blynk Libraries -for all the popular hardware platforms -enable communication with the server and process all the incoming and outcoming commands The controlling is also done thro ugh the applications which in turn initiates the respective relays using BLYNK applications Cradle starts swinging automatically when baby cries and swings till baby stops crying. A sound detector is interfaced to the controller which senses sound when baby cries and activates the controller with its digital output. Sounds an alarm when mattress gets wet. A temperature sensor kept under the bottom cover where the baby sleeps can sense the temperature all time and sends analog signals to the inbuilt AD C of the RL78 controller. The digital data can be continuously monitored. A reduction in temperature indicates the wetness in t he cover. The controller can be made to activate an alarm, so that his/her cover be changed. Sounds an alarm if baby cries for more than a stipulated time indicating that baby needs attention by sending a notification through GSM interface to android based handsets. Also plays music and talk to the baby with the help of a mic. A camera fixed also helps to keep an eye on the baby. The android interface holds an interface which has a food chart to help parents which is predefined with the help of nutritionists to maintain good health of the baby.

V.

3 Expected Outcome

In the present study, an smart baby cradle system is being developed which is capable of detecting the movement of the baby and initiate cradle swing. Additionally, in the event of bed wet or hyperthermia, the developed system is capable of sending notifications to android interface. The device can be used to minimize the workload of the parents and nurses in home and hospitals respectively.

4 Future Scope

To enhance the security of the baby apart from the basic requirement more modules can be added like PIR sensor to detect the motion, camera to see the surroundings or the person who has been around the baby. To extend the range of the signals we can implement the same circuit with help of GSM module and Wifi module. Using GSM

module, the message can be send to parent even in different city, country so parents can monitor their baby even on business trips for companies. One of the most important feature that can be added to this device is that a trigger can be added in such a way that if the parents are very far away in different city or they could not reach to their baby than through the app they should be able to trigger an emergency help with nearest police station. For this GPS services can also be included. This ensures expert level safety for the child. More sensors to record statistics of body like body temperature, heartbeats, sleeping pattern can be observed and using data science technology more information about the baby can be known. The data received from the sensors can be stored in the database and using data analytics a pattern can be recorded when the baby cries or at what time of the day the baby wets the bed t he most. This would increase the credibility of the gear using t he machine learning techniques, prediction & modeling. The mobile app we used for the prototype model is the builti app for Bluetooth module. Depending upon the requirement, android or ios app can be made which increases the scope of project in app development framework. Additional functionalities like triggering emergency from app tracking the baby from app using GPS can also be added.

5 VIII.

6 Conclusion

The above proposed IOT based algorithm is designed to connect the parents to the baby through a device in order to keep the parents informed about the security of baby when they are not close to their baby. The sensors used ensure that the major aspects of security are covered. Parents can keep a check on their baby very easily through a mobile device. The algorithm fits best for the working parents or those who travel a lot especially for business purpose. There is also large amount of opportunity that opens up in order to modify the system further to extend t he level of security using other different sensors, using cloud computing technique and machine learning to extend the further research. The Iot has transformed our everyday lives at a significant exponential rate. The idea of connecting the information recorded from surroundings using complex sensors and sending it to mobile device shows the vast possibilities of how IoT can influence the lives of people through smart devices what they are called these days. We have already seen the reach of IOT in medical, security, environmental and many other fields. For example -The Running hand or wrist gear that measures all the vital statistics of the body and sends it to your device in real time and you can easily monitor your performance.

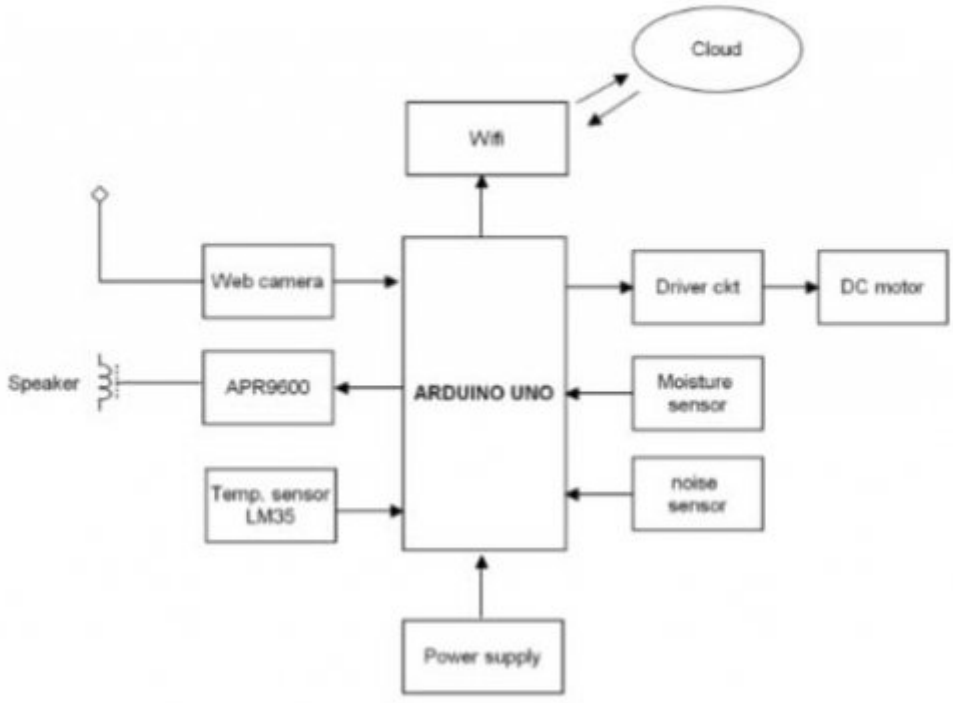

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Figure 1: Figure 1 :

Formants (F1, F2, F3, F4, F5) are used. The F is extracted from the cry signal using autocorrelation of the signal, and also by auto-correlation of linear prediction (LP) residual, for validation purpose. The formants are derived using LP spectrum. The cry sounds of infants in the age group of months to 22 months, exhibit remarkably distinct patterns of growing distributed energy with growing age. These spectral patterns are consistent for both male and female infants. In few cry sounds, the pitch variation effects for the Shrill and Growl type sounds are also observed. Whereas in few cry sounds, the Wheezing effect is observed, t hat has a peculiar effect on the cry melody contour. The formant frequencies of different cry sounds also indicate differences in characteristic patterns. Qualitative assessment of typically different cry sound types is attempted by identifying of strained, regions growling or shrill sound effect onsets, in a cry acoustic signal. III. Components Arduino UNO Temperature sensor-LM35 Speaker - APR9600 Moisture sensor Noise sensor Driver circuit DC motor Power supply Web camera Wifi module Arduino UNO 1.8.5 IDE

Clinical Diagnosis," in 7t h Workshop on Speech and Technologies, SLPAT 2016, San Francisco, USA, 13 September 2016, 2016, pp. 3742. Cry is a means of communication for a n infant. Infant cry signal is usually perceived as a high-pitched sound. Intuitively, significant changes seem to occur in the production source characteristics of cry sounds. Since the in stantaneous fundamental frequency (F) of infant cry is much higher than for adults and changes rapidly, the signal processing methods that work well for adults may fail in analyzing these signals. Hence, in this paper, we derive the excitation source features F and strength of excitation (SoE) using a recently proposed modi fied zero frequency filtering method. Changes in the proc of these discriminating features is examined for differ

Assessment of Different Sound Types of an Infant Cry" (accepted for publication) in 4th IEEE Uttar Pradesh Section International Conference on Electrical, Computer and Electronics (UPCON 2017), India, Oct. 2017 Acoustic characteristics of the cry sound can indicate cry cause, as it can be perceived easily by humans. Features melodyont our, MFCCs and harmonics factors have been explored to identify different sound types of infants cries. But detection of cry-causes is lesser explored. In this paper, different types of infant cries are analyzed from the spectral patterns derived from acoustic signals. Different cry sound patterns are identified related to different cause-factors of infant cries. An Infant Cry Sounds Database (IIITS-ICSD 2), consisting of infant cry sounds signals for 7 different cry cause categories, is analyzed. It consists of cry sounds signals categorized for different age-groups of infants. Features F and

Figure 2:

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