

Smart Cradle

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ABSTRACT

“When baby is happy everyone is happy”. One of the biggest problem faced by today’s parents is to soothe the baby’s distress and to ease their mind in all the other aspects. The net framework of the proposed project is to break up the above block chain by developing a smart electronic cradle to convoke all the data to assist the baby and to bridge the gap between the parents and the infant. The main nonpartisan of the project is to create a bed time ritual, lull the baby to slumber, assist the baby and to provide a healthy environment.

Keywords: Wiegen, Wet Sensor, Camera, Mike module, Mobile App.

1. INTRODUCTION

The advent of urbanization has increased the percentage of working women. Women who are basically known for multitasking undergoes a very tough time in taking care of their children. Those mom's who are excessively occupied and don't have a baby sitter to deal with their infants find it so difficult to take care of the baby. The parents who cannot afford costliest comfortable cradles has to swing the conventional cradle to make the baby sleep. On the other hand people who could afford costliest cradle are not happy with the features provided. To add on the infants do have certain discomforts. Inventing smart, powerful and profitable products to satisfy the needs and expectations of the market and then turning the insights that emerge into ideas that deliver change is more important than creating junk or crap. We are trying to soothe the baby's distress and to serve as a helping hand for the parents.

2. PROBLEM

One of the biggest wealth an infant could get from their parent's is their love and care. It can never be replaced by any other factor. But that precious person goes through tough time when looking after her infant especially when the baby's age is less than 1. She sacrifices everything including her health to look after her beloved child. As health is a cycle, when the mothers health get affected, it influences the infant's health too due to mother feeding. Mother's health need to be protected. Here comes the automatic electronic cradle to help her.



Fig 1. Traditional cradle

3. EXISTING PRODUCT

There are few existing products like "Intelligent baby cradle", "Smart baby cradle" these products are a kind of conventional model where in they use a constant mechanism to soothe the baby's distress. The method of swinging the cradle follows an East to West mechanism which leads to Shaken Baby Syndrome (SBS).

This creates a shearing and tearing motion between the tissues of the white matter and grey matter of the brain serves as the major cause for the damage of Intelligent quotient (IQ) and cognitive function.



Fig 2. Fisher Price 4 in 1 Smart Cradle's Swing

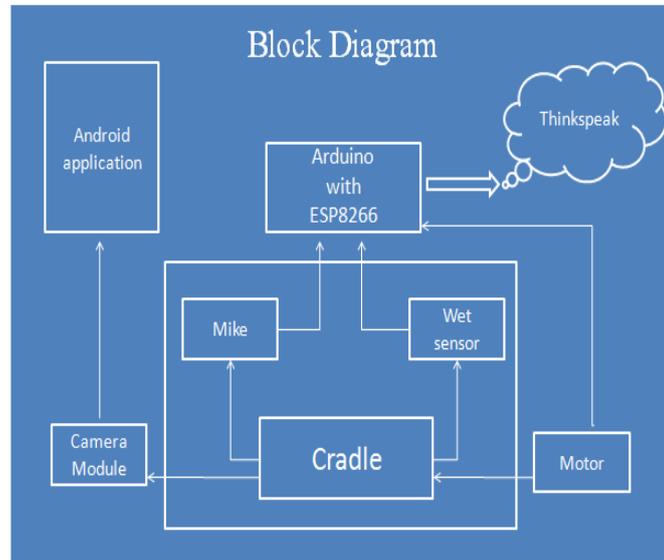
4. PROPOSED SYSTEM

The net framework of the proposed project is to break up the above block chain by developing a smart electronic cradle to convoke all the data to assist the baby and to bridge the gap between the parents and the infant. Our product uses a Wiegen mechanism where in the cradle is designed to swing in North-to-South direction preventing the infant from Shaken Baby Syndrome. Wiegen will act as a personal assistant to take care of the infant. The main objective of our project is to bridge the gap between the children and parents who are far away from the infant.

5. COMPONENTS USED

- Arduino UNO
- Wet Sensor
- Mike Module
- Camera Module
- Motor
- Relay Module
- Battery
- ESP8266

6. BLOCK DIAGRAM



The above block diagram describes the following;

- (i) The first module involves the mike module in where the input will be the cry of the baby. If the baby cries there will be an increase in voltage level, this change in voltage will be observed, analyzed to activate the automatic Wiegen swing mechanism with the help of motor. The set up will be like the mike will be connected to the cradle if the mike output is high then the signal will be sent to the arduino. The arduino will direct the motor to swing the cradle.
- (ii) The second module involves the bed wet sensing module. The wet sensor will be connected to the cradle. When the bed is wet an indication will be sent to the arduino in where the observations will be done with the pre surveyed values. The values retrieved will be uploaded to things speak platform which acts as a virtual server or cloud and the values will be compared. And in case of any distress the parents will be intimated via an android applications.
- (iii) The third module involves the monitoring system. If the voltage level observed from the cry of the baby is high for a certain critical period then there will be a communication channel established between the parent and the offspring. The camera module integrated with the cradle will record the movements of the baby when the baby is under any distress.
- (iv) The android application is used to display the notification messages about the infant to the parent.

7. HARDWARE DESCRIPTION

1. ARDUINO

The Arduino UNO is a microcontroller board based on the ATmega328. It has 14 digital and 6 analog input/output pins. It operates at a clock speed of 16 MHZ. It requires an additional power supply. Here, Arduino will receive the input from the wet sensor, audio sensor through the input pins accordingly and will be quantified to acquire the data to assist baby. If the baby's distress is not soothed by automatic Wiegen swing mechanism, the Arduino will help us to integrate the camera module via which the parents can see the baby.

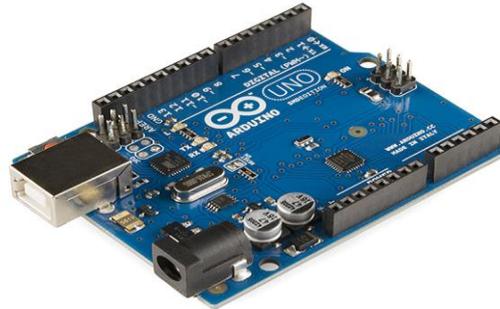


Fig 4. Arduino UNO

2. *WET SENSOR*

The wet sensor used here is WETK2 version 4. Generally the babies urinate for about two times in an hour, which makes the bed wet and they'll start crying. In order to solve the above catastrophe we are using the wet sensor to check for the bed wet condition. If the bed is wet the sensor's output will turn high and intimate the parent via Arduino.

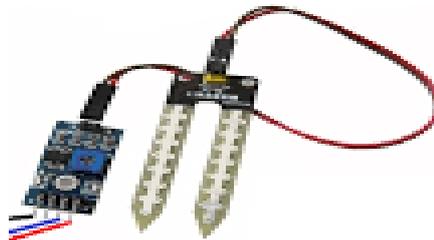


Fig 5. Wet Sensor

3. *MIKE MODULE*

Here the mike module is used to detect the cry of the baby. The mike will be directly connected to Arduino UNO. The output from the mike will be fed as input to the Arduino in where it will be analyzed to check whether the baby is crying or not. If the baby cries then the automatic Wiegen swing will be activated.



Fig 6. MIKE MODULE

4. CAMERA MODULE

The camera module integrated with Arduino UNO is used to capture the baby's images as frames which will be seen as video. The video will be captured when the baby's distress couldn't be soothed by automatic Wiegen swing. In this case the captured video will be sent to the parent in order to intimate the parent about the abnormal condition of the baby .Because the baby might suffer from any problem or catastrophe which could not be resolved just by swinging.



Fig 7. IP Camera

5. MOTOR

Here the motor is used to swing the Wiegen cradle in the North-to-South direction to lull the baby to slumber. Henceforth when the baby cries the Arduino will intimate the motor to start its swinging action until the baby stops crying.



Fig 8. Motor

6. RELAY MODULE

The relay module is used to drive the motor on both the directions. This supports the Wiegen mechanism of the cradle.

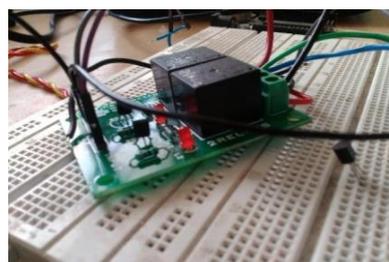


Fig 9. Relay Module

7. BATTERY

Here the battery module is used to provide supply for all the above modules.



Fig 10. Battery

8. ESP8266 – WIFI MODULE

The ESP8266 is a low cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-Style command.

The ESP8285 is an ESP8266 with 1 MiB of build-in flash allowing for single chip devices capable of connecting to Wi-Fi. Here, Wi-Fi module is used to transmit the information from float sensor to Thingspeak API through Internet of things.

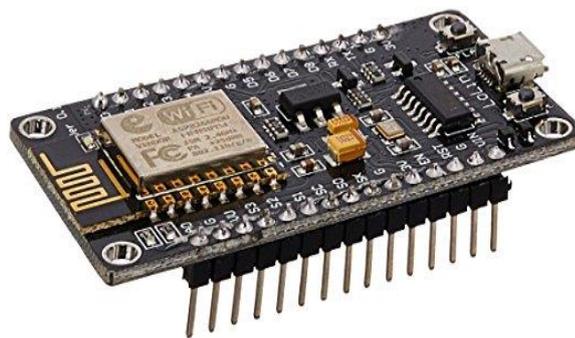


Fig 11. ESP8266

8. METHODOLOGY

Our project proposes a novel system to serve as a personal assistant for the parents to take care of their little hearts (babies).

Methodologies adapted are

1. Automatic Wiegen mechanism
2. Communication channel between parent and the infant via Wiegen

METHODOLOGIES IN DETAIL

1. AUTOMATIC WIEGEN MECHANISM

Unlike the conventional cradles in the market which swings left to right, our frame work follows the top to bottom approach.

A statistical data states that due to usage of available modern electronic cradles the baby's are exposed to Shaken Baby Syndrome which creates a shearing and tearing motion between the tissues of the white matter and grey matter of the brain.

To overcome this we are going to implement a traditional methodology of swinging the Wiegen cradle in North-to-south direction. We could remember that all the cradles used in olden days were made out of cotton sarees and they use to manually swing them up and down. This motion would maintain a constant sequel of blood flow from head to toe in the baby. This unique combination of traditional methodology into a modern electronic Wiegen cradle makes our product unique.

2. COMMUNICATION CHANNEL

Today most of the parent's find it difficult to take immense care on their babies. Most of them get stuck with work either in office or in kitchen. Though our product serves as an assistant in where it will soothe the baby's distress there are certain medical emergencies where we cannot handle in those cases the live video of the baby will be sent to the parent so that we can bridge the gap between the parent and the infant.

9. IMPACT OF THE PROPOSED SOLUTION

- This product has a wide market in where most of the working parents will be benefited.
- And it will also eradicate the need for the baby sitters to take care of the infants.

10. RESULTS AND DISCUSSIONS

The mike module leads to the automatic swinging action of the cradle in North-to-south direction. The wet sensor results a Boolean value either true or false indicating whether the bed in the cradle is wet or not. The integrated camera module is used to display the video of baby during any abnormal condition. The video will be shown in the developed Android application.

RESULTS: Results for automatic Wiegen swing mechanism



Fig 12. Wiegen Swing

Results for bed wet sensing module

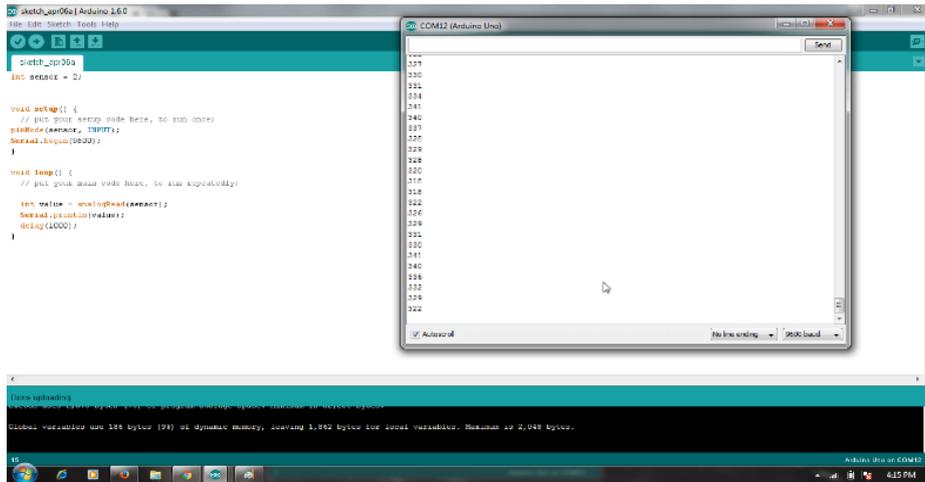


Fig 13. Readings retrieved by arduino from wet sensor

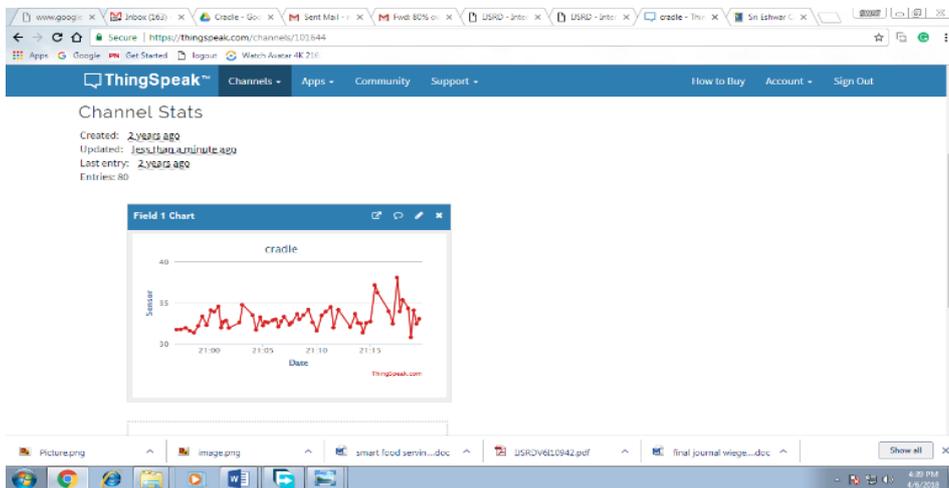


Fig 14. Observations in ThingSpeak

Screenshot of the App developed to notify the parents

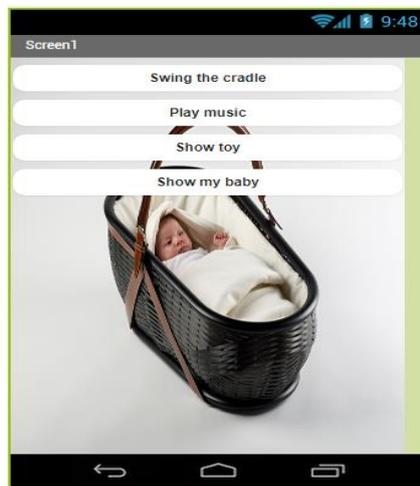


Fig 15. App to display notifications

Output - IP camera module



Fig 16. IP camera output

11. CONCLUSION

The most precious treasure for a parent is their child. Although the days with little kids often seem long, the years fly by. So they opt to spend excess of money for the ease and nourishment of their baby. Finding the right child care is a big deal and it's no wonder -is there anything more important for them. For a baby, this cradle will act as a baby sitter for about 2 years. This designed product will be reliable, easy to maintain, safe to operate and less in cost compared to other types of automatic electronic cradle and will be available in an affordable price.

12. FUTURE SCOPE

This product is a business oriented prototype. After the complete development of the product, what remains is the scope for improvements. Firstly the market analysis should be done, followed by that sales and marketing should be done.

13. ACKNOWLEDGEMENT

The success of a work depends on a team and its cooperation. We take this opportunity to express our gratitude and thank everyone who helped us in our project.

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