

# Mimo Pillow – To Provide Comfort to Babies

Srinivas M, Maruthi D, K C Vidhya, Sandesh S  
Telecommunications Department  
MVJ College of Engineering  
Bangalore, India

Vijitha U G  
Telecommunications Department  
MVJ College of Engineering  
Bangalore, India

**Abstract:- A baby crying sign is the consideration call for guardians or parental figures and inspires them to reduce the misery. These infants frequently experience the ill effects of torment, pain and inconvenience amid the principal long stretches of their lives. Albeit pharmacological agony treatment frequently is accessible, it can't generally be connected to diminish an infant from stress or inconvenience. When the baby is crying the mother has to be intimated and measures have to be taken to comfort the baby in the mother's absence. The Pillow has to be designed in such a way so as to avoid the flat head syndrome in babies. A low cost, simple and portable system is the solution to this problem. This paper depicts a non-pharmacological arrangement, called Mimo Pillow, which gives comfort through intervention of a mother's physiological highlights to the troubled infant by means of a smart pillow system installed with detecting and impelling capacities. We exhibit the outline, the usage and the assessment of the model.**

**Keywords:- Smart pillow Heartbeat Temperature Maternal Heartbeat Vibrations Arduino.**

## I. INTRODUCTION

The first verbal communication of newborn baby with the world is baby's cry. Infant crying is a biological alarm system. An infant crying signal is the attention call for parents or caregivers and motivates them to alleviate the distress. The change from a womb to the world is a major change for any child. When we experience huge changes, the main thing we look for is the wellbeing and solace of something well-known. Baby Monitoring is very important in these days. Increase in rate of working women's makes difficult to monitor baby health all the time. Parents in the present world are busy in their professional life, so they do not get sufficient time to take care of their babies. It may be expensive for the household to afford a nanny. Today's woman has to manage home along with their office work simultaneously. So, we should develop a system that can do all the tasks to keep a check on the baby. The existing systems are expensive, huge and lack reliability. There is a need to develop a new low cost indigenous electronic system. Infants can't keep themselves warm at to begin with, in light of the fact that they have not developed stores of muscle to fat ratio. This is the reason they require outer warmth. New conceived should be kept warm till their temperature settles.

There are numerous systems to enhance the child's solace but in any case, everything prompts pressure and agony. These may inevitably prompt formative debilitations. A portion of the therapeutic intercessions that reason agony and uneasiness to the newborn children are heel cut and venipuncture; connection and separation of sensors for estimating

physiological body signals. Ecological elements like over the top commotion and light likewise influence the babies. These may prompt an agonizing condition for the newborn child. It is trusted that, if the agony is left untreated, it might prompt weaknesses in dealing with the torment and worry in later youth. There are likewise numerous strategies that are noninvasive. Some physiological reactions of distress has expanded heart rate, expanded respiratory rate, expanded or diminished pulse, and decline in oxygen immersion, vagal tone and skin temperature. The child is smoothed and helped by mother's well-known pulse, temperature, her odor and sound of her voice. Music is additionally demonstrated towards recuperating of the untimely children. The mother's delicate touch and breathing additionally fortifies the child's development. There are numerous pharmacological agony medications proposed in the previous two decades. In any case, these days, non-pharmacological medicines have turned out to be prevalent and compelling. Some of them are:

### A. Nutritive Sucking

This was the main strategy presented as a non-pharmacological technique. A sweet arrangement of sucrose is infused into the cheek of the baby through a syringe. This occupies the newborn child to suck something sweet. A pacifier can likewise be given amid excruciating systems.

### B. Facilitated Tucking

In this strategy, the parental figure holds the infant with one hand on its head and the other on its body/feet, contingent upon how agreeable it is. This goes for giving a position like how it was in the mother's womb. It likewise limits the development space.

### C. Skin to Skin Care (SSC)

It is otherwise called kangaroo care. In this, the newborn child is held to the exposed chest of the mother and wrapped by a material to give warmth to the baby. However, this isn't generally conceivable.

## II. OBJECTIVE

Designing a system which monitors baby body temperature and increase the pillow temperature according to mother's body temperature, monitors the mother's heartbeat and providing heartbeat vibrations to the baby and intimation in times of baby cry to the mother and play mother's voice to comfort the baby. Intimation to mobile phone about the baby heartbeat and temperature has to be done. A low cost, simple and portable system is the solution to this problem. This paper describes a non-pharmacological solution, called Mimo Pillow, which provides comfort through mediation of a mother's physiological features to the distressed baby via an intelligent pillow system embedded with sensing and actuating

functions. We present the design, the implementation and the evaluation of the prototype.

Existing systems have a lot of disadvantages such as: Mechanical systems for pillow management. No synchronization between child and mother health parameters short range implementations, costly implementations, manual operated system is Costly.

### III. DESIGN

The concept for the proposed comforting solution was based on findings from literature study. A basic initial phase in the advancement of a new, non-pharmacological agony treatment is the acknowledgment and assessment of status quo. We apply User Centered Design (UCD) amid the plan procedure and in view of the result; we characterize framework necessities and settle on choice on innovative headings. In UCD the end-client is always associated with the plan procedure. Babies can be comforted in two ways: by providing an active comforting treatment, or by taking away sources of discomfort. Some hospitals have a very strict policy that focuses on the latter. The fragile babies are taken out of the incubator only for medical treatments. The care policy focuses on limiting external stimuli to the babies as much as possible. Noise and light levels are reduced to absolute minimum and parents can visit their babies during fixed visiting hours.

Other hospitals are less strict and emphasize on the value of parent-child bonding as a source of active comfort, therefore they allow parents to visit their baby in the NICU at any given time. These hospitals also encourage the parents to take part in their child's care, by changing diapers or bottle feeding. This kind of involvement also helps the parents who often feel that they cannot help their fragile baby during the stay at the NICU. These hospitals encourage kangaroo mother care as a means of comfort and bonding. Nurses and parents from these hospitals stated that infants are the most relaxed during kangaroo mother care.

Although it is clear that parents can play an important role in the comfort of their child, they cannot be present at all times to provide this comfort. In all hospitals, some more than others, there are situations in which alternative means of comforting are required. Therefore, it seems appropriate that a new comforting solution would focus on providing a neonate with the same feeling of comfort that parents would provide, even when the parents cannot be physically present.

### IV. DISCUSSION

The Mimo idea comprises of two functioning parts: an android unit and a smart pillow. A recording unit is utilized to record physiological information, (for example, pulse and body temperature) from a parent. This information would then be able to be exchanged to the pillow, which incorporates innovation that empowers it to 'replay' the recorded information to the infant. The present model accomplishes a piece of the elements of the first idea, as it concentrates just on the account and playback of a parent's pulse. Later on work, the total capacities for all the more detecting and activating

capabilities (e.g. breathing beat, parental smell and so forth.) will be produced. Advance improvements additionally incorporate scaling down of circuits and hardware and a Flash disk to exchange the mother heart beat information to the cushion. The parent-child bonding is loose for the child due to the detachment of infant from their parents. The utilization of Mimo pillow is required to comfort the infants on one hand and at the in the interim to comfort guardians and enable them to feel significantly nearer to their children. We did preparatory meetings with guardians at a hospital and online by showing them the utilization of Mimo. The criticism from guardians demonstrate that Mimo assumes a positive part in consoling guardians and achieving parental part by helping them feel considerably nearer to their infants and feel that they are dependably there to help their children. The crying time was surveyed by perception on the children's outward appearance. Since the members are untimely newborn children and their outward appearance isn't also created as the outward appearance of a term baby, the physiological measure of recuperation time to gauge SCA value is more dependable than perception.

More physiological information, for example, ECG, EEG, and heart rate changeability, and behavioral information of the children could likewise be estimated with the end goal of multi-modular evaluation and factual investigation.

Besides, the present outline is just a model for tests and show purposes. To build up the answer for a prepared to-showcase item, strict item configuration process and clinical security assessment of the unwavering quality of the entire framework are required.

### V. PROPOSED SYSTEM

Here, in this work, we have proposed the idea of exchanging the maternal highlights like the maternal temperature and the maternal pulse vibrations by means of a smart pillow.

The temperature sensor and the pulse sensor tests and records the temperature and the pulse separately. These information are transmitted to the pillow unit which has actuators which delivers the pulse vibrations. The unit can be turned on and off when required. An Arduino microcontroller is utilized as a controller with in-constructed ADC18. A LCD is utilized to show the recorded maternal temperature and heart rate and in addition the temperature as an input. A LED strip is utilized to deliver the warm temperature through to the cushion. Another temperature sensor is utilized which gives the input about the infant temperature. It tosses a mistake on the off chance that both the maternal temperature and the child temperature breaks even with.

The cushion is a savvy mimo pillow that effectively spreads the air inside it. It is hostile to unfavorably susceptible, ultra-clean and keeps the danger of suffocation. This is a viable technique, which gives solace to the child under agony. The pulse sensor takes a shot at the rule of photograph plethysmography, used to quantify blood volume changes. The yield from the sensor is nourished to a simple stick of Arduino, where the abundance of yield is estimated each 2ms. A heartbeat is identified when the flag adequacy achieves edge

esteem. At that point the beat is recorded until the point when the yield falls beneath the edge esteem. 9 more examples are recorded comparatively and the interim is assessed and in addition recurrence of beats. Temperature from the temperature sensor is recorded for a timeframe, and normal esteem is ascertained (since temperature differs in focuses, we take normal of readings). Upon mother affirmation, these examples are sent to the pillow by means of arduino.

In view of the interim between the pulsates, the heart thumps are reproduced, which is simple audio signal. They are sent to enhancer by means of analog pin later they are increased and fed to the actuator, whose diaphragm goes about as the vibrating unit. The temperature inside the pad is estimated by utilizing a temperature sensor which is settled inside the pillow.

The got temperature value is contrasted with the mother's. On the off chance that distinction is more noteworthy than 0, the warming cushion inside the pillow is fueled up for certain time (t) and killed. Presently the two temperatures are looked at once more, in view of distinction the warming cushion is fueled on. The time is computed in light of the distinction between got temperature and cushion temperature. Higher the distinction, higher is 't' esteem. This procedure rehashes until the point when cushion comes to the tested temperature. Later the cushion temperature is tried to keep up the temperature.

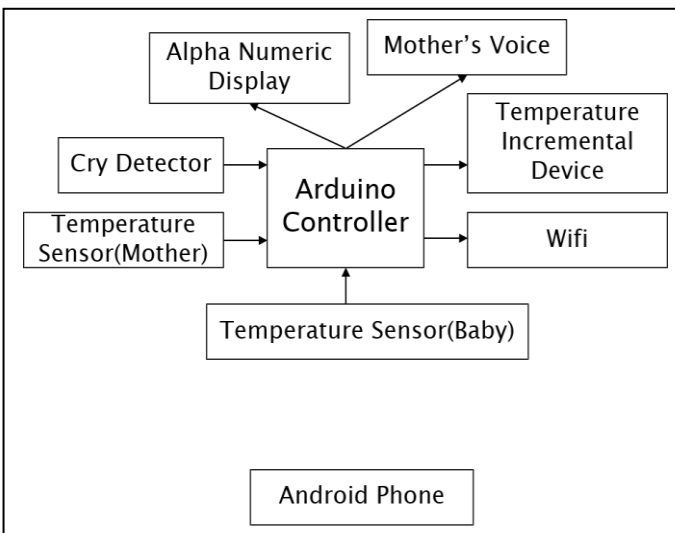


Fig 1:- Block Diagram of the proposed system

• *Sensor*

The heartbeat sensor that is utilized as a part of the model is a PPG sensor, which is an optical sensor that measures a person's heartbeat. An infra-red LED on one side of the sensor radiates through the finger onto a photosensitive sensor at the opposite side of the finger. The measure of blood that courses through the finger impacts the measure of light that achieves the sensor, henceforth giving data about the individual's heartbeat. In spite of the fact that there are different approaches to record a pulse, (for example, electrocardiogram sensors), the PPG sensor gives a speedy and simple approach to record a pulse for this application.

• *Electronics*

The core of the Mimo Recorder is an Arduino Uno microcomputer, fueled by a 9V battery or TTL. The Arduino handles nearly the entire recording process, extending from detecting and capacity to transmission of the pulse to the Pillow. It was intentionally chosen to use a battery as opposed to a settled power supply, to give most extreme adaptability to guardians in their decision of a chronicle area. The Mimo Pillow is controlled by an Arduino uno microcomputer. This Arduino is considerably smaller and compliment, with the end goal that it is not really felt from the outside of the pillow. Different endeavors to guarantee that hardware are not felt by the neonate have been made by utilizing a particular level model racing battery as power supply, a little vibration motor to intercede the pulse vibrations, and by utilizing a small control to turn on or off the electronics.

• *User Interface*

The UI of the Mimo Recorder was intended to be as basic as could be expected under the circumstances, so guardians can play out the entire chronicle process themselves. It gives feedback to the guardians about the status of the pulse recording. It demonstrates whether the gadget is turned on, another light shows whether the sensor is legitimately attached and the two residual lights demonstrate whether the unit has not begun yet (lights off), is right now in advance (lights blinking) or has completed (lights on). With a specific end goal to record their pulse, guardians first need to connect the sensor to their finger or ear cartilage. Once the sensor marker affirms that the sensor has been legitimately connected, the parent can press the account catch and sit tight for the status lights to light consistent. At that point the cushion can be associated with the chronicle unit and the pulse will be exchanged to the pad. The pulse information that has been recorded with the Mimo Recorder can be exchanged to the Mimo Pillow by associating the association links of the two gadgets. Once the pulse information has been exchanged to the pad, it is instantly prepared for utilize. The recorded pulse information is put away in the microcomputer in the Mimo Pillow and is played back persistently, as long as the gadget is exchanged on.

In view of the literature survey, the previously mentioned user studies and a brainstorm, an idea for a novel arrangement of comforting preterm neonates was proposed. This idea, called Mimo Pillow, is a soothing arrangement that furnishes neonates with an affair like being held by their parents. Since neonates give less pressure suggestions when they are in contact with their folks and held to their chest, which is by all accounts a standout amongst the most wonderful encounters for a preterm neonate, Mimo goes for furnishing a soothing arrangement with characteristics like those of being held to a parent's chest, accessible particularly when the parent can't give the solace him-or herself. This idea may expand the general solace level, as well as add to the bonding amongst parent and baby. Mimo allows guardians to record their own features, for example, pulse, smell and temperature, which can be interceded to the youngster when it needs comfort. At the point when the idea is completely understood, the youngster may encounter an inclination as the guardians were near them, notwithstanding when the guardians are not physically there. One of Mimo's essential attributes is its usability, which empowers guardians to record their physiological features without direction.

## VI. FUTURE WORK

This paper presents the plan, execution and assessment of a new, non-pharmacological consoling solution for preterm neonates. The idea, named Mimo, goes for consoling a neonate by furnishing the infant with an inclination like that of being near a parent. A clever cushion framework was proposed and executed with implanting detecting and inciting capacities for the exchange of maternal heart beat into the pad and playing the throb to the neonate. During testing, among the 9 of 10 newborn children who indicated inconvenience following diaper change, a shorter recuperation time to standard Skin Conductance An algesimeter (SCA) qualities could be estimated when the maternal pulse vibration in the Mimo was exchanged on and in 7 of these 10 a shorter crying time was estimated. Along these lines this gadget can possibly be a straightforward, successful and safe intercession for ameliorating babies.

## VII. ADVANTAGES

The proposed system has many advantages such as.

- Automated System
- No manual attention required all the time
- Easy to implement
- Baby health gets monitored all the time
- Use of wifi module makes the monitoring from any part
- Immediate attention to the baby
- A scope for development of the project is seen

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