DEVELOPMENT OF

SMART SAFETY CRADLE SENSOR

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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SMART SAFETY CRADLE SENSOR

Tajuk Projek : ....

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Saya ....

(HURUF BESAR)

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"I confess this report is all my own work except the certain passage that I have

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Prepared by: SITI NOR AZURA BINTI ARSHAD

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Special dedication to my father and mother, family, my kind hearted supervisor Puan
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ABSTRACT

The title of this project is Smart Safety Cradle Sensor. This project is designed to provide maximum comfort to the baby in addition to maintaining their health. The main objective of this project is to design the Smart Safety Cradle Sensor which this cradle can rock on automatically when any movement of baby detected. This is because; experiments found that using electric cradle are 2-4 minutes lesser than the traditional manual cradle for babies to fall asleep. The experts confirmed that the traditional manual swing size and speed are not stable. Unbalanced swing can make babies' brain not regulate smoothly, and then can affect their health for entire life. Besides that, this baby's cradle also is safe and comfortable for baby with the timer that make a smooth rock on and not continuously that can affect the babies' health.

ABSTRAK

Projek Smart Safety Cradle Sensor ini adalah bertujuan untuk memberi keselesaan yang maksimum kepada bayi di samping untuk menjaga kesihatan mereka. Objektif utama projek ini adalah bertujuan membina buaian bayi yang boleh digerakkan secara automatic apabila pergerakan bayi dapat dikesan oleh sensor. Ini adalah disebabkan berdasarkan kajian, buian bayi yang menggunakan elektrik dapat membuatkan bayi tidur 2-4 minit lebih cepat kerana buaian traditional yang digoyangkan menggunakan tangan adalah tidak stabil. Ini dapat membahayakan kesihatan otak bayi yang mungkin akan mengakibatkan gegaran kepada otak dan member kesan tidak baik kepada kesihatan bayi seumur hidup.

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INTRODUCTION

1.1   Introduction of the project

Smart safety cradle sensor is a new innovative idea to solve the parent's problem. Babies always love to be rock as if they are in the mother's arms. Some babies loved to be cuddled to sleep and whenever they are placed down on the crib, they start crying again and someone will have to start all over again. With Smart Safety Cradle Sensor every parent doesn't have to worry anymore.

Smart Safety Cradle Sensor is a one product that keeps your baby secure and comfortable by gently rocking baby to sleep. It can be self-activated by baby himself by small movement of kicking the stopped cradle or turning the body. With using this product, parent will able to do another job because it is no need to rock on the cradle if the babies make a movement. So, it can reduce parents' stress. Babies are more erratic

and unsettled from 3 weeks to 6 months old. Babies cry and fuss up to 6 hours at late nights causes frustrating sleepless nights and upsets tiring parents. Besides that, well rested babies ease parents with peace of mind, increase their work productivity and improve psychological fitness. In addition, this baby cradle also helps baby sleep through with longer hours and cultivate brain also physical growth and good health.

1.2   How it works

The scope of this project is to make a smart and safety cradle for baby so that all baby will comfort to use it. It is because it can sense the movement of the baby and it will rock on depends on setting time. Then if the baby makes a move, the cradle will make a rock on again in the time setting and the process will happens till the babies wake up.

The main circuits are used for this project that is vibration (shock) sensor circuit, PIC16F877A circuit, Liquid Crystal Display (LCD), relay and a motor as a control panel. The vibration sensor will sense the move from the baby and will make the cradle rock on back. After that, the timer will count downward depends on mother's setting time and the countdown will display it and lastly the relay will cut the power circuit after that and the cradle will stop rock on. This project started with the research about the related information via the books and internet. Besides that, the lecturer's guidance is also important for the project development. Sketches about the project will be done based on the information gathered.

1.3   Problem statement

Nowadays, cradles are under stringent safety rules to ensure that children are safe from harm in their cradles. These standards are continually updated and new products are tested for safety. Parents still need to take precautions to ensure the safety of their child in the cradle. The cradle also has a computerized baby cradle. But, there is some problem

that the cradle is rock on non-stop and will make the baby feel uncomfortable. Some baby might be had headache or vomit because of that.

From the analysis that have made from the case, the objective of this project is to make an innovation to the cradle that ready at the market to give the baby more simple, stable, gentle, rhythmic harmonic vertical motion consistently align with Earth Gravity Force feel like calm sea waves, allows baby cruise into sweet dreams.

1.4   Objective of the project

Objectives of this project are:

- To design the Smart Safety Cradle Sensor which this cradle can rock on automatically when any movement of baby detected.
- To make a babies cradle is safe and comfortable for baby with the timer that make a smooth rock on and not continuously that can affect the babies' health.
- To make cradle innovation that is more flexible and less expensive to market.
- User friendly - simple and complete with instruction.

1.5   Scope of study

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and internet. Besides that, the lecturer's guidance is also important for the project development. Sketches about the project will be done based on the information gathered.

Then, the circuit will be constructed for simulation purposes which then will be tested whether it will give the required output. Any troubleshooting works will be done during the simulations. After that, the circuit will be constructing on the PCB. The circuit will be tested and observed together with display unit.

1.6   Thesis outline

This thesis represent by five chapters. The following is the outline of the Smart Safety Cradle Sensor project in chapter by chapter.

Chapter I:

This chapter is discuss briefly about the overview project such as an introduction, objectives, problem statement and scope of the project.

Chapter II:

This chapter describes about the research and information the project. Every facts and information which is found through internet, journal, magazines, and other references will be compared and the better methods have been chosen for the project.

Chapter III:

This chapter is discussing about the project methodology used in this project such as material and component that will used in this project. All this methodology should be followed to get a better performance.

Chapter IV:

This chapter describes about the project findings such as result and analysis of the electronic circuit.

Chapter V:

This chapter represents the discussion, conclusion and suggestion for this project.

CHAPTER II

LITERATURE REVIEW

2.1   Introduction

In this project, we must get some information that can help to learn more knowledge on the main point that must included to this project. So any information that is related to the scope of the project must be considered.

2.2   Theory

2.2.1 Cradle History

A baby cradle is literally a small cradle that is designed for baby to sleep in. They have progressed from having a minor cult following to being a popular option for parents

and careers alike, with many saying that the baby cradle has helped them to get a full night's rest while being confident that their baby is sleeping safely and securely. The usual design for a baby cradle is such that it hangs from the ceiling on a wooden pole and the cradle itself is made from natural breathable fibers. A futon mattress is then inserted into the cradle so that baby is completely comfortable while resting. A cradle is a useful item now for new parents. If used safely, they provide a place to lay a baby that is not as large as a crib and does not take up as much space.

Despite popular belief, a baby cradle is not identical in its design to an adult cradle and although they may appear similar at first glance, baby cradle have been designed specifically for the needs of young children. It is meant as a place for baby to get some rest and ultimately to fall asleep and slumber through to morning.

Figure 1: Example of babies cradle

The history of baby cradles goes back several hundred years ago. Before babies had cradles like nowadays they usually slept with their parents. Bedrooms were rare until the mid 17th century. At that time beds were present in each room and were also used as sitting areas similar to the way a daybed is used today. The earliest type of cradle was known as a rocker and was made from a hollowed-out log. These were soon replaced with simple boxes mounted on curved pieces. Early American colonials used cradles that had sloping sides and a hooded end. In the early 15th century, cradles were commonly

boxes suspended by chain, rope or hooks from a stand. Modern cradles vary in size and shape and are even available with motors to rock the cradle automatically.

A baby cradle can be one of the safest places for a baby to sleep. The soft fabric that is suspended around the baby will naturally mould to the babies shape, making them fit snug and comfortable and in many cases it could possible remind the baby of the womb and the security that went along with that feeling. Using a baby cradle can also make it a lot easier to get your toddler off to sleep, if you employ a gentle rocking motion along with the security the baby feels will work together to get your baby to drift off to sleep. Compare this to having your baby sleep on a straight mattress, whether it is a bed or a crib. It is clear to see the advantages of using a cradle.

2.2.2 Benefits of Baby Cradle

A benefit of baby cradle is to reduce the risk of sudden infant death syndrome (SIDS) and it's the leading cause of death in the United States for babies between 1 month and 1 year old. Several studies have shown that if a baby is used to sleeping on his back and is placed to sleep on his tummy, his risk of SIDS rises markedly. Incidences of SIDS have been proven to be higher in babies that sleep on their stomach and the baby cradle is specially designed to ensure that your baby cannot roll over off their back. [1] Do ensure that used a proper baby sleeping cradle otherwise it is likely to be little more than a scaled down version of a string cradle and not only can this prove uncomfortable but also dangerous for child.

SIDS isn't any one illness or disease. Rather, it's the diagnosis given when a child under a year old dies suddenly and an exact cause can't be found after a death scene investigation, an autopsy, and a review of the child's medical history. That it can happen without warning makes SIDS particularly devastating for families.

The rate of deaths from SIDS has dropped more than 50 percent since 1994, when the Back to sleep campaign was launched by the American Academy of Pediatrics

(AAP), the U.S. Public Health Service, the SIDS Alliance, and the Association of SIDS and Infant Mortality Programs. Make sure that anyone who cares for your baby – relatives and babysitters, for example – knows to place your baby on his back to sleep. [1]

Of course, by the time your baby is 5 or 6 months old, he may be able to roll over in both directions, making it a challenge to keep him on his back at night. At this age his risk for SIDS starts to drop, though, so just do your best to get him settled on his back, and then don't worry if he rolls over. Just make sure there is nothing soft in his crib that he could get his face next to that would increase the risk of SIDS or suffocation.

Besides that, experiments found that using electric cradle are 2-4 minutes lesser than the traditional manual cradle for babies to fall asleep. The experts confirmed that the traditional manual swing size and speed are not stable. Balanced swing can make babies' brain regulate smoothly, then can fall asleep quickly. During the swing process, babies need constantly to adjust and reset the nerves regulation, thus prone to dizziness and regurgitate milk. While the electric cradle can automatically set the stable swing range according to the babies' needs, which is good for protecting babies' nervous. Therefore, the baby can sleep faster and get better sleep quality [7].

2.2.3   Baby Sleep Pattern

Babies have their own pattern to sleep and how long baby should sleep at their age. A newborn will sleep approximately 16 to 20 hours per day. The length of each sleep session is affected by whether your baby breastfeeds or formula feeds. Breastfed babies wake up every 2-3 hours, while formula fed newborns wake every 3-4 hours. A newborn's sleep cycle is very different from an adult's. They have shorter cycles with more light sleep than deep sleep, which is why they spend most of their days drowsing way.

Figure 2: Sleeping baby

For 1 to 2 months, your newborn will start taking 1-3 hour naps during the day, and will sleep only about 15-16 hours per day. If your child sleeps for more than 3 or 4 hours during the day, it might be good to wake her up, as this will allow for more sleep during the night.

Three months have passed and now your baby is entering the second trimester. At this point every parent want to know how much their baby should be sleeping as parents did not get enough sleep during the first 3 months of their baby life. Most parents want to know when they will get their sleeping pattern back to normal and want to know what to expect at this stage. For 3 to 4 months, the 15 hours your baby sleeps will break into 9 nighttime hours and 6 hours throughout the day (about 2-3 hours each). Almost 40% of the baby's sleep is (REM) sleep. REM sleep is a stage of sleep that you go through many times every night. REM stands for Rapid-Eye-Movement, and it is called this because if you see someone sleeping and they are in this stage, their eyes might be moving back and forth almost as if they're looking at things all over the room.[2]