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Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF IOT BASED SMART BREAST MILK PUMPING MACHINE

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A project report submitted
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DEDICATION

To my beloved parents,

Zubaidah Binti Harun who

always there for me and support me to finish my report.

To my siblings that always give me idea in order to

complete this report.

To my great supervisor,

IR Mohammad 'Afif bin Kasno who encourage and guide

me to finish this report.

ABSTRACT

An automated Breast Milk Pumping Machine system milking machine system was created for mothers with babies. A covering will be placed on the breast when using this milk pumping system. The relevant bottle will be attached to the cover. When the motor pump is turned on, the vacuum created by the motor pump permits the milk to flow out from breast through into bottle. One of the helping tool items that mothers bring with them when pumping breastmilk is a pumping breastmilk machine. Mothers who are passengers or drivers will utilize this pumping breastmilk machine in the vehicle if necessary. To monitoring the breastmilk pumping is important to prevent wasting the milk when the bottle is full. However, the mothers are facing difficulties when they need to constantly monitoring the amount of milk in the bottle especially during driving. Therefore, the idea of this project is to help promote motherhood by developing an automated breast milk pumping system. The non-contact liquid sensor is attached to the NodeMCU as a smart tool for monitoring the milk level and is added to the current pump system. When the bottle has reached the predetermined level, when a sensor non-contact liquid detects and sends a signal, the pump will immediately shut down. Then, NodeMCU will send the notification thru Blynk to alert the mother of the current condition of the pumping breastmilk machine, as well as an alarm to alert the mother. It will also give the record on duration time taken to fill up a bottle for mothers' references.

ABSTRAK

Sistem Mesin Pengepam Susu Ibu automatik telah dicipta untuk ibu yang mempunyai bayi. Sarung akan diletakkan pada payudara apabila menggunakan sistem pam susu ini. Botol yang berkaitan akan dilekatkan pada penutup. Apabila pam motor dihidupkan, vakum yang dicipta oleh pam motor membenarkan susu mengalir keluar dari payudara melalui ke dalam botol. Salah satu alat bantu yang ibu bawa semasa mengepam susu ibu ialah mesin pengepam susu ibu. Ibu yang merupakan penumpang atau pemandu akan menggunakan mesin pam susu ibu ini di dalam kenderaan jika perlu. Untuk memantau pengepaman susu ibu adalah penting untuk mengelakkan pembaziran susu apabila botol penuh. Bagaimanapun, ibu-ibu menghadapi kesukaran apabila perlu sentiasa memantau jumlah susu di dalam botol terutama semasa memandu. Oleh itu, idea projek ini adalah untuk membantu mempromosikan keibuan dengan membangunkan sistem pengepaman susu ibu secara automatik. Penderia cecair bukan sentuhan dilampirkan pada NodeMCU sebagai alat pintar untuk memantau paras susu dan ditambah pada sistem pam semasa. Apabila botol telah mencapai tahap yang telah ditetapkan, apabila cecair bukan sentuhan sensor mengesan dan menghantar isyarat, pam akan segera ditutup. Kemudian, NodeMCU akan menghantar pemberitahuan melalui Blynk untuk memaklumkan ibu tentang keadaan semasa mesin pam susu ibu, serta penggera untuk memaklumkan ibu. Ia juga akan memberikan rekod mengenai tempoh masa yang diambil untuk mengisi susu botol untuk rujukan ibu..

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LIST OF ABBREVIATIONS

RX	–	Receiving Frequency
RF	–	Radio Frequency
SMPS	–	Switch-Mode Power Supply
AC	–	Alternating Current
DC	–	Direct Current
LCD	–	Liquid Crystal Display
SMS	–	Short Message Service
IOT	–	Internet of Thing
LED	–	Light Emitting Diode
GSM	–	Global System for Mobile
UART	–	Universal Asynchronous Receiver-Transmitter
USART	-	Universal Synchronous and Asynchronous Receiver-Transmitter

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The project history, research problem, scope statement, research projects, and objective are all discussed in the introduction. The overarching strategy for guiding and developing of iot based smart breast milk pumping machine is discussed in this section. Because the cleanliness factor is so important to the project's success, a sensor non-contact liquid will be employed to keep track of the liquid level.

1.2 Project Background

Mother's milk is superior to other formula milks in terms of nutrition. However, nowadays, the majority of mothers are working women. The mother may not always be able to be with the breastfeeding baby. To guarantee that their infants obtain appropriate nutrition, mothers who are working must offer breast milk to their infants. Breast milk is the only source of nutrition for children under the age of six months. As a result, mothers must bring pumping breastmilk equipment in order to collect breast milk and feed their newborns with the greatest nourishment possible. Breast milk can be refrigerated and used at a later time.

A single pipe or allegorical glass, comparable to a suction container, was included within the to begin with adaptation of the draining gear. It'll be connected to an areola as well as a little breast. The bottle is joined to a suction container and pump.[1]

Figure 1. 1Pumping Breastmilk First Generation.

Whereas the second generation of breast pump machine is not using a vacuum, the first generation does, therefore moms must manually pump milk. Upgrade the machine so that mothers may free their hands when breast pumping, and it's also easy for them to do other things. Some milk pumps are powered by electricity, while others are powered by batteries. It is time-consuming and needs mothers to utilize their energy, unlike the first generation. Because the mother's first generation must operate the vacuum while the other maintains the suction cup's connection to the breast, it is also more difficult than the second method of breast pumping.[1]

Figure 1. 2 Pumping Breastmilk Second Generation.

The third iteration of the milk pump is nearly identical to the second. The single suction cup and the double suction cup are the differences between these two models. Double suction cups, which are convenient for maternal postpartum use, are often only offered in hospitals. The double suction cup is less time-consuming and labor-intensive than the single suction cup. Suction cups with two suction cups are likewise more expensive. This milking opportunity changes as technology advances. Breast milk remains the best until the infant is two years old, even though globalization has made several types of formula milk available.

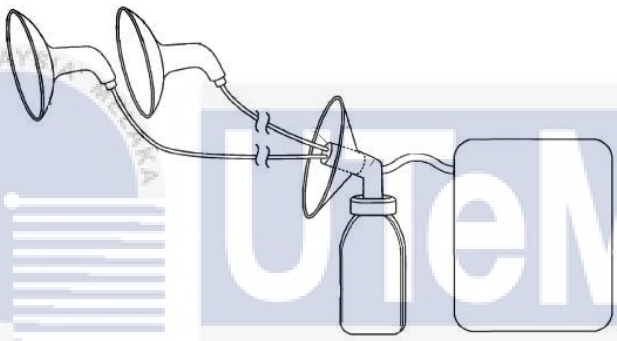

Figure 1. 3Pumping Breastmilk Third Generation

1.3 Problem Statement

Nowadays, most mothers are the career woman which is always busy with their works. When at home, they also need to manage the household chores where they need to cook, cleaning the house, take care of their children and so on. As a mother, they also need to do many tasks at home or at their work within a day. This will cause them to feel tired and not having enough rest. Sometimes, their work becomes imperfect and causes negligence.

Additionally, for mothers that have a baby need to direct feed from the body at every two or three hours depends on the person. Currently, milk pumping machine that sold in the market needs to press the button on and off manually [2]. Tired mothers with day-to-day work may fall asleep while doing the milk pumping process. This will cause the wastage of milk if the mothers did not notice the bottle have full. Furthermore, this also will consume mother's time that rushing to get to work but need to pump and at the same time need to drive to work. Currently, the manual or electric milk pumping machine is quite troublesome because the mother always needs to check the level of milk in the bottle manually before stopping the pumping session.

Hence, this project will conduct the investigation to identify, analyze and evaluate the suitable related level monitoring for milk pumping machine based on the problem that has been mentioned. The main reason for the proposal of this project is to develop a solution to facilitate milk pumping users. The level monitoring for milk pumping machine also the solution to avoid the wastage of milk if the mothers did not notice the bottle was full of milk. This automatic milk pump also can be used while driving and does not need to manually check the level of milk in the bottle. This automatic milk pumping needs to be developed for mothers to let them rest when pumping and do not worry about the milk in the bottle.

1.4 Project Scope

This project especially developed for mothers that have baby and toddler to take care at the same time. Mothers can use the level monitoring for milk pumping machine since it will help them to avoid the wastage of milk when they do another job while pumping. The system can detect the level of milk beside can automatically stop when the milk has reached the specified level.

1.5 Project Limitation

The limitation of this project is that the product can be used to test person to pump milk. Apart from that, the time taken for person to pumping is different.

1.6 Project Objectives

In order to complete this project, there are a few objectives that must be archived. The following are the project's objectives:

1. To design the IOT based smart automation of milk pumping machine using NodeMCU and Blynk.
2. To develop the prototype of pumping breastmilk machine with level monitoring system and notification using NodeMCU and Blynk for nursing mothers.
3. To analyze the performance of proposed milk pumping machine with level monitoring and alert system.

1.7 Conclusion

Finally, all the project's goals should be recorded. This chapter provides an overview of the history of breastfeeding systems prior to the invention of this method for the advantage of moms. Considerations for implementing the project with current technologies.