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DEVELOPMENT OF LEVEL MONITORING FOR MILK PUMPING MACHINE

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Computer Engineering Technology (Computer System) with Honours.

by

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TECHNOLOGY

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Computer Engineering Technology (Computer System) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Satu sistem mesin mengepam susu diciptakan untuk kegunaan ibu yang mempunyai bayi. Mesin mengepam susu ini mempunyai perisai yang akan diletakkan pada payudara. Perisai ini akan disambungkan pada botol yang sesuai. Vakum yang dihasilkan oleh pam apabila pam dihidupkan membolehkan susu mengalir dari payudara masuk ke dalam botol. Mesin mengepam susu ini adalah salah satu keperluan ibu yang akan dibawa ke mana-mana untuk mengeluarkan susu. Malah, ibu juga akan menggunakan mesin mengepam susu ini sewaktu berada di dalam kereta jika perlu sama ada sebagai penumpang atau pemandu. Ibu akan mengalami kesukaran apabila sentiasa perlu memantau paras ketinggian susu di dalam botol supaya tidak berlaku pembaziran apabila susu telah penuh. Oleh sebab itu, maka terhasil idea untuk projek ini bagi memudahkan para ibu. Di samping itu, projek ini adalah projek mesra pengguna di mana ia juga dapat menyelesaikan masalah para ibu. Projek ini direka supaya dapat memberi isyarat kepada pengguna apabila susu di dalam botol telah sampai pada paras ketinggian yang ditetapkan. Sensor cecair tidak bersentuhan ditambah pada sistem mesin mengepam susu yang sedia ada dan disambungkan kepada Arduino Mega sebagai alat untuk mengukur paras ketinggian susu. Apabila sensor cecair tidak bersentuhan telah memberi isyarat maka pam secara automatiknya akan berhenti berfungsi.

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ABSTRACT

A milk pumping machine system is created for the use of a mothers that have a baby. This milk pumping machine has a shield that will be placed on the breast. This shield will be connected to the appropriate bottle. Vacuum generated by the pump when the pump is switched on allows the milk to flow from the breast into the bottle. This milk pumping machine is one of the mother's needs to be taken everywhere to produce milk. In fact, the mother will also use this milk pumping machine while in the car if necessary as a passenger or driver. The mother will have difficulties when it is always necessary to monitor the level of milk in the bottle to avoid wastage of milk when the bottle full of milk. Therefore, the idea for this project is to facilitate mothers. In addition, this project is a user-friendly project where it can also solve mothers problems. This project is designed to be able to notice to users when the milk in the bottle has reached the predetermined level. Non-contact liquid sensors are added to the existing pumping machine system and are connected to Arduino Mega as a tool for measuring the level of milk. When the non-contact liquid sensor give signal then the pump will automatically stop working.

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DEDICATION

This dissertation work I dedicate especially to my beloved parents Jamarudin bin Ali and Nik Abdah binti Omar, who always give me encouragements and supports. Not forgotten my beloved family that always give positive vibes whenever I needs and share their success. I also dedicate this report to my supervisor that help and guide me until the completion of the project. Finally, big thanks to all my beloved friends that always give support and surround me with love that can avoid me from sadness and give up.

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LIST OF SYMBOLS

mmHg	-	Milimeter of Mercury
min	-	Minute
ml	-	Milimeter

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LIST OF ABBREVIATIONS

IOT	Internet of Thing
LED	Light Emitting Diode
GSM	Global System for Mobile
TIM3	Timer 3
ADC	Analog to Digital
USB	Universal Serial Bus
UART	Universal Asynchronous Receiver-Transmitter
USART	Universal Synchronous and Asynchronous Receiver-Transmitter
GPRS	General Packet Radio Service
RX	Receiving Frequency
RF	Radio Frequency
SMPS	Switch-Mode Power Supply
AC	Alternating Current
DC	Direct Current
LCD	Liquid Crystal Display
IR	Infrared
SMS	Short Message Service
OS	Operating System
IC	Integrated Circuit
ICSP	In-Circuit Serial Programming
3D	Three Dimension

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PWM	Pulse Width Modulation
GCC	GNU Compiler Collection
STM	STMicroelectronics
ASK	Amplitude-shift Keying
NO	Normally open
NC	Normally close

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CHAPTER 1

INTRODUCTION

1.0 Introduction

The introduction discusses project background, problem statement, project scope, project limitation, and objective. This section explains the overall view to guide and development of level monitoring for milk pumping machine. The non-contact liquid sensor will use to detect the liquid of water level because of the hygiene factor is the most important in the success of this project.

1.1 Background

Mother's milk is healthier than others formula milk. But nowadays, most mothers are a career woman. Sometimes mothers cannot be with a nursing baby at all times. Mothers that work outside the home must provide mother's milk to their child to make sure their child gets enough nutrients. This is because a child under 6 months gets the nutrients only from their mother's milk. Thus, mothers need to bring milk pumping equipment to the works to collect mother's milk to provide the best nourishment for their infants. The mother's milk can be stored in the fridge for later use.

The first version of the milk pumping equipment includes a single funnel or parabolic-shaped cup which is similar to a suction cup. It will place over a nipple and a bit of the breast. The suction cup connected with the bottle to fill the milk and a vacuum pump.

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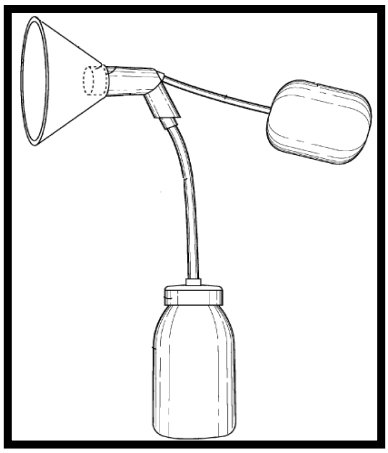

Figure 1.1: The first version of the milk pumping. (Shaw and Francisco, 2014)

While the second version of milk pumping equipment does not use the vacuum that needs the mothers' pumping using their hands. It upgraded by using the machine to allow the mother's hands to be free during the process of milk pumping and also can facilitate mothers to do others work at the same time. Some milk pumping machine is electrically operated and some are battery powered. Different from the first version that needed the mothers used their energy and have been time-consuming. It also more difficult than the second version of milk pumping because the first hand of the mothers need to operate the vacuum while the other hand needs to maintain the connection with the suction cup and the breast.

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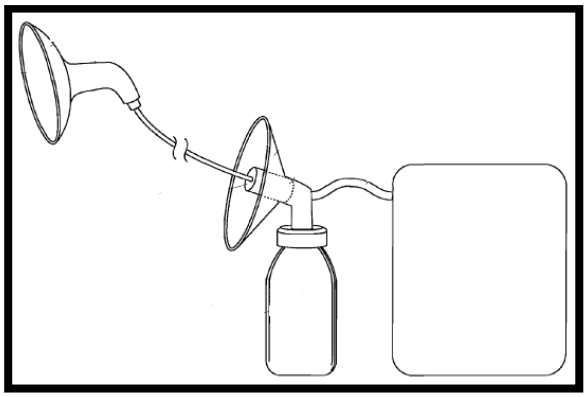

Figure 1.2: The second version of milk pumping machine. (Shaw and Francisco, 2014)

The third version of the milk pumping machine almost same with the second version. The different of this two version is the single suction cup and double suction cup. Usually double suction cup only available at the hospital to facilitate the mothers after giving birth. The double suction cup does not have been time-consuming compared with the single suction cup. The double suction cup is also expensive. This milk pumping machine will evolve through along with the technology even though in this era globalization have provided with many brands of formula milk but the mother's milk is the best to give to the child until their age reaches two years old.

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