



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DEVELOPMENT OF AN AUTOMATED MEDICAL DISPENSER  
REMINDER SYSTEM ARCHITECTURE**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology (Automation Industrial & Robotics) (Hons.)

by

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**FACULTY OF ENGINEERING TECHNOLOGY**

**2016**

**BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA**

**TAJUK: Development of An Automated Medical Reminder System Architecture**

**SESI PENGAJIAN: 2016/17 Semester 2**

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## **DECLARATION**

I hereby, declared this report entitled “Development of An Automated Medical Reminder System Architecture” is the results of my own research except as cited in references.

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Date : 9 DISEMBER 2016

## **APPROVAL**

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Automation Industrial & Robotics) with Honours. The member of the supervisory is as follow:

.....  
(Project Supervisor)

## ABSTRAK

Pada masa kini, masyarakat mungkin lupa untuk mengambil ubat-ubatan tepat pada masanya atau mereka lupa sekiranya telah mengambil ataupun belum. Oleh yang demikian, mereka terlepas untuk mengambil ubat pada waktu yang telah ditetapkan dengan dos ubat-ubatan yang berlebihan. Justeru itu, untuk menyelesaikan masalah ini, projek ini akan direka khusus untuk mereka. Projek ini adalah satu sistem elektronik yang boleh dipasang dalam kabinet untuk mengingatkan seseorang tentang pengambilan ubat-ubatan pada masa yang ditetapkan. *“An Automated Medical Reminder System Architecture”* adalah satu sistem keselamatan yang merangkumi dua bahagian iaitu pembangunan perisian dan pembangunan perkakasan. Kit ini boleh digunakan di hospital atau di rumah untuk digunakan kepada pesakit yang berusia untuk mendapatkan ubat-ubatan dan mengikut masa yang ditetapkan untuk mengambil ubat. Ia juga berguna kepada golongan yang sering lupa untuk mengambil ubat. Peranti ini akan mengingatkan mereka untuk mengambil ubat-ubatan mereka menggunakan loceng dan memilih ubat yang ditetapkan berdasarkan paparan LCD ubat yang perlu diambil.

## ABSTRACT

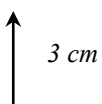
The people might forget to take their medications on time or forget that they have already taken their medicines. Consequently, they miss doses of medicines or take overdose. To solve this problem, we designed and built an electronic system, which can be installed in medicine cabinet to keep track of a person's intake of medicines. **Development of An Automated Medical Reminder System Architecture** project is a security system that encompass two important parts which are development of software and development of hardware. This kit is used in hospital or in home to serve the patients and aged who get medicine. The server will record the time of taking medicine and according to the time to judge whether the aged take medicine in time. It is more useful for aged who always forget to take medicine. This device will remind them to take their medicines using a sound buzzer and choose their medicine based on LCD appeared. Moreover, this device also displays the name of the medicine to be taken at that time. This project expected to remind the user to take medicine on time and reduce drug addicted.

## DEDICATION

Special thanks to my beloved parents

Special thanks to my supervisor

Special thanks to my colleagues



## **ACKNOWLEDGEMENT**

I would like to thankful to Allah S.W.T for giving me a chance to complete this project to success. While completing this project, there several individuals that keep giving me their support and advices to complete this project successfully. I would like to express my deepest gratefulness and appreciation to my Supervisor, Puan Intan Mastura Binti Saadon in all guidance, teaching, advices and time for me. Without her constant supervision. I may be not able to complete this project. Thank you for the advices, guides, tips and generous support that you have gave me. To my family that keep supporting me until finish this project. To my friends, my special gratitude and thank you for all the support and guidance. Also not forgotten to all lectures and people who helped me in completing this project whether it is directly or not. Without all the support and help, this project maybe cannot complete. Thank you.



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# **LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE**

AC	-	Alternating Current
CE	-	Common Era
DC	-	Direct Current
EEPROM	-	Erasable Programmable Read-Only Memory
FTDI	-	Future Technology Devices International
GPS	-	Global Positioning System
IDE	-	Integrated Development Environment
I/O	-	Input Output
ISCP	-	In-Circuit Serial Programming
ISIS	-	Intelligent Schematic Input System
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
PDA	-	Personal Digital Assistant
PWM	-	Pulse Width Modulation
RAM	-	Random Access Memory
RTC	-	Real Time Clock
SCLK	-	Serial Clock
USB	-	Universal Serial Bus

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Medical reminder systems are for the category of patients involving all human beings-teachers, students, businessman, housewives, children and also all of us have busy hectic schedule. Today's in life is full of responsibilities and stress. So, people are prone to be diagnosed with diseases of different types and it is our duty to keep ourselves stays fit and healthy. If patient stays home then he or she might get someone to look after or remind them but when one is not at home, is out of the city or away from home then it is hard for the family members to call them and remind them their dosage timings every time. This project aims to design a medical reminder system by using an RTC clock for medicine intake. Besides that, hardware and software development are used to develop this project. The software development consists of the arduino for RTC clock command. The hardware development consists of arduino circuit, RTC clock, buzzer, relay module and solenoid.

## 1.2 Problem Statement

The reason why this project needs to be developed is to solve the forgotten people to take the medicine. This is because people so busy with their work without taking care about their health. When people know they not well, they just go to the hospital or clinic to take the medicine but do not eat them because they forget about that. Besides that, this project should be developed because to solve the forgotten people about the amount or doses of medicine that they should take. Sometimes, people always forget about the doses should their take. It can be overdoses if people take more than once. It also can be a drug addicted that it is dangerous and not healthy for life. This product can alert people with alarm to take the medicine and remind them with exact doses without take an overdose medicine. The automated medical system can makes people alert to take the medicine and easier for them to take their medicine.

## 1.3 Objective

The objectives of this project are:

- i. To design a reminder system to alert users on the timing and dosage for medicine intake.
- ii. To develop a prototype of a medicine dispenser.

## 1.4 Project Scope

This project is the process of alert the people to take the medicine when patient at home using a medical dispenser that can design an embedded system that can remind and take a correct dose of medicine.

- i. Software development is using a Arduino ATmega and Proteus. Arduino connect to the RTC clock, LCD, solenoid and relay module to hardware development.



- ii. Prototype development is design a mechanical part of the dispenser using a sketch up software and develops the prototype to be implemented with the electronic parts.

## **1.5 Project Significance**

This project will be a significant in promoting for hospital users, homes that can makes great and better life. This project will be benefits for old folks, nurses, doctor and children to take dosage of medicine on time and not forget to take medicines.

## **1.6 Flowchart**

Figure 1 below shows the flow of the project using a flowchart. In this project, the overall concept of the project starting when the sound of the buzzer will on it will alert the people it is time to take a medicine. When the alarm is sound, the LCD will appear the doses of the medicine for each medicine to remember the people. When people see the amount of the medicine, the people should push a button to take a medicine with correct dose. Medicine will out by using a solenoid that place at the end of the box. Then, people can eat the medicine through the medical dispenser.

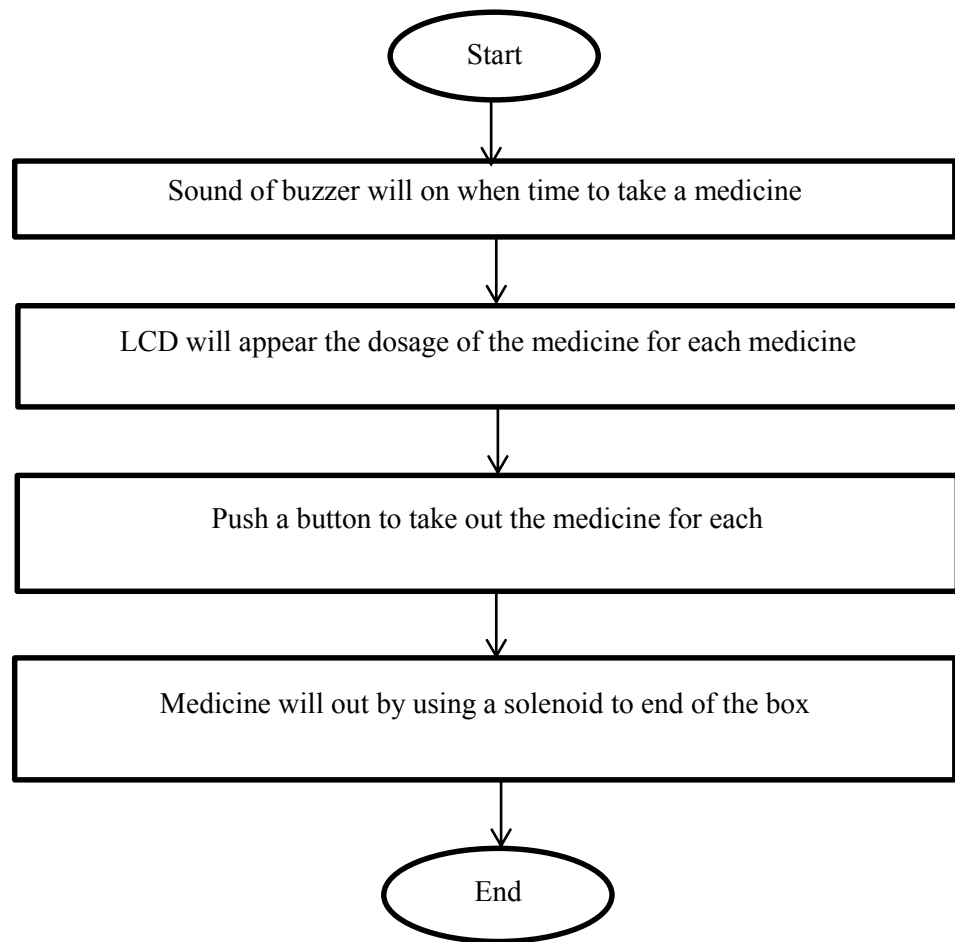


Figure 1.0 : Flowchart of Project

## 1.7 Thesis Outlines

There are three chapter in this thesis include of introduction of the project, literature review which is the works of others that related with this project and lastly the method that used to implement the knowledge into project.

**Chapter 1 :** In chapter 1, currently brief about general ideas of the project which are introduction, problem statement, target of the project, scope of project, project significant and thesis outlines.

**Chapter 2** : In this chapter, basically study about literature review which is work that related with the project. It is important in order to obtain some knowledge about the project. Furthermore, this chapter include some explanation about software and hardware development and also about the main component in the project.

**Chapter 3** : Chapter 3, will be discuss about methodology, which is consists flowchart of whole project and the description of component that will used to solve the problem statement.

## **1.8 Expected Result**

This project will achieve the objective of the project, which are to design a system that will give the accurate dosage and take a medicine on time and to develop a prototype. This medical reminder box is proposed to be used by nurse, old folks and teenagers too to always alert them for take a medicine on time and right doses. By using this system, it can avoid from drug addicted and forget to take the medicine on time. This system is created and developed by using simple components that easy to get in any types of component store. It also comes in very small of product that easy to install at home and hospital so the expectation for this project is to be implement this medical reminder box for nurse, old folks and teenagers. With the creation of this system, hopefully peoples more responsible for ensuring to take their medicine on time and exact doses.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction Literature Review**

This chapter will discuss about all related information and study about project to achieve the project aims. This chapter involves research and find the information about the concept of medical reminder system that has been done and related to this project Furthermore; this chapter also have more detail description about software and hardware use in this project. A study regarding all required components must be done in order to design the overall circuit. It is important to understand on how software and hardware were used in Aduino system.

#### **2.2**

There are some of journals that are almost related with Medical Reminder System Architecture. These journals are used as a reference to complete this project.

##### **2.2.1 A Design of an Automated Patient Tracking and Medicine Dispensing Mobile Robot for Senior Citizens**

According to Yasothaa Kalai Chelvam, Norshuhani Zamin (2014), they use a robotics application. The system built to support elderly living independently. In this project, they use a PIC microcontroller as a controller. They use 3 of touch sensor that can detect when pressed the button. IR sensor used for detect the beacon heading which will be attached to track the direction of the

patients. Another sensor is Ultrasonic sensor that detect proximity of obstacle enabling avoidance of collision. Dispenser is used for control the dispensing of the medicine. There are many differences method that been used in this project compared to my project. There will be some modification at microcontroller and put alarm system to alert the patient and will put the medical dispenser at one place only.

### **2.2.2 A Medication Calendar to Assist Old People with Drug Dose**

According to Joel Palomino, Haruo Nakashima, Shunji Moromugi, Takakazu Ishimatsu (2012), this product used a manual calendar that has twenty eight pockets. The twenty eight pockets are divided into weekdays and four period at once time. Inside the pockets, there are bags to put the medicine with the doses. Each pocket has a reed switch as a sensor to detect the medicines. LCD display, four knobs, two switches is using in controller. At the end, the differences between this project is manual calendar will change as a automation calendar by using a RTC clock. Put the alarm for alert the patients and used a difference microcontroller and modified the design of the medical dispenser.

### **2.2.3 Medication Reminder And Healthcare – An Android Application**

According to Deepti Ameta, Kalpana Mudaliar and Palak Patel (2015), this product used a smart phone. They used an Android application that automatic alarm ringing on smart phone. They focusses on doctor and patient interactions. Patients will not remember their dosage and timing while they can set an alarm on their dosage timings. The alarm can be set for multiple medicines and timings including date, time and medicine description. A notification will be sent to them through email or message inside the system preferably chosen by the patients. They can search doctor disease wise. The patients will get the contact details of doctors as per their availability. Also the users can see different articles related to medical fields and health care tips. The system focuses on easy navigation and good user interface.

## **2.3 Microcontroller**

Arduino consists of two open sources which is open source hardware and open source software. It is also act as microcontroller that can sense control physical devices based on kits for building digital devices and interactive objects.

### **2.3.1 Arduino Uno**

Atmega328 include at Arduino Uno microcontroller board. The board consists 14 digital input and output pins. There are 6 pins which is PWM outputs and analogue input. There are also consists 16 MHz crystal oscillator, USB connection, power jack, ICSP header and reset button on microcontroller board. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

## **2.4 RTC Clock**

A real-time clock (RTC) is a computer clock (most often in the form of an integrated circuit) that keeps track of the current time. Although the term often refers to the devices in personal computers, servers and embedded systems, RTCs are present in almost any electronic device which needs to keep accurate time.

### **2.4.1 Purpose of RTC**

Although keeping time can be done without an RTC, using one has benefits:

- i. Low power consumption (important when running from alternate power)
- ii. Frees the main system for time-critical tasks

- iii. Sometimes more accurate than other methods

## **2.5 Linear Solenoid**

Direct solenoid's fundamentally comprise of an electrical loop twisted around a round and hollow tube with a ferro-attractive actuator or "plunger" that is allowed to move or slide "IN" and "OUT" of the curls body. Solenoids can be utilized to electrically open entryways and hooks, open or close valves, move and work automated appendages and instruments, and even activate electrical switches just by empowering its curl.

## **2.6 Software Specification**

There are three software will be utilized in this tasks. There are several different lists of software design principles:

- i. Proteus 8.1 Professional.
- ii. Aduino Software.

### **2.6.1 Proteus 8.1 Professional**

In this project to design and simulate the related circuit designer used Proteus 8.1 Professional. It is also able to carry out an outline of the whole circuit for a microcontroller system. Intelligent Schematic Input System (ISIS) is used to obtain the output characteristic. It is widespread due to it is suitable with any types of microcontroller. Thus, it is easier for users to design and simulate the circuit. Figure 2.0 below shows the Proteus 8.1 Professional Software:

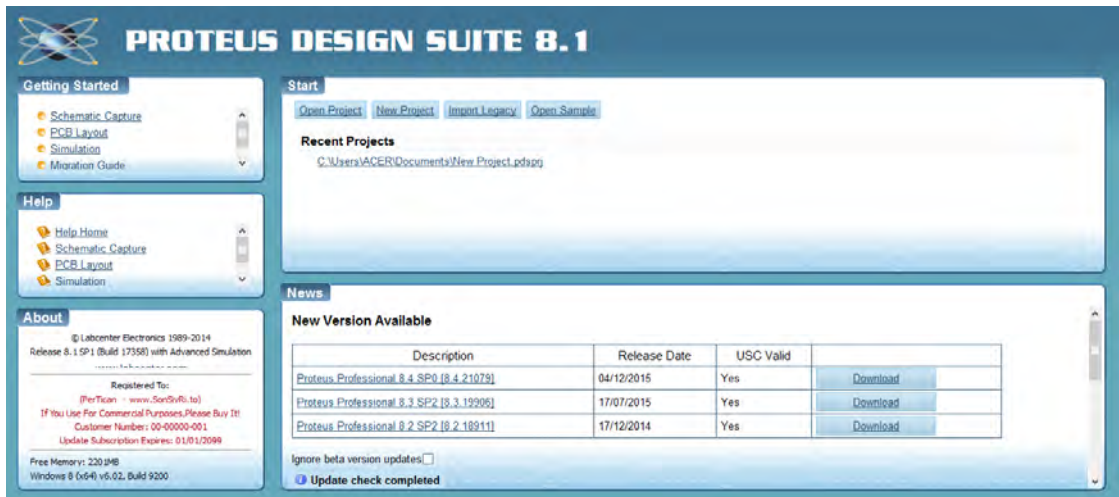


Figure 2.0 : Proteus 8.1 Professional Software

## 2.6.2 Arduino 1.6.8

Arduino 1.6.8 is open source Arduino Software (IDE). This software can write the code easier and upload it to the board. It can be used with any Arduino Board. This software contains a lot of functionality which is a text editor for write a code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. The Figure 2.1 above shows Arduino 1.6.8 Software.

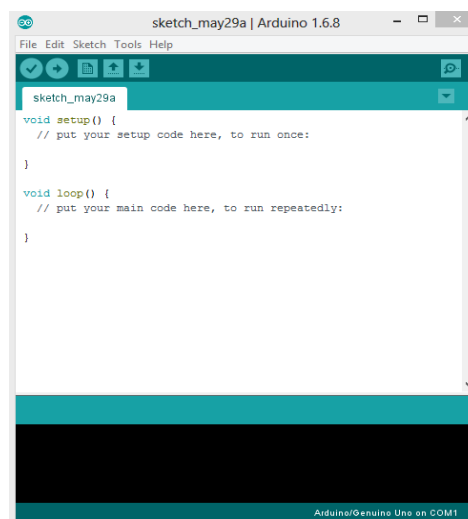


Figure 2.1 : Arduino Software