



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DEVELOPMENT OF SMART MAIN CIRCUIT BOARD FOR  
HOME APPLICATION**

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

by

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APPLICATION

Sesi Pengajian: 2019

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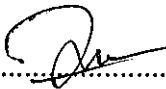
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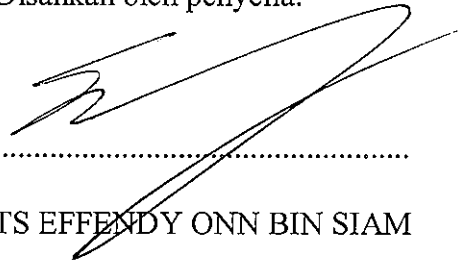
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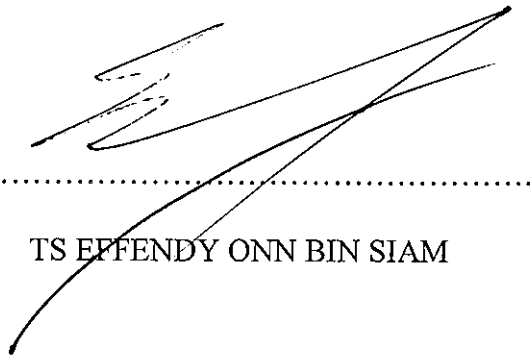
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## APPROVAL

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

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## ABSTRACT

In this project, Arduino is combined with relay module, ACS712 current module, ZMPT101B voltage module and ESP 8266 Wi-Fi module for smart main circuit board for home application. The Arduino is basically programmed as a controller to communicate with the relay and sensor which is connected with lamp and switch socket outlet and blynk to communicated with each other and send the values of sensor. It can be shown from the results that by implementing Arduino, the energy consumed by the electrical appliances can be saved. In addition, the system can also be applied to small scale office building.

## DEDICATION

I dedicate this project to Allah Almighty my creator, my strong pillar, my wellspring of motivation, shrewdness, learning and comprehension. He has been a wellspring of my quality all through this program and on His wings just have I taken off. I also dedicate this project to my family who has supported me the distance and whose consolation has ensured that I give it everything necessary to complete what I have begun. This project also is particularly committed to my supervisor, for his ability to manage me to the accomplishment of undertaking for my degree.

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Next, I would like to express my thanks to my family members for their moral support for my project at its completion. They provide me with a comfortable and convenient environment so that I can complete this project in peace. They also encourage me to be strengthened and bolder than ever before when I am stressed at the workload.

Finally, I wish to thank all my friends who have helped me to complete this project directly or indirectly. They shared their own knowledge, thoughts, opinions and tips about my project. They also helped write the project report by providing me with information about the formats and which components.



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#### LIST OF ABBREVIATIONS

<b>MCU</b>	Microcontroller unit
<b>LCD</b>	Liquid crystal display
<b>RSC</b>	relative soil water content
<b>PIC</b>	Peripheral interface controller
<b>MCB</b>	Main Circuit Breaker



# CHAPTER 1

## INTRODUCTION

### 1.0 Introduction

The idea of this project is briefly described in this section. It describes briefly the project background, the problem leading to the idea of the project, the objectives to be reached, the project scope and the expected project results.

### 1.1 Background

In this fast-moving era progressing technologies with growing acceleration in the Internet of Thing trend, where digitalization in technology becomes a smart main circuit board, it is a home with advanced systems of automation which enable people to monitor the functions of various installed devices and control them. For example, a smart main circuit breaker that can control the lighting, the use of the meter and overcurrent protection. The smart main circuit board auto monitors consumption in sources, providing clear information on how and where a building uses energy, and also smart cross-referencing of energy use by zone (bathroom, bedroom, storage, parking, etc.) and by type of application (light, heating, clean water, etc.). But a particular party or individual should be notified as soon as practicable to ensure prompt action is taken. Thus the idea was developed to develop a quick-response main circuit board together with a notifications system.

This technological trend makes the house smarter. The use of distributed switches gradually shifts from modern homes to a centralized wireless communications system. This trend will reduce the disadvantages of distributed switches situated in various areas of the home significantly. For people with special needs, such as elderly people or those with physical problems, this is particularly beneficial. Invariably, smart home technology offers a simple way to improve home and improve comfort and efficiency. Smart homes have been defined as the incorporation of technology and services via home networking for improving quality of life. The automatic measuring system has been designed to simplify and efficiency existing billing system electricity to measure the consumed units on the side of the consumer pulse shape in the automatic system design, transmitted on the side of the board of electricity calculates the consumption and the amount equivalent and returned to the consuming unit. Currency values shown on the side of the electricity and consumer boards. If the case of failure events such as leaking current, electric arcs, overcurrent and overvoltage, the proposed system enhances electrical security with rapid disconnections of electricity supply and is designed in order integrated in intelligent environments like intelligent homes and city devices. The system also enables the monitoring and notification of events on a real-time basis by means of a state-of - the-art communication interface.

## 1.2 Problem Statement

The world of smart home automation devices has grown enormously in recent years. The purpose of these gadgets is to facilitate the interaction between people and homework. Each device has its own setup interface, which offers an overhead for users ' general experience, although individually they are simple to work with. This article provides a solution to connect more devices into a signal entity that is accessible at all times easily. The implementation integrates in a single application the functionality of various home automation devices.

## 1.3 Objective

The objective of this project is:

- 1) To develop a smart main circuit board using Arduino UNO.
- 2) To develop Arduino control system to allow control of lighting, used of watt meter, and over-current protection operations whether the residents are at home or not in the house to allow additional actions.
- 3) To develop an immediate reaction system, interactions between people and homework can be easily controlled using Android smartphones.

## **1.4 Scope**

This project is primarily targeted at residential or household users based on the problem statement and the objectives set out in the previous sections. This project was intended to be carried out in-house, so that the user is guaranteed to be informed immediately if something happens, even if no one is at home. Thus, it needs to be small and easy to install in the smart main circuit board system.

This project also intended to use its main control unit Arduino UNO microcontroller. In order to control the lighting, use the watt meter and over-current protection in the House, the Arduino microcontroller will operate either at home or not to allow further action. Then it controls the actions and current protection of other connected components such as the Android smartphone, watt meter and contact relay. The system circuit is designed with Proteus while the Arduino IDE is used to code the microcontroller and Blynk used as to control circuit with monitoring system.

## **1.5 Expected Output of Project**

The main function of this project is to operate an electronic control system that enables lighting, watt metering and over current protection operations to be carried out in the home, whether residents are present or not so that further steps can be taken. It was intended for implementation in household or residential areas, so only conditions relating to these situations were taken into account.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.0 Overview

This chapter discusses previous studies and works related to the proposed project which include journals, theses, articles, papers and other sources. The literature review consists of reading, evaluating and analyzing the work of others before initiation of the proposed project so that substantial data and information can be collected for the purpose of assisting with project progress.

#### 2.1 Previous Related Research

A few previous projects, which range from 2011 to 2019, have before then been studied with a view to increasing the understanding of the theme with the aim of building a more smart main circuit boards.

##### 2.1.1 Android Based Smart Home System

This project have been proposed by the Modibbo Adama, Yola, Nigeria Department of Electrical and Electronic Engineering, Adamu S. Kadalla, Ahmed I. Tijjani and Matthew K. Luka. The Android-based Smart Home System has been suggested here. With an application running on android smartphone, the system gives home users wireless control of the house-hold lighting systems, ventilation systems

and the home main port. It also allows the user to read in advance the surrounding temperature and the energy that the device consumes in the building. In order to handle data acquisition and processing of the system, a centralized controller has been developed around the PIC 18F4550. In control of lamps, fans and gates of the prototype of one bedroom apartment, the overall system performance was shown and the success of the design confirmed. The overall system is composed of a sensor, an actuator and a control unit. The figure 2.1 displays the system's functional block diagram. An application installed on an Android smartphone provides the user interface through which the end user can issue commands. The android app transforms these commands into a "GET/" request and transmits the Smart Home Controller via Wi-Fi via the Wi-Fi module. The controller processes the order received and acts on request. You can change the load ON / OFF to the room, read the room temperature, open / close the door, or read the energy consumed by the home. Following processing of the request, the controller generates a feedback via JavaScript Object Notation (JSON), which is transmitted via the same link back to the android app. The application updates or completes the user interface when feedback is received.

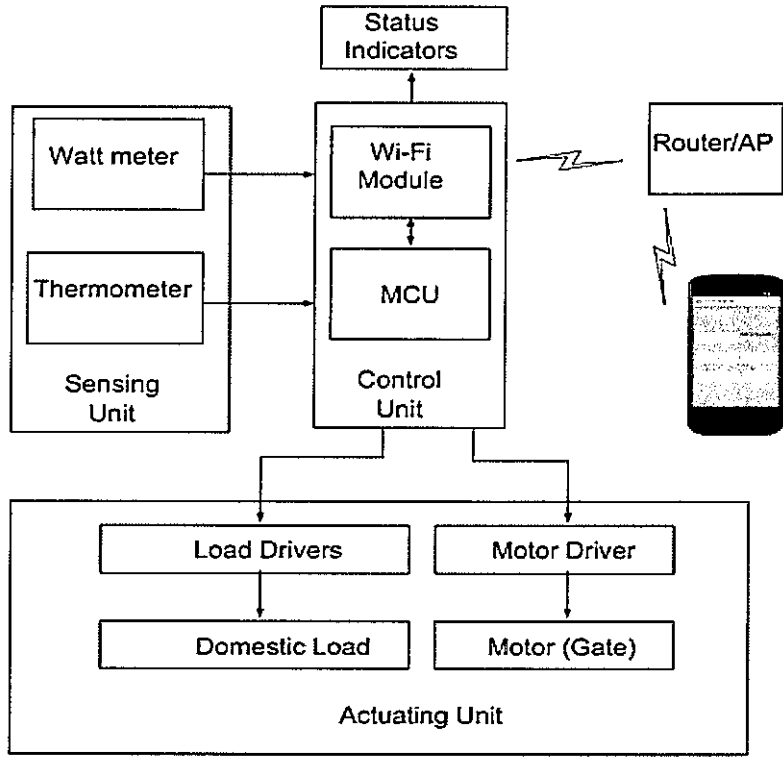


Figure 2. 1: System functional Block Diagram.

As the main control unit, the microcontrol unit distributes the sensors around the house, improves system efficiency and transmits signal from the sensors to the module connected to the microcontroller for further reading from the microcontroller.[1]

### 2.1.2 Smart Home Using Andriod Application

This title was proposed by Dhawade Pooja J, Lathkar Y, and Date Purushottam B, from the Department of Electronic and Telecommunication, IOK COE Pune, Maharashtra, India. The aims of project is to develop and implement a smart home app using Android. The overall system control function is illustrated in Figure 2.2 the system is designed for smartphone use. The smartphone app is nothing more than app that is the main source for instruction in a wireless module. The Wi-Fi transmits data provided by the application via radio wave technology. Wi-Fi is used for transforming data into electromagnetic signal that is passed through Wi-Fi and then transmitted using an antenna using radio wave technology. At the receiving end of the signal, the router will receive and decode this signal. The signal will be passed on to the controller, but the only thing is the AVR control. The AVR also manages the information received and operate the devices driven by the driver circuit. Therefore, the hardware needs to be developed for the system. [2]

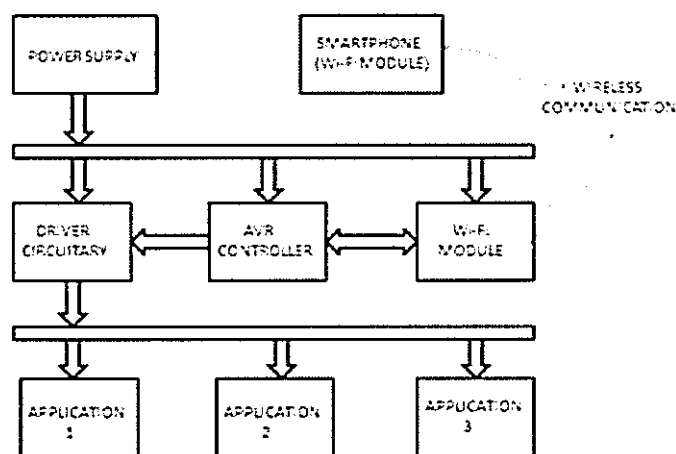


Figure 2. 2: functional Block Diagram.