
# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## AUTOMATIC POWER SOURCE INSIDE LECTURER ROOM

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

By

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# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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TAJUK: **Automatic Power Source Inside Lecturer Room**

SESI PENGAJIAN: **2015/2016 Semester 1**

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# DECLARATION

I hereby, declared this report entitled “Automatic Power Source Inside Lecturer Room” is the results of my own research except as cited in references.

**Signature :……**

**Name : FARA MAIZURA BINTI KARIA**

**Date : 10 JANUARI 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 Engineering Technology (Telecommunication) (Hons.). The member of the supervisory is as follow:

…….

(Project Supervisor)

# ABSTRACT

The project is about automatic power source inside the lecturer room. The power source is one of the human needed in daily life. However, it will be some wasted if the power source is not turn off if it is not use. This correspond to the main function of this application which to minimize the used of power supply and save the budget for utilities. The previous system that are use a manually on off by human. This system also helps the problem faced by student which confuse about the presence of their lecturer. There are two part of designing this application. Firstly is software design which involves the Arduino Software (IDE) and secondly is hardware designing which included the connection between the components, soldering process, printed circuit on bread board and other steps. In order to perform all the designing step, some research is conducted through the internet sources and a few of journal. As the result, each lecturer will be given a tag and they just need to bring the tag near to the RFID reader so that the reader can transmit data to the Arduino and power on the power supply in their room. One RFID tag will represent one lecturer and one room. Whenever card one is tag the power source inside lecturer room one will only turn on or turn off.

# ABSTRAK

Projek ini adalah mengenai sumber kuasa automatik di dalam bilik pensyarah. Sumber kuasa adalah salah satu manusia yang diperlukan dalam kehidupan seharian. Walau bagaimanapun, ia akan menjadi sia-sia jika beberapa sumber kuasa yang tidak dimatikan jika ia tidak digunakan. Ini sesuai dengan fungsi utama aplikasi ini iaitu untuk mengurangkan pengunaaan bekalan kuasa dan menjimatkan bajet untuk utiliti. Sistem sebelumnya dikawal secara manual oleh manusia. Sistem ini juga dapat membantu masalah yang dihadapi oleh pelajar yang keliru mengenai kehadiran pensyarah mereka. Terdapat dua bahagian mereka bentuk aplikasi ini. Pertama adalah reka bentuk perisian yang melibatkan pengaturcaraan Arduino dan kedua ialah mereka bentuk perkakasan termasuk pemasangan antara komponen, proses pematerian, litar yang dicetak di *bread board* dan langkah-langkah lain. Dalam usaha untuk melaksanakan segala langkah mereka bentuk, penyelidikan dijalankan melalui sumber internet dan beberapa jurnal. Rumusnya, setiap pensyarah akan diberikan tag dan mereka hanya perlu membawa tag terdekat untuk pembaca RFID supaya pembaca boleh menghantar data kepada Arduino dan membekalkan kuasa di bilik mereka. Satu tag RFID akan mewakili seorang pensyarah dan satu bilik. Setiap kali kad siapa yang tag sumber kuasa di dalam bilik pensyarah kita hanya akan menghidupkan atau mematikan.

# DEDICATIONS

To my beloved parents

KARIA BIN TEPAP

MAIMON BINTI BACHOK

To my supervisor

SITI ASMA BIN CHE' AZIZ

# ACKNOWLEDGMENTS

Firstly, I would like to express my gratitude to my supervisor, Puan Siti Asma Binti Che' Aziz for the guidance and enthutiasm given throughout the progress of this project. Under his supervision, I have obtained many knowledge and exploration. I also would like to thank his for the ideas and knowledge shared during the development of my project. I would like to thank my family for their endless support and encouragement, a deepest appreciatioan for their unconditionally love and support. I would like to give appreciation to my friends, Safizzan Hakim Bin Anuar and classmates who willingly spend their time in assisting me and lent their tools to complete my project.

I would like to give appreciation to my lecturers who patiently and passionately teach us throughout my study in UTeM and last but not least, I would also like to thank all the lab technician who have give great assistance during the progress of my project.. Thank you very much.

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# CHAPTER 1
# INTRODUCTION

## 1.0 INTRODUCTION

Power source is a device that provides a power to electric machine. This power source is widely used in human life including cooking, sport, education and others. Currently, power source are control by human. It is a basic knowledge that sometimes someone might be forgets to switch off the power source or someone maybe left their post unintended. In order to overcome this kind of problem, a system is created so it can help user to control the power supply.

The main motive in inverting this application is to solve the current problems face nowadays and to enhance the use of power supply with care of utilities.

## 1.1: BACKGROUND PROJECT

Automatic power source is created to be used inside the lecturer room. The main function of this application is to minimize the use of power source and save the budget for utilities. At the same time, it also uses to verify whether lecturer is inside their room or not. The RFID technology and Arduino is the main equipment that will be used to design this application. Thus for every lecturer, they would have to bring their tag close to the reader(about 10cmfrom the reader ).As a result, the power source such as lamp, fan and computer will be turn on only after him or her scanning their tag. The entire objective, scope and other will be discussed in the next chapter.

## 1.2: PROBLEM STATEMENT

There are several problems on recent power supply inside the lecturer room. First of all, the lamp, fan and computer are not switch off even there are no lecturers inside. This situation contributes to the wasted electric.

Not just that, student also face some confusion which they are not sure whether their lecturer is inside the room or not. This is because the light is always on. In addition, data that lecturer saves inside the computer also not secure because anyone can steal the information just because the computer is not power off.

## 1.3: OBJECTIVE

The purpose of this project is:

1. To analysis about the RFID technology.
2. To implement the RFID technology by constructing the circuit.
3. To build an application that help to minimize the used of power source inside the lecturer room.

## 1.4: WORK SCOPE

The scope of this project is limited to lecturer room and RFID technology. By doing this, we will study about the RFID technology and how it can work for this application. To power on the power source inside the lecturer room, he or she need to scan their own tag. By doing this, it is limited to 150 lecturers to scan their tags at one period time. In addition, there are also software development that will be used such as C Programming and ArduinoSoftware (IDE)

This project is to examine the uses of power source such as lamp and fan inside the lecturer room. By using RFID technology, we want to build an automatic power source inside the lecturer room.

# CHAPTER 2
# LITURATURE REVIEW

## 2.0 INTRODUCTION

In this chapter, reviews of the previous researches project that are related with this project will be discussed. The information will be become additional source for the project in becoming more successful. To have a brief understanding of the researches related to the project, a few literature reviews had been done. This chapter will describe the related literature reviews.

## 2.1: ARDUINO

Arduino is known as an open-source prototyping platform with easy-to-use hardware and software. Arduino is easy to use because it can read sensors and control things like motors and light in plain English. The program can be uploaded to the Arduino board which then can interact with the things in real world. The entire program uploaded can be defined by a set of instruction programmed through the Arduino Software (IDE).


Figure 2.1: Arduino Board

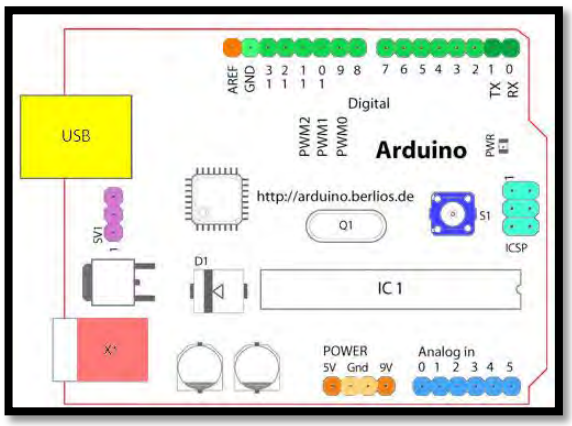



Figure 2.2: Arduino Board Specification

Here the elaboration for each of the pin the in the Arduino Board. Each of the pin has their own specific function

Table 2.1: Arduino Pin Explaination

- Analog Reference pin (orange)
- Digital Ground (light green)
- Digital Pins 2-13 (green)
- Digital Pins 0-1/Serial In/Out - TX/RX (dark green) - These pins cannot be used for digital i/o (digitalRead and digitalWrite) if you are also using serial communication (e.g. Serial.begin).

- Reset Button - S1 (dark blue)
- In-circuit Serial Programmer (blue-green)
- Analog In Pins 0-5 (light blue)
- Power and Ground Pins (power: orange, grounds: light orange)
- External Power Supply In (9-12VDC) - X1 (pink)
- Toggles External Power and USB Power (place jumper on two pins closest to desired supply) - SV1 (purple)
- USB (used for uploading sketches to the board and for serial communication between the board and the computer; can be used to power the board) (yellow)

## 2.2: ARDUINO UNO

In Italian "Uno" means one and it be a marked for the releases of Arduino Software (IDE) 1.0. It was the references version of Arduino. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards. Table below show the technical specs of Arduino Uno that taken from Arduino official page.

| | |
|---|---|
| Microcontroller | ATmega328P |
| Operating Voltage | 5V |
| Input Voltage (recommended) | 7-12V |
| Input Voltage (limit) | 6-20V |
| Digital I/O Pins | 14 (of which 6 provide PWM output) |
| PWM Digital I/O Pins | 6 |
| Analog Input Pins | 6 |
| DC Current per I/O Pin | 20 mA |
| DC Current for 3.3V Pin | 50 mA |
| Flash Memory | 32 KB (ATmega328P)<br>of which 0.5 KB used by bootloader |
| SRAM | 2 KB (ATmega328P) |
| EEPROM | 1 KB (ATmega328P) |
| Clock Speed | 16 MHz |
| Length | 68.6 mm |
| Width | 53.4 mm |
| Weight | 25 g |

Figure 2.3: Arduino Uno Technical Specs

## 2.3: RELAY

This voltage suppression can be presented in two ways. Either the PC gives the suppression or the hand-off gives the suppression. In the event that the transfer gives the concealment they are called voltage- suppression transfers. In transfers voltage suppression is given the offer of resistors of high some assistance with value and even diodes and capacitors. Out of these diodes and resistors are all the more generally utilized. Whatever gadget is utilized, it will be plainly expressed in the hand-off.


Figure 2.4: Relay

Relay can be defined as an electrically operated switch that can turn on or off a much larger electric current. Mainly there are two principles used by relay which is electromagnetic and solid-state relay. Electromagnetic principles is used to operate a switch meanwhile solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Figure and explanation below show how relay work is.

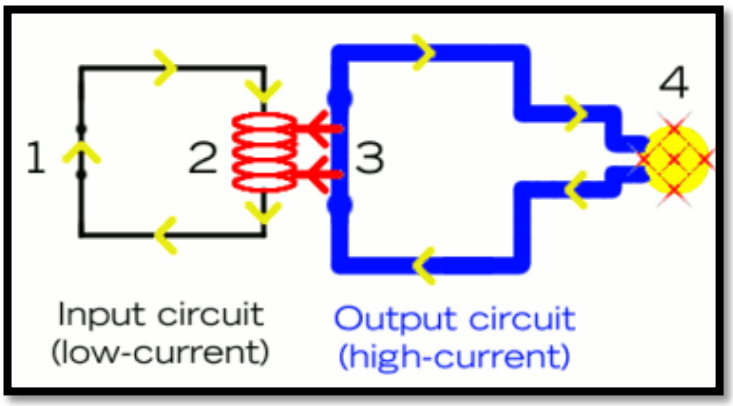



Figure 2.5: Process of Relay

1. The input circuit (black loop) is switched off and no current flows through it until something (either a sensor or a switch closing) turns it on. The output circuit (blue loop) is also switched off.

2. When a small current flows in the input circuit, it activates the electromagnet (shown here as a red coil), which produces a magnetic field all around it.

3. The energized electromagnet pulls the metal bar in the output circuit toward it, closing the switch and allowing a much bigger current to flow through the output circuit.

4. The output circuit operates a high-current appliance such as a lamp or an electric motor.

**2.4: RFID (Radio Frequency Identification)**

According to Vangie Beal, RFID is a technology similar in theory to bar code identification. With RFID, the electromagnetic or electrostatic coupling in the RF portion of the electromagnetic spectrum is used to transmit signals. RFID systems consists of an antenna and a transceiver, which read the radio frequency and transfer the information to a processing device, and a transponder, or tag, which is an integrated circuit containing the RF circuitry and information to be transmitted. RFID systems can be used just about anywhere, from clothing tags to missiles to pet tags to food -- anywhere that a unique identification system is needed. High frequency RFID systems (850 MHz to 950 MHz and 2.4 GHz to 2.5 GHz) offer transmission ranges of more than 90 feet, although wavelengths in the 2.4 GHz range are absorbed by water (the human body) and therefore has limitations.

**2.4.1: Component of the RFID System**

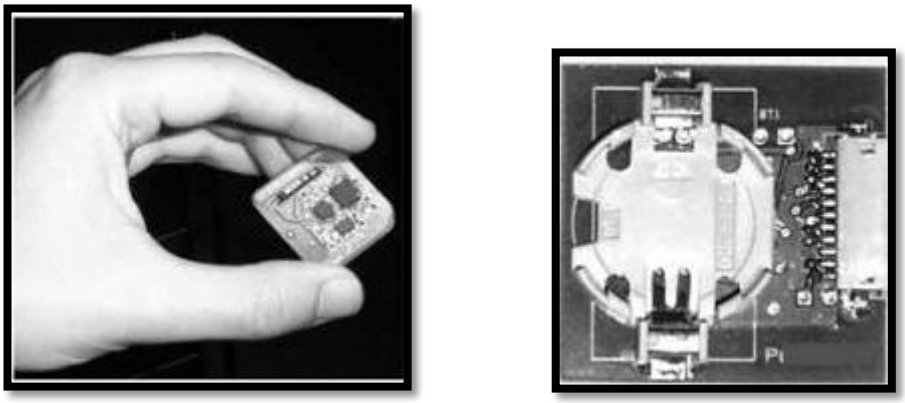
RFID system consists of RFID reader, RFID tags and information managing host computer. The reader contains an RF transceiver module, a signal processor and signal unit, a coupling element, and a serial data interface to a host system. The tags act as a programmable data-carrying device and contains of coupling element and low-power CMOS IC. RFID involves contactless reading and writing of data into RFID tags non-volatile memory through an RF signal. The reader emits an RF signal

and data is exchanged when the tag come in proximity ti the reader signal. Tags can be categorized as follow:

1. Active tags, which has a battery that supplies power to all functions
2. Semipassive tags, which has a battery used only to power the tag IC not for communication
3. Passive tags, which has no battery on it. The absence of power supply makes passive tags much cheaper and more reliable than active tags.

#### 2.4.1.1: Active Tags Description

An active tag usually performs a specialized task and has an on-board power source (usually battery). It does not require induction to provide current, as is true of the passive tags. The active tags can be designed with a variety of specialized electronic including microprocessor, different types of sensors or I/O devices. They are larger and more expansive than passive tags, but can hold more data about the product and are commonly used for high-value asset tracking.



: a) front b) reverse sides

Figure 2.6: Active tags

#### 2.4.1.2: Passive Tags Description

Passive RFID devices have no power supply built in, meaning that electrical current transmitted by the RFID reader inductively powers the device, which allow it to transmit its information back. Because the tag has limited supply of power, its transmission is much more limited than an active tag, typically no more than simply

ID number. Passive device has limited range of broadcast, requiring the reader to be significantly closer than an active one would. Uses of passive tags tend to include things such as inventory, product shipping and tracking, where it is practical to have reader within a few meters or so of the RFID device.

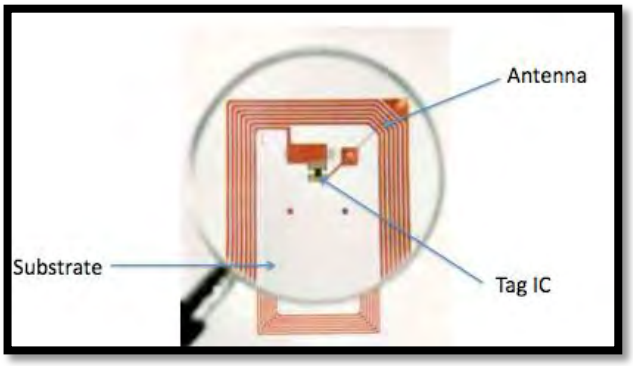



Figure 2.7: Passive Tags

## 2.5: RFID APPLICATION

In real life, there are so many applications that used RFID technology. In can be used in daily life, sport, business and work section. Logistic and supply chain is one of business site that used RFID technology. By used it they can increase efficiency, reducing errors and improving quality. Sometimes human not realize that RFID is around them such as in sport. One of the familiar applications of RFID technology is used as race timing. However, the race participant never realizes they are being timed using RFID technology and that's a testament to RFID's ability to provide a seamless consumer experience. Not just that, RFID technology also being used in library system. An RFID library solution improves the efficiency of circulation operations. While barcodes require line of sight, RFID tags can be read from multiple angles which means the checkout and check-in process is significantly faster.

### 2.5.1: STUDIES ON USAGE OF RFID AND ARDUINO

#### 2.5.1.1: RFID Becomes an Overnight Sensation for Sernam

Sernam is French shipping and logistics company which have been operate since 2001. The purpose of using RFID in their company is for improve its operations competitiveness and capabilities. Sernam has been applying RFID tags to all parcels it collect and ships overnight. In this case, that parcels will then tracking them as they pass through Sernam's Paris distribution center. Therefore, by adding RFID it creates a trail of each tagged parcels movement trough the company operations at once increases their operation efficiency and bring greater value to their customer.

According to Gwennaelle Perron, who is responsible for traceability solutions at Sernam, adding RFID makes it easier for they to handle parcels, and they expect at least one less staff member will be required to track shipments in and out of the DC, compared to our current bar-code system. At that time, one of Sernam's publishing customers applies RFID-enabled labels to its parcels. The labels are also printed with bar codes, still used both as a backup for the RFID system during the trial, and for points in the delivery chain at which that customer does not yet use RFID for such things as pick-up and delivery.

According to Sernam operating system, an RFID label encoder-printer deployed at the customer site has a network link to Sernam's custom shipping chain application, running on an IBM AS/400 computer at Sernam's headquarters. The encoder reads the RFID label to verify its functionality, to link the preprogramed unique ID on the tag to the bar code printed on the same label and to create a link between the ID number and the transportation data stored in the Sernam system. The parcels are shipped together on single-use wooden pallets. The pallets are collected by truck and transported to Sernam' major distribution centres in Porte de Clichy, in Paris. There, four of the DC's 14 delivery doors have been equipped with RFID portals, which record tagged parcels as employees load and unload them onto trucks