



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF BUS ALERT SYSTEM USING RF
TRANSMISSION WITH LCD DISPLAY FOR STUDENT
CONVENIENCES**

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

by

SHAMSUZZILA BINTI SEBLI

B071310242

910514136072

FACULTY OF ENGINEERING TECHNOLOGY

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.....
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ABSTRAK

Bus pengangkutan sangat penting untuk kegunaan pelajar Universiti. Dalam sistem yang sedia ada, universiti hanya menggunakan sistem jadual waktu di mana ia tidak begitu berkesan dalam kehidupan seharian pelajar. Oleh sebab itu, sistem amaran bas yang menggunakan teknik radio frekuensi telah di cadangkan sebagai langkah alternatif untuk menyelesaikan masalah ini. Projek ini direka dengan dua sistem yang dikawal oleh mikro pengawal Arduino Uno, di mana sistem tersebut adalah pemancar dan penerima. Di bahagian pemancar, sistem ini menghubungkan suis dengan modul pemancar RF untuk menerima isyarat. Manakala, di bahagian penerima, peranti yang berfungsi untuk memberi amaran dihubungkan dengan modul penerima RF. Jarak sistem ini terhad kepada 100m antara pemancar dan penerima.

ABSTRACT

Bus transportation for University student is very important for students' conveniences. Currently, university merely uses timetable system where it is not so effective in student's life. Hence, bus alert system which using Radio Frequency technique was proposed as an alternative to solve this problem. This project fabricated with two systems and handled by Arduino Uno microcontroller, which is transmitting and receiving system. At the transmitter, the system links a switch to the RF transmitter module. While, at the receiver, the device that functions to alert will be connected to RF receiver module. The distance range for this system is limited to 100m.

DEDICATION

Special dedicated to my beloved parents,

Sebli Bin Sanai & Normah Binti Hj. Zainuddin

And my siblings,

Shamsuzzaman

Saifur Rahman

Syamimi

Syazwani

Nursyafiqah

Nursyammiza

Thank you for your loving support, financial and otherwise, throughout my 4 years here. I love you.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

UTeM	-	Universiti Teknikal Malaysia Melaka
FTK	-	Faculty of Engineering Technology
SU	-	Sri Utama
TX	-	Transmitter
RX	-	Receiver
RF	-	Radio Frequency
IR	-	Infrared
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
Rev3	-	Revolution 3
FSPL	-	Free Space Path Loss
VLF	-	Very Low Frequency
EHF	-	Extremely High Frequency
GHz	-	Gigahertz
MHz	-	Megahertz

CHAPTER 1

INTRODUCTION

1.0 Overview

This chapter will briefly discuss on the project background. This chapter also elaborates the problem statement, the objective of this project, and the scope of this project.

1.1 Introduction

Nowadays, the technology is growing rapidly which is in line with the country development. To get as an example, Radio Frequency (RF), it has been widely used in today's technology, which suitable use in telecommunications.

The theory states that RF is referring to electromagnetic waves that have a wavelength suited for use in radio communication. Radio waves are classified by their frequencies, which are expressed in kilohertz, megahertz, or gigahertz. Radio frequencies range from very low frequency (VLF), which has a range of 10 to 30 kHz, to extremely high frequency (EHF), which has a range of 30 to 300 GHz. RF technologies is used in many different applications, such as television, radio, cellular phones, radar, and automatic identification systems. Commonly, RF is applied as remote in transfer and receives the signal. Radio Frequency (RF) capable of covering a large area of coverage propagation compare to Infrared(IR). It also can transmit the signal in any direction and not limited to one direction only.

To illustrate it in a small electronic device, RF module, this device was used to transmit and receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly, and can be accomplished through Radio Frequency (RF) communication or optical communication. RF does not require a line of sight and mostly incorporate with transmitter and receiver. Furthermore, this module is widely used in electronic design owing to the difficulty of designing radio circuitry. Good electronic radio design is notoriously complex because of the sensitivity of radio circuits and the accuracy of components and layouts required achieving operation on a specific frequency.

Besides that, to ensure the reliability of RF communication, it needs carefully monitoring the manufacturing process which is much important and pertinent to the RF performance. RF modules are most often used in medium and low volume products for consumer applications such as garage door openers, wireless alarm systems, industrial remote controls, smart sensor applications, and wireless home automation systems. However, sometimes RF used to replace older infrared communication designs as they have the advantage of not requiring the line-of-sight operation. Several carrier frequencies are commonly used in commercially available RF modules, including those in the industrial, scientific and medical (ISM) radio bands such as 433.92 MHz, 315 MHz, 868 MHz, 915 MHz, and 2400 MHz. These frequencies are used because of national and international regulations governing the use of radio for communication. RF modules may comply with a defined protocol for 3 RF communications such as Zigbee, Bluetooth low energy, or Wi-Fi, or they may implement a Proprietary protocol. (Manna, Pal and Das, 2016).

The project named as “Development of Bus Alert System Using RF Transmission with LCD Display for Student Conveniences” is help for the student conveniences, in order to reduce the waiting time for the bus at the bus stop. In fact, this will help them to estimate and arrange their time more effectively. Currently, bus alert systems for university only use timetable or schedule system. However the constraints of timetable system are the University’s student do not alert and warned about the bus arrival. Therefore, in this project a transmitter, a receiver, and an RF technique is proposed due fact that RF signal covers longer distance and reliable. The range of this project is limited to 10-100 meters with the operating frequency of 3-

30MHz. The development of the proposed RF remote control consists of designing a transmitter-receiver circuit. A one-directional communication concept is applied in transmitting the signal from transmitter circuit to receiver circuit. A reliable and robust RF bus alert system is expected to be developed.

1.2 Basis of Project

Basically, this project will activate the Arduino Uno that already attached along with the receiver module. Then, the Arduino Uno Microcontroller will perform the process to take out the output. At the output part, there will have a buzzer and LCD to perform the system alert in this project. Figure 1.1 illustrated the basic block diagram of the project.

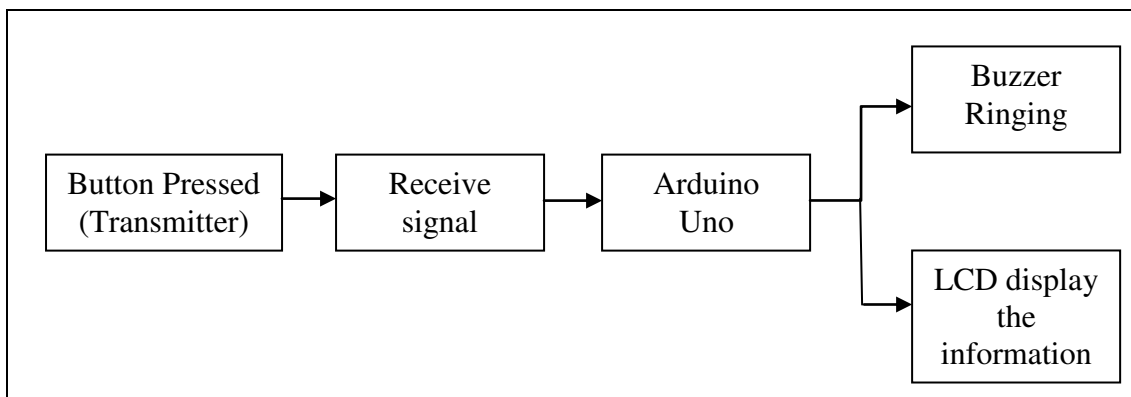


Figure 1.0: Block diagram

1.3 Objectives

The objectives of this project are as stated below;

1. To study the system and design of bus alert system for UTeM Industry campus.
2. To develop bus alert system.
3. To design a system using Arduino Uno with LCD display

1.4 Problem Statements

The systems use currently at UTeM is only timetable or schedule system. This system was not so effective in giving alert and warned the student about the bus arrival. From observation, some problem occurred regarding this system. For example, the students often waste their time for waiting the bus arrival and also miss taking the bus. Apart from that, there were no specific waiting areas at the hostel, like bus-stop. This leads to the problem that make student unable to get the bus on proper time.

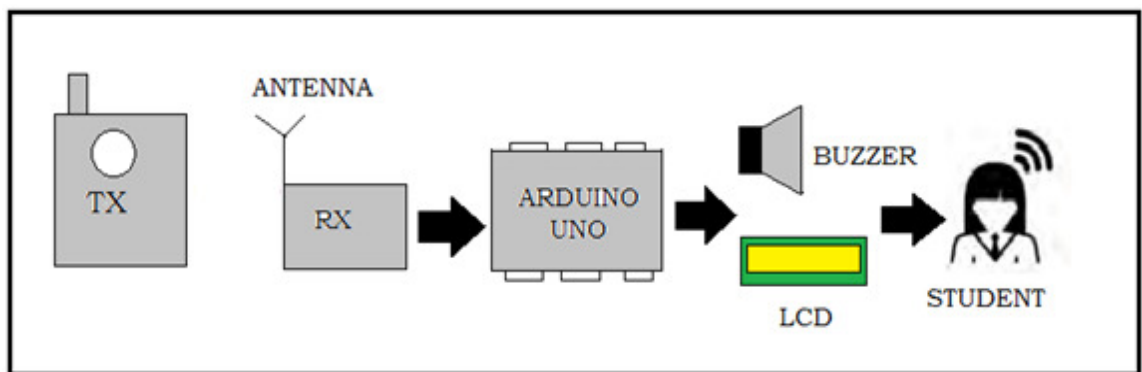


Figure 1.1: System diagram

By referring to Figure 1.2, this project provides alarm system to alert and warned the student about bus arrival. The system is equipped with buzzer and the LCD.

1.5 Scope project

This scope of this project is divided by two, which is for hardware and software development. For hardware, this system will using RF module, Arduino Uno, buzzer and a LCD. A range transmitter and the receiver depending on the distance suitable for this project, which is using pair RF module of 433MHz. The transmitter and receiver device is using a wave as a medium to propagate and the

nature wave help it spread the wave everywhere. So that, the transmitter and receiver not limit to one direction only.

Besides, for software development, this system will use Arduino software to program the Arduino Uno microcontroller. In designing the circuit, the suitable software will use is ISIS software. This software will installed together with Proteus software and it can be used for stimulating the circuit created and changing the parameter required.

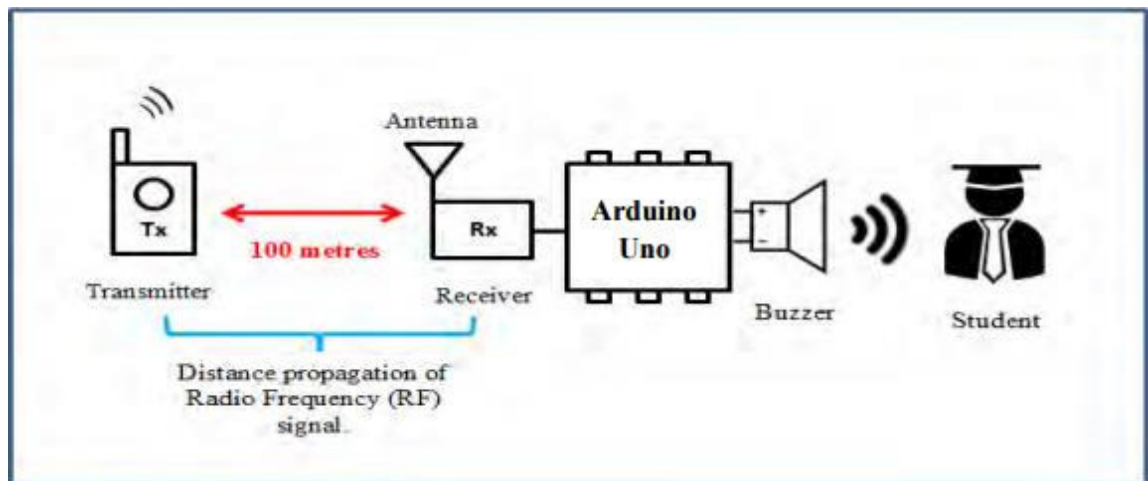


Figure 1.2: Distance between Tx-Transmitter and Rx-Receiver

Illustrated in Figure 1.3, this project has its own distance range, which only covers around 100 meters from the bus parking lots. However, the system will fit out with the antenna that will enlarge the distance range that propagates through electromagnetic wave.

CHAPTER 2

LITERATURE REVIEW

2.0 Overview

This chapter will discuss a theory and previous project concept. The purpose of this chapter is to explain the perspective and method used to complete this project and to discuss how far this project interrelated with study and theory that is existing. Apart from that, this chapter will also show a theory and concept that has been used in solving project problems. Comprehension theoretically is very important as the guide in conducting any study. The result of certain study could not be valued otherwise compared to theory.

2.1 Introduction to Bus Alert System

Nowadays, a development of bus transportation is increasingly stable and develops. However, there are a good and a bad in taking bus transportation. Sometimes, when it comes to taking the public transportation issues, time and patience are of essence. Many of them, experienced time loss because waiting at the bus stop. Hence, a passenger need to know the location of the bus and the time being needed for bus to reach a bus stop.

Means the services provided system is very important. By waiting too long at the bus stop will make the passenger feel reluctant to take a bus. Currently, most bus transportation companies have been providing their timetables on the web freely available for the travelers. According to John et al., (2014) article, they have been provide and implement the idea of giving the notification to their passenger. So that,

their passenger will receive extra info like alert the driver when the bus over speeds and also records the bus details, location, date and time. These recordings will help authorities to take action against the culprits. Also the system aids the public from the long waiting hours at the bus stop.

2.2 Related Projects Articles

In this chapter, the research has been done to view what technology has been used to our world due to achieve the same goal regarding the bus alert system. For first example, paper by Chheda et al. (2012), the entitled Real Time Bus Monitoring And Passenger Information System has discuss that, this system has GPS technology, which can help the passenger who is frequently late to work or going to classes. This problem occurs in which condition to deciding whether to wait for the bus or walk or use alternate transport. This system has deployed at the various bus stop around the Mumbai city. The real locations of the buses in Mumbai will be display on the LCD screens on the bus stops.

Moreover, paper entitled Passenger Bus Alert System for Easy Navigation of Blind People by (Lavanya et al., 2013) has discussed about the wireless technology system, ZigBee. This system used to notice and make it easier for blind people who want to take a bus. The system has been placed at two places, which are in the bus and in the bus station. Apart from that, a Speech recognition system is placing together to easier the passenger (blind people) to know the particular buses for a given location. Means, when the blind speaks through the microphone, the speech recognition system analyze the input which is then processed by the microcontroller, and then produces the required output in the audio format which is heard by the user through the headphones. So that, the desired bus that the blind want to take is notified to him with the help of voice data system.

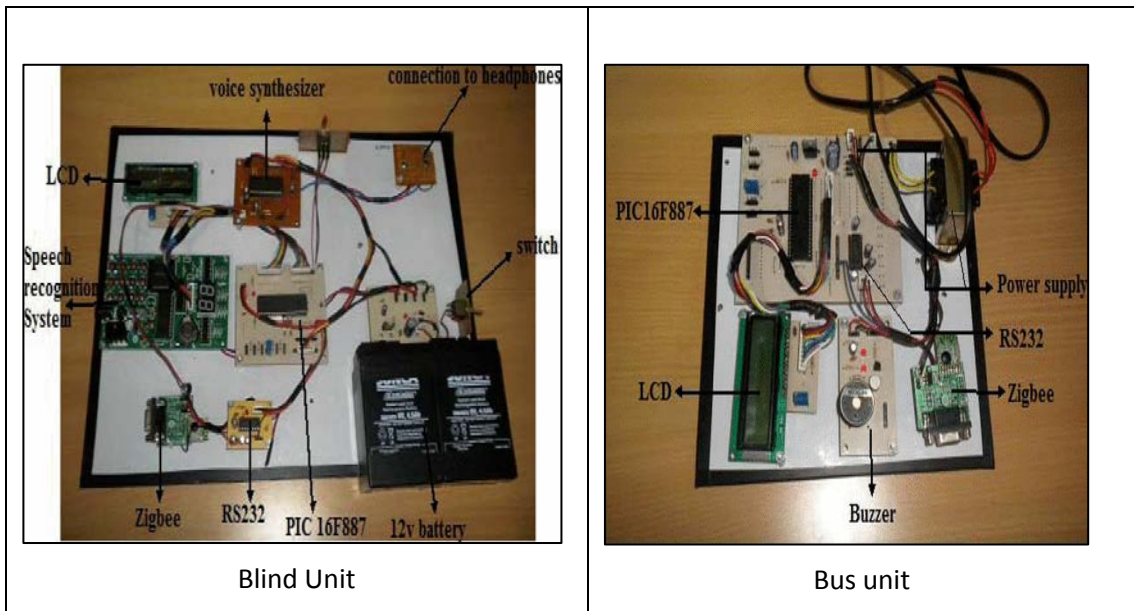


Figure 2.0: The circuit for blind and bus unit (Lavanya et al., 2013).

In the next paper, ZIGBEE and GSM based Passenger Bus Alert System by (Sakhare, Bansod and Kedar, 2015) has purpose the system using zigbee and GSM modems. It is a system of automatic Bus announcement for easy transportation.

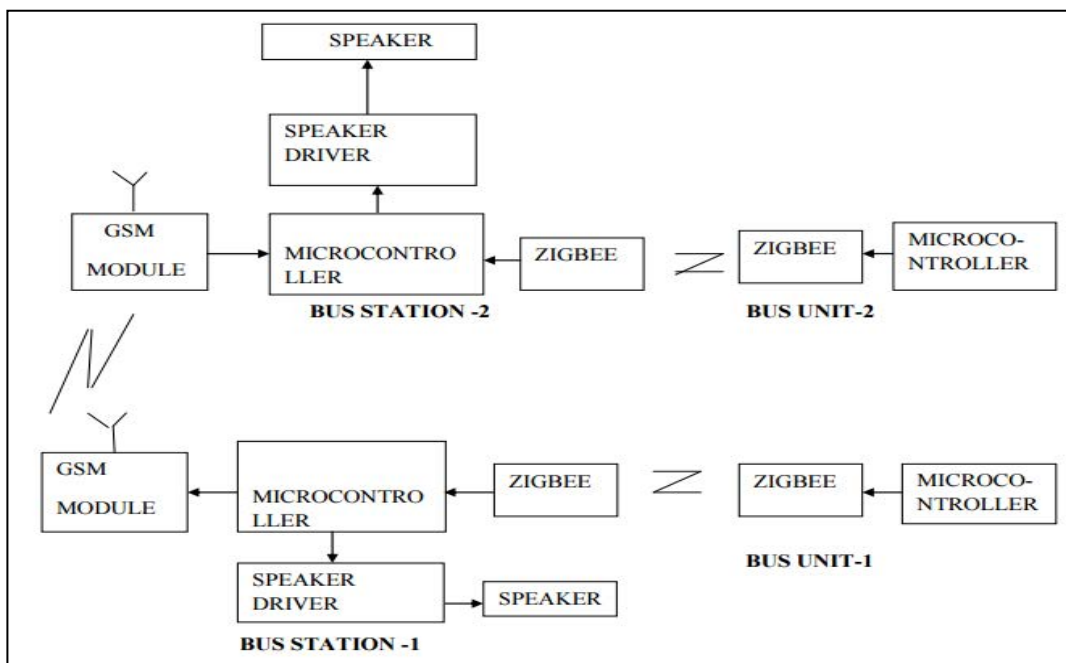


Figure 2.1 : Block diagram project (Sakhare, Bansod and Kedar, 2015)

Figure 2.2 shows the block diagram for the project. The project uses Zigbee module to detect the bus arrival at the bus station, then the bus will be announced at the approaching bus station. The GSM modem is then used for transmitting the same information from the present bus station to the next bus station. Thus, the arrival at the present or approaching bus station and the arrival is announced at the next bus station earlier to its actual arrival as well.

2.3 Radio Frequency

In Coleman, 2004 books briefly explained, radio frequency (RF) technology sometimes known as the exploitation of electromagnetic wave phenomenon that entails in the spectrum between 3Hz and 300Hz. In modern society, this radio frequency technology is most important technologies. It comprises of frequencies applied in communications signals such as radio and television broadcasting and cell-phone and satellite transmissions or radar signal. It is also widely used in nowadays technology. As an example, remote control.

Basically, Infrared technology was widely used, such as for home electronic appliances. It is easy to use and also low cost. However, infrared technology remote is limited to a specific range which requires a close distance to use. The communication involved in this system is the signal sent only one way and up to 30 feet only as viewed in SCV Audio Video, (2013) websites.

Nowadays, this technology has been improved with wireless technology that provides a long range of frequency use in communication technology such as Bluetooth, Wi-Fi, and Radio Frequency. The new standards of Infrared Technology like Radio Frequency (RF) technology, it is easier to use because they provide a wide range in communications. To be used as a remote control, this technology is unidirectional, it does not require line of sight and does not have to be aimed at the equipment. The RF remote can also be operated from another room. Held in the hand like a cell phone, the buttons are pressed in the same straight forward manner.