Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF AUTOMATED PASSENGER COUNTING SYSTEM BUS

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DEDICATION

This thesis work is dedicated to my parents, Hairudin Bin Pardi and Shamsiah Binti Abd Malik who has been always become a source of my support and encouragement during the bachelor degree project. I am truly thankful for having both in my life. This work also dedicated to my supervisor, Dr. Md Ashadi Bin Md Johari who always make me feel to enjoy every moment in this semester. He also always give a solution when there is a problem.

ABSTRACT

University buses are considered the main medium for university students who do not own a vehicle. Therefore, students are always on standby to keep up with the set bus time. Irregular bus schedules disrupt students' plans. Other than that, during peak hours there are not enough seats to accommodate many students. Moreover, bus drivers are often not alert at monitoring the number of students that the bus can accommodate. In addition, a pressure sensor will be activated when it is found that a passenger on the seat indicates that the seat has been occupied. In order to detect passengers on the bus, the system will notify the driver on the monitor display. The aim is to provide a convenient university bus transportation system and create a user friendly monitoring system.

ABSTRAK

Bas universiti dianggap medium utama bagi pelajar universiti yang tidak mempunyai kenderaan. Oleh itu, pelajar sentiasa bersiap sedia untuk mengejar waktu bas yang ditetapkan. Jadual bas yang tidak tetap mengikut waktu menyebabkan perancangan pelajar sering terganggu. Selain itu, tempat duduk penumpang adalah terhad dan sering menjadi rebutan terutamanya pada waktu puncak. Tambahan pula, pemandu bas tidak peka dalam pemantauan jumlah penumpang di dalam bas. Seterusnya, penggunaan sensor tekanan akan diaktifkan apabila mendapati penumpang berada di tempat duduk berkenaan menunjukkan tempat duduk berkenaan telah diduduki. Bagi mengesan penumpang di dalam bas, sistem akan memberitahu pemandu pada paparan monitor. Matlamat projek ini adalah bagi menyediakan sistem pengangkutan bas universiti yang mudah dan mewujudkan sistem pemantauan yang mesra pengguna.

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CHAPTER 1

INTRODUCTION

1.1 Background

Everyone has their own agenda in doing things. Therefore, everyone will manage time differently travelling from one destination to another. Many people preferred to use bus's services especially for long destinations. There are different types of bus services available such as express bus, tour bus and university bus. Within the population, there are several groups including big group of persons with low earnings. These people are older people, unemployed people, low paid workers and also young people[5]. This public transportation would help these people by get the lowest increase in travel time and cost savings that will cause a route modification [6].

These types of public transport are very important to use in cities where the use of buses can reduce traffic congestion on the road. Every year in every country state that, the number of register new vehicles is increased. This means that the higher the population, the higher the total number of vehicles. There are moments when road repair work, accidents or construction work happens, unplanned delays that makes unexpectedly cause traffic congestion. Poor road design also can be a main reason to traffic jams. Traffic jams are not only a waste of time, but it also gives an impact on the environment [7].

The increasing growth in the number of automobiles causes issues with air quality in big cities can be considered to be sources of pollution. The more the usage of the fuel, the more the results of car emissions. Most of vehicles are contains hydrocarbons(HC), carbon monoxide(CO) and nitro oxides (NOx) [8]. This observation tells that by increased usage of public transportation can contribute in the reduction of air pollution and give health benefits. The uses of public transportation are able to reduce vehicles on the road which also will reduce the amount of air pollution that effected to environment.

Lastly, there are a lot of benefits by use the latest technology that give beneficial effect on the management of the bus. The implementation of new technology that come out with the idea and easy to install but not practiced in all placed. The latest technology uses which keeps up with the trend of today.

1.2 Problem Statement

Due to the growth of campus population, it has encouraged universities to improve the bus services that is provided for student's trips to and within the campus area. These services provided makes it easier for students who stay around the campus area to attend classes, programs or events. However, most drivers are not aware about the number of passengers. This may cause many casualties if an accident were happened during the trip.

Furthermore, the bus has the limitation of seats, so students need to know better on how to organize the time to avoid clash of timings and missing the bus. Finally, some of the bus drivers are unconcerned about the accidents that occur often on the bus.

1.3 Project Objectives

The objectives of this project are:

a) To study Proteus 8 and Arduino software for monitoring purpose

b) To design an automated passenger monitoring system.

c) To evaluate the reliability of the system for user.

1.4 Scope of Project

The main purpose of this study is to make bus management more effective and organize. This project can help in time management as well as facilitating public affairs. The focus is on bus services in universities. It is created for students to be able to detect the availability of the passenger.

Arduino Mega 2560 Rev3 module is one of the equipment used in this project as a controller for the system. The presence of the passengers detected by the pressure pad and, will also be displayed on the LCD. In addition, the advantages are given to the driver in order to detect the number of passengers.

From programming software, the simulation will be done to ensure that the program can be used. Among the software used are Proteus 8 and Arduino Compiler. The software will be used to execute the monitoring and tracking in the system.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter is to discuss the development of automated passenger counting for monitoring and intelligent bus transportation systems. The movement of vehicles in the everyday operation of public transportation systems, especially buses, is impacted by a variety of unpredictable variables as the day advances, such as traffic congestion, unexpected delays, unpredictable passenger demand, irregular vehicle dispatching times, and accidents[1]. This project is one of the solution to avoid student being late for classes and people late to work because of the late arrival of the bus. Besides, this project allows people to plan their trip to avoid full seats. There are a few studies focused on how to track the location of the bus and how to track data when the system is running for counting passenger.

2.2 Real-time bus monitoring

The movement of people inside the cities us mass transportation technology like buses and trains. This is also known as public transportation. Some of urban passenger transportation is of the greatest importance for the city's lifestyle, with a modern city's role reduced to convenience and reduced travel time. Most people take the bus because they want to avoid congestion and save more energy than driving on their own [9]. Real-time monitoring technology has now been upgraded and more advanced. It will provide the latest information by providing the actual time when something happen. When this application is used, a person or an organization can take action and be able to handle a problem efficiently.

However, this current monitoring provides notifications, alerts and information so that it can take the timely to address any issues.

2.2.1 Using GPS

A research states that national standard vehicle driving log recorders are currently unable to have real-time and effective monitoring of "speeding, fatigue driving, and overloading." Yunfa Corp said that the use of GPS can help in automatic monitoring system design, implementation, and outcomes with a comprehensive description of procedures and equipment used to monitor speeding, fatigue driving and overloading [1]. In order of installing GPS on city buses, GPS are used to detect the real-time location by using devices. Today's Android phones commonly used this purpose because the GPS already built in. Most of the tourists, travelers and also adventures are using GPS navigation systems on their mobile phones to locate their current location. Besides, it also helps customers find the closest establishments that they wish to visit such as restaurants, hotels, malls, banks and other places that they may interest to go. Modern vehicles also used this tracking systems to locate their vehicles and all the data information of the vehicles can be viewed via Internet [9].

The technical Requirements for Driving Log Recoder were declared and implemented by the State in 2003. In this [1]says that GPS is used to monitor the speed of the vehicle where there is when the car hits the speed of the limit the data will be recorded and the management will contact the driver by sending a message or calling.

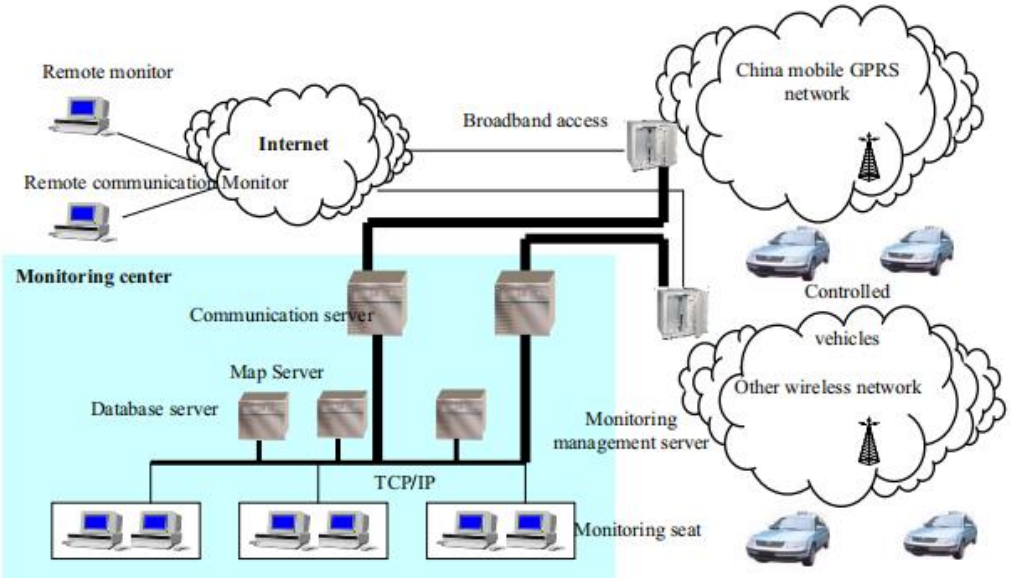

Figure 2.1: System Topology [1]

Figure 2.1 shows about the terminal of the GPS with the driving log recorder are contains of GPS module, GPRS module, LCD image display, AMR7 CPU, ferroelectric memory, RS232C communication port and also power supply.

Android phone technology can be used to track location where there is built-in GPS as a receiver inside the Android's system. GPS is used to track the bus's location which is based on the mathematical system. To receive the signal to show the location of the bus from the satellite are at least need three satellites. At regular intervals, the value of longitude of the bus's position to the server [2].

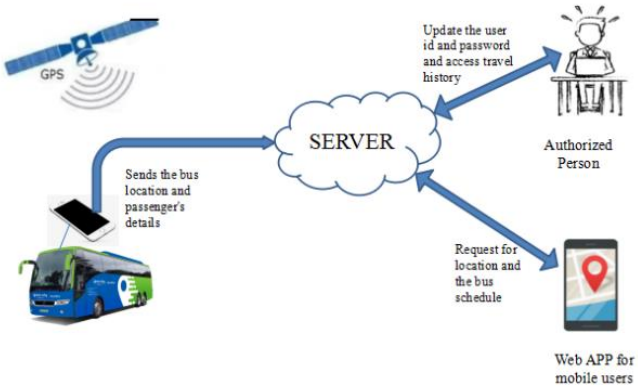

Figure 2.2: Architecture of proposed system [2]

The server is in the system in figure 2.2 are one of the important module and the function is as the central repository of the system. All the information is stored and keep in the MySQL database

Figure 2.3 : Passenger module [2]

Figure 2.3 shows the results of this previous study. The passenger can either download the app or go to the website to track the location of the bus. The link on the applications also can display the view of the map to track the location of bus on the Google Map. The function of GPS that built-in the phone can be a receiver or transmitter as well. This tracking system can be used to prevent the vehicle from theft [9].

2.2.2 Using Infrared system

Based on studies made, there are buses that have adopted sensor technology to carry out the counting method. One of the methods applied were to scan the ticket purchased. Some detect the limit from the weight applied by passengers on the vehicle. There are technologies that uses sensors to detect people from their entry through the door [10]. There is an Automated Passenger Counting system(APC) that isused to better the accuracy when tracking and reliability to count the number of passengers that board the transport.

The majority of people in 21th century are using transportation every day to go work, class, and other destination. There are a few problems such like overcrowding that faced by the public transport and irregular bus schedule in major cities in India. The percentage of the population of India continues to grow at a rate of 1.13%. According to research before, the United Nations State of the World Population says that 40.76% of the country's population would be living in urban areas by 2030 [11].

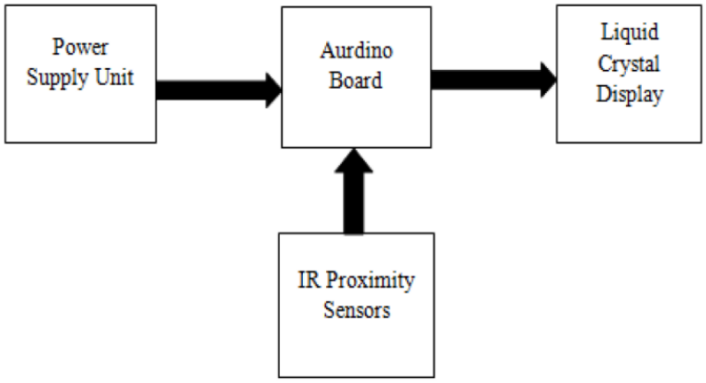

Figure 2.4: System Architecture [3]

Figure 2.4 shows the block diagram of the system. Arduino board uses as microcontroller. IR sensor are as input and use power supply. The LCD display will show the output of the project.

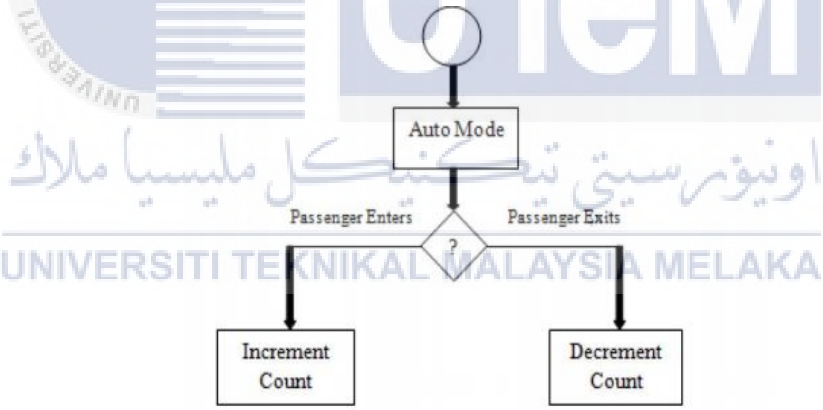

Figure 2.5: Process specification of passenger counting system [3].

Figure 2.5 explains about the process of the IR sensor hold in two condition. The first condition is an increment in the count happens for each person who enters and the second condition is decrement count is happen when each person exits.