KANTIPUR ENGINEERING COLLEGE

(Affiliated to Tribhuvan University)

Dhapakhel, Lalitpur

[Subject Code: EX755]

A MAJOR PROJECT PROJECT DEFENSE ON

SMART BUS

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Submitted to:

Department of Computer and Electronics Engineering

August, 2019

SMART BUS

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APPROVAL LETTER

The undersigned certify that they have read and recommended to the Institute of Engineering for acceptance, a project report entitled ”Smart Bus” submitted by

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Date: August , 2019

ABSTRACT

In this paper we present a bus system which is kept stationary at the bus-stand and system which is kept at bus that can effectively help the public to participate in bus transportation facilities to its fullest. A bus that is coming toward the bus stand is identified by this passenger infotainment system and the details of that particular bus is provided to the passenger on display at bus-stand. Bus location identified using GPS same will be announce in Bus This information send to next bus stand for passengers.The passengers can create their ID and buy credits to ride the bus which will be stored in their profile.The passengers will then can use the credits to reach to their destination according to their station.

ACKNOWLEDGMENT

First of all we like to express our sincere thanks to the Department of computer and Electronics & communication, Kantipur Engineering College, for providing us the environment to initiate minor project successfully.

We would like to record our appreciation to our Head of Department .Er.Rabindra Khati, for this valuable encouragement for initiating the project. His effort will create the environment and infrastructure to our project.

We would like to thank Er. Sujin Gwacha, our project head who gave us generously his time and thoughts for selecting our project & discussing the problems and issues that may be encountered during the process of working. we are very much indebted to his support and encouragement for the initial progressing of this project.

We then express our due thanks to Sir,Er.Anand Kumar Sah for supervising and overseeing our performance and operation towards project progress.Also we would like to express our sincere thanks to our seniors and our teachers for inspiration and generous help and idea in the project.

We would like to express our heartfelt gratitude to all the people who have directly and indirectly helped to initiate this project and we will expect for their support up to the completion of the project.

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CHAPTER 1
INTRODUCTION

1.1 Background

SmartBus was originally a policy initiative of the Kennett State Government in the late 1990s, but was slowly implemented under the Bracks and Brumby governments. However, plans from the late 1980s included a number of cross-town routes, which were to be called MetLink.

The first stage of the trial was implemented on 5 August 2002, with the following services being chosen as pilot routes: 703 Middle Brighton to Blackburn and 888/889 Nunawading to Chelsea. These two routes received extra funding for more services, services on 703 increased by 20Three orbital bus lines operate in Melbourne as part of the SmartBus network, they provide cross city links connecting railway and tram lines and other bus routes. The first orbital route started as route 700 running between Mordialloc and Box Hill, it opened on 14 June 2005. On 20 April 2009 it was extended to Altona, becoming the Red Orbital 903, it connects to 11 railway stations and nine tram lines, and is 86 kilometres in length. This was followed by the Yellow Orbital 901 on 24 March 2008 operating between Frankston and Ringwood. It was extended to Melbourne Airport 26 September 2010, it is Melbourne's longest bus route at 115 kilometres with a journey time of four and a half hours and connects with nine railway stations and over 100 bus routes. Lastly in April 2010 the Green Orbital 902 commenced operations, assuming the operations of route 888/889, it runs between Chelsea and Airport West connecting to nine railway stations, three tram routes and over 60 local lines, spanning 76 kilometres. A Blue Orbital (route 904), was proposed in the 2006 Meeting our Transport Challenges publication, which proposed to service the inner city from Sandringham to Williamstown, however this proposed route was cut from the 2008 Victorian Transport Plan, with the route not mentioned in text or maps.

Doncaster Area Rapid Transit (DART) Routes commenced operation on 4 October 2010. These routes were designed to provide a public transport connection between the

Doncaster area and Melbourne City Centre.All were originally operated by National Bus Company, but have been operated by Transdev Melbourne from August 2013 as a result of Transdev's awarding of the Melbourne Metropolitan Bus Franchise.

1.2 Objectives

The major objective of our project are as follows:

a. Easier for tracking bus.
b. To provide easy payment method.

1.3 Feasibility

The project is quite feasible for our context as per the economical, technical and operational aspects are concerned.

1.3.1 Technical Feasibility

As per the technical aspects of the project is concerned, the project contains the uses of the system software to control the work of the hardware. The main aspect of the project is handling the devices being used through programming.

1.3.2 Operational Feasibility

The main component used in our module is aurdino which is basically a high performance microcomputer. It is highly efficient and is readily available in the market.

1.3.3 Economic Feasibility

Most of the components used in the project are cheap and easily available which reduces the overall economy of the system. This part of the system makes the implementation very cheap and easy.

CHAPTER 2
LITERATURE REVIEW

Smart Bus technology was first introduced to ETS in January 2011 when City Council approved the initial with 3.4 million investment. During the first phase of the Smart Bus project, 45 buses were equipped with Smart Bus technology. When nine new buses were purchased in 2013, they came equipped with the technology. Since then, all new bus purchases have included Smart Bus features.

ETS began to retrofit the rest of the fleet in 2014 using funding from the Council-approved Smart Fare project, starting with 250 buses. By December of that same year, Council approved additional funding to equip another 500 ETS buses with the technology.

The final phase included Council approving the remaining funding in December 2015 that was needed to complete Smart Bus installation on the remaining 125 buses in the fleet.

SmartBus is a network of bus services in the city of Melbourne, Australia. Overseen by Public Transport Victoria, the network comprises nine key cross-town and orbital bus routes around Melbourne. Key aspects of the service include more frequent services, extended hours of operation to include late evening and Sunday services, improved timetable information at bus stops, roadspace priority along certain routes and priority at particular traffic lights.The SmartBus network was expected to reach 370 kilometres by 2012.

SmartBus was originally a policy initiative of the Kennett State Government in the late 1990s, but was slowly implemented under the Bracks and Brumby governments. However, plans from the late 1980s included a number of cross-town routes, which were to be called MetLink.

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Nunawading to Chelsea. These two routes received extra funding for more services, services on 703 increased by 20

Three orbital bus lines operate in Melbourne as part of the SmartBus network, they provide cross city links connecting railway and tram lines and other bus routes.

The first orbital route started as a large number of routes (including Route 665 from Dandenong to Ringwood and Route 830 from Dandenong to Frankston). It was relaunched as the Yellow Orbital Route 901 on 24 March 2008 operating between Frankston and Ringwood. It was extended to Melbourne Airport 26 September 2010, it is Melbourne's second longest bus route(2nd to 684-Melb to Eildon) at 115 kilometres with a journey time of four and a half hours and connects with nine railway stations and over 100 bus routes.

This was followed by Route 700 running between Mordialloc and Box Hill, it was relaunched as a SmartBus on 14 June 2005. On 20 April 2009 it was extended to Altona, becoming the Red Orbital 903, it connects to 11 railway stations and nine tram lines, and is 86 kilometres in length.

Lastly in April 2010 the Green Orbital 902 commenced operations, assuming the operations of route 888/889, it runs between Chelsea and Airport West connecting to nine railway stations, three tram routes and over 60 local lines, spanning 76 kilometres. A Blue Orbital (route 904), was proposed in the 2006 Meeting our Transport Challenges publication, which proposed to service the inner city from Sandringham to Williamstown, however this proposed route was cut from the 2008 Victorian Transport Plan, with the route not mentioned in text or maps.

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Several reviews have been conducted of patronage growth on SmartBus routes. A review of routes 703, 903 (formerly route 700) and 902 (formerly 888/889) found that boardings increased between 15

In 2010 the Bus Association of Victoria found that SmartBus patronage on routes 703 and 902 (formerly 888/889) increased 15 percent over two years.

CHAPTER 3
SYSTEM REQUIREMENT

3.1 Hardware Requirement

3.1.1 NodeMCU

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term ”NodeMCU” by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS. NodeMCU was created shortly after the ESP8266 came out. On December 30, 2013, Espressif Systems began production of the ESP8266. The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core,[citation needed] widely used in IoT applications (see related projects). NodeMCU started on 13 Oct 2014, when Hong committed the first file of nodemcu-firmware to GitHub.

Figure 3.1: NodeMCU

3.1.2 DC Motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

Figure 3.2: DC Motor

3.1.3 Motor Driver

Motor Driver circuits are current amplifiers. They act as a bridge between the controller and the motor in a motor drive. Motor drivers are made from discrete components which are integrated inside an IC. The input to the motor driver IC or motor driver circuit is a low current signal. The function of the circuit is to convert the low current signal to a high current signal. This high current signal is then given to the motor. The motor can be a brushless DC motor, brushed DC motor, stepper motor, other DC motors etc.

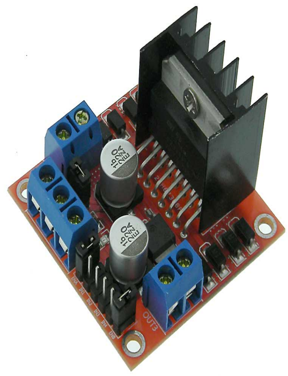

Figure 3.3: Motor Driver

3.1.4 Voltage Regulator

A voltage regulator is a system designed to automatically maintain a constant voltage level. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements. In automobile alternators and central power station generator plants, voltage regulators control the output of the plant. In an electric power distribution system, voltage regulators may be installed at a substation or along distribution lines so that all customers receive steady voltage independent of how much power is drawn from the line.

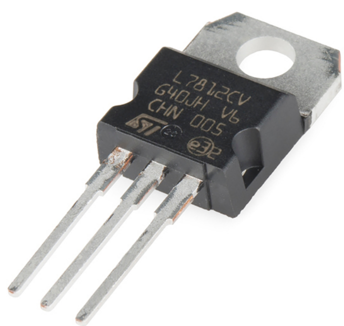

Figure 3.4: Voltage Regulator

3.1.5 Local Server (PC)

A local server is a server that is running in a local or a mounted folder and whose document root is NOT the parent of the project root.To configure access to the server in this set-up, you need to specify the following: The server configuration root folder and the URL address to access it. PC is short for personal computer or IBM PC. The first personal computer produced by IBM was called the PC, and increasingly the term PC came to mean IBM or IBM-compatible personal computers, to the exclusion of other types of personal computers, such as Macintoshes.

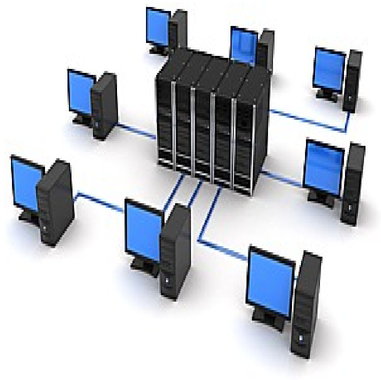

Figure 3.5: Local Server

3.2 Software Requirement

3.2.1 Proteus

The Proteus Design Suite is an Electronic Design Automation () tool including schematic capture, simulation and PCB Layout modules. It is CAD Design software used for Schematic Capture, Microcontroller Simulation and PCB Design. Before hardware implementation, the whole circuit is simulated in this Cad designing software and based on the result the product is made.

3.2.2 Sublime Text

Sublime Text is a proprietary cross-platform source code editor with a Python application programming interface (API). It natively supports many programming languages and markup languages, and functions can be added by users with plugins, typically community-built and maintained under free-software licenses. Python language was used to develop.

3.2.3 Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software () - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

CHAPTER 4
METHODOLOGY

The system block diagrams are described below:

4.1 Hardware Block Diagram

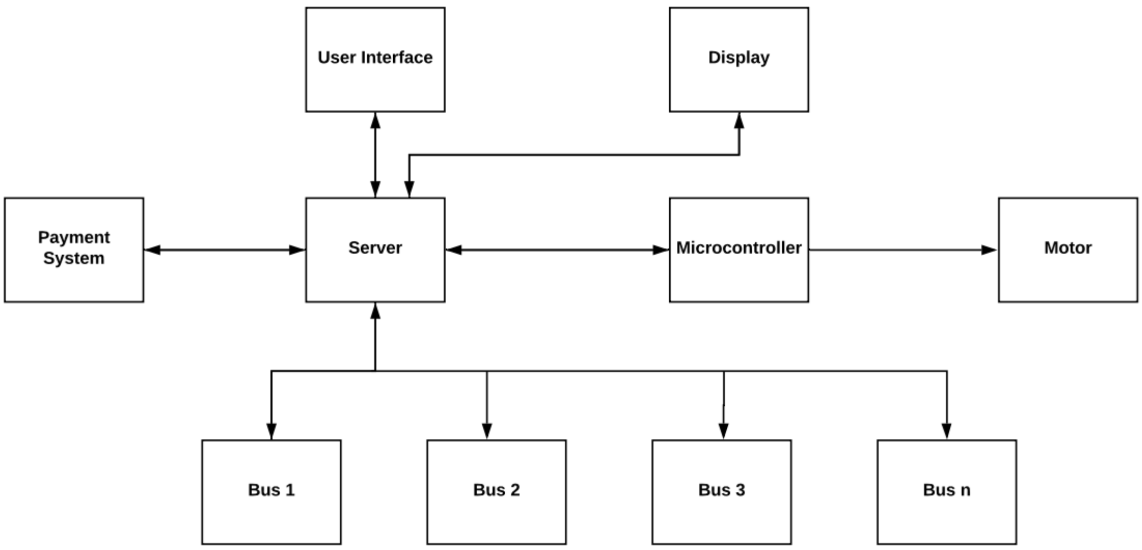

Figure 4.1: Hardware Block Diagram for Smart bus

A local server is placed which is connected to all the devices present in the system.The user can create his/her id which stores the required credit needed for the user which they can buy .There are bluetooth module in the station which the users can use to connect and find the location ,timing of the bus. The bus timings are are also displayed on the display in the station. The user can use their mobile phones for the payment system which is stored in the server and deducts the credit that has been used. The server is connected to the buses all over its area which sends its location to the server which updates that to the users. When the bus arrives the users phones is connected to the bus bluetooth which then can be used for the payment and to open the bus door if they have sufficient balance.

4.2 Flowchart

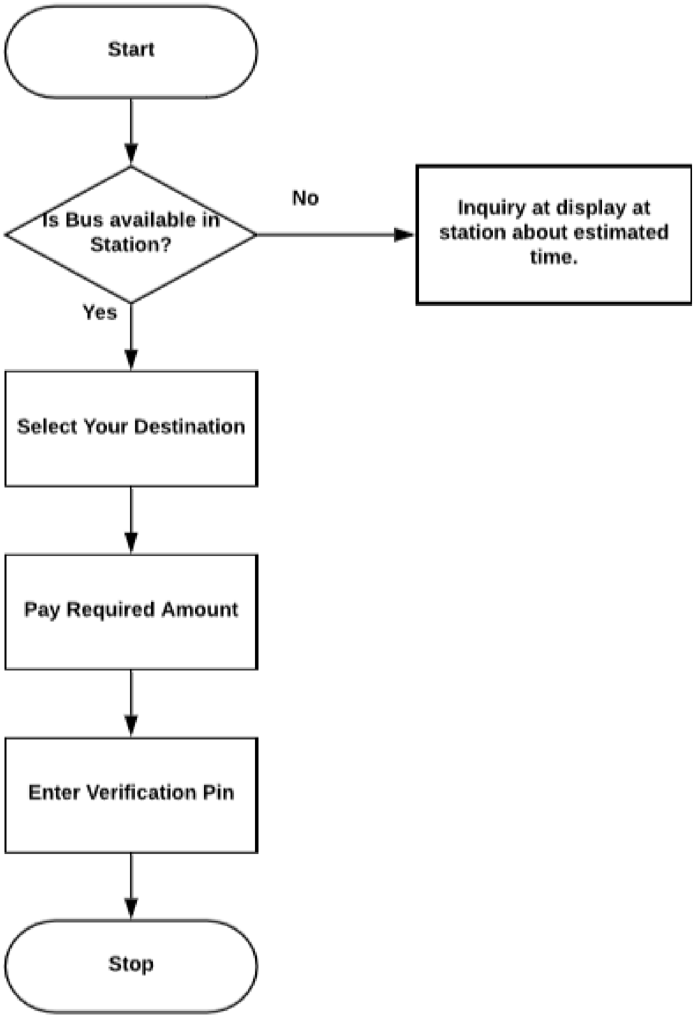

Figure 4.2: Flowchart for Smart bus

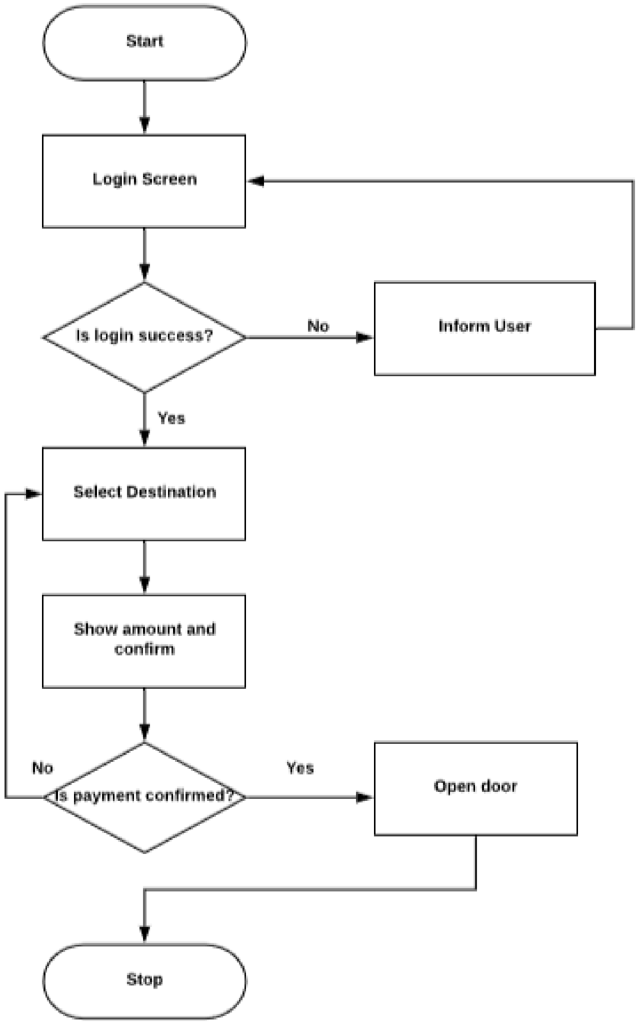

Figure 4.3: software flowchart

CHAPTER 5
EPILOGUE

5.1 Problem Encountered

During the period of our project we have faced many problems.It was a challenging task to encounter those problems.Eventually,we were able to solve all the challenges and completed our project successfully.The encountered problems are listed below:

a. Interfacing hardware and software.
b. Failure of the components
c. Updating data to database.

5.2 Limitations

There is always certain limitations in every projects.Likewise,our project has also following short listed limitations:

a. Budget Limitation
b. Technical persons limitation
c. Components limitation

5.3 Future Enhancements

There are many possible enhancements that can be implemented on the Smart bus System. Among others they are listed below:

a. Mobile application can be built.
b. Adding cameras can be very much enhancement for surveillance.
c. Use of GPS which can give the location of the bus.

5.4 Applications

a. It can be used in developing countries.

b. It can be used for proper management of bus traveling .

c. It can be used for proper payment purpose.

5.5 Cost Estimation

S.N	Hardware	Quantity	Price(Rs)
1	Node MCU	1	1000
2	DC Motor	1	500
3	PCB	1	200
4	Motor Driver	1	1500
5	Voltage Regulator	1	1000
6	Resistors,Capacitors,Inductors,Miscellaneous	-	1000
	Total		5200

Table 5.1: Cost Estimation

5.6 Gantt Chart

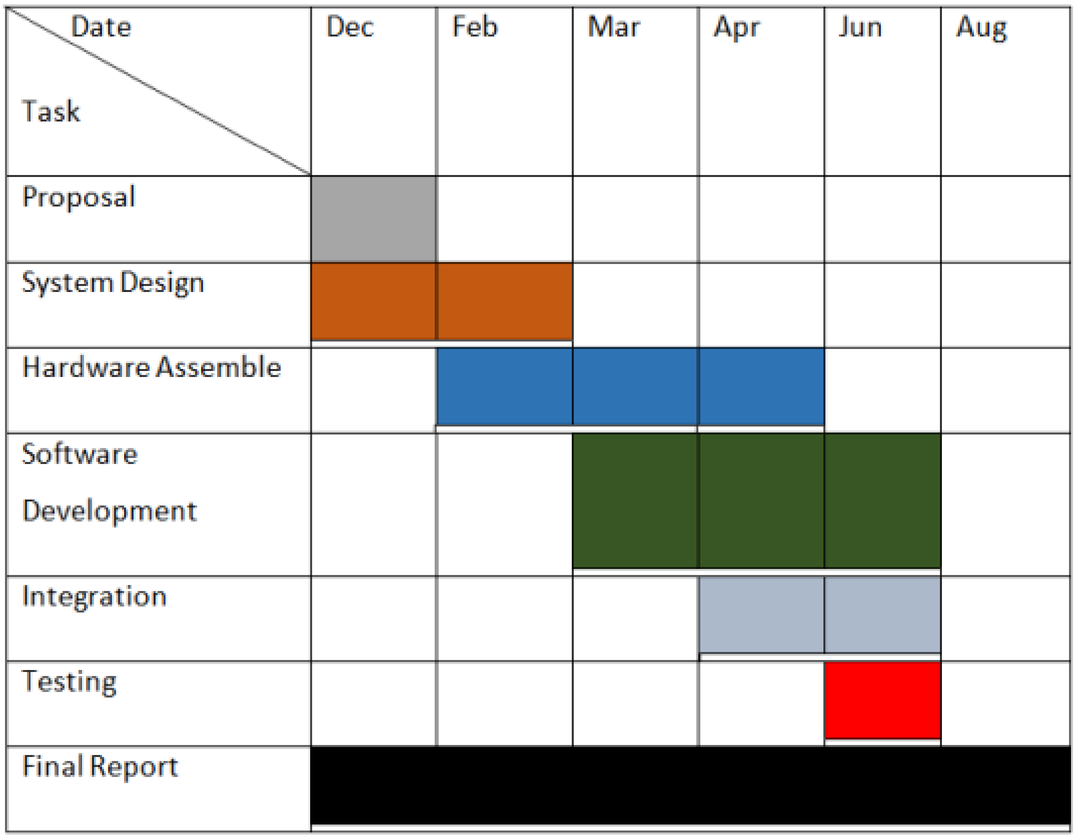

Figure 5.1: Gantt Chart

5.7 Conclusion

Hence, using our idea and support of everyone we were able to complete our project within the specified period of time. By implementing this project passengers will be highly benefited and they can travel in a more systematic way. Passengers don't have to dwell on the timing of the bus and can efficiently manage their time according to the bus arrival and departure. Passengers dont always have to carry cash to pay for the bus and can easily pay by using e-payment system.

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APPENDIX

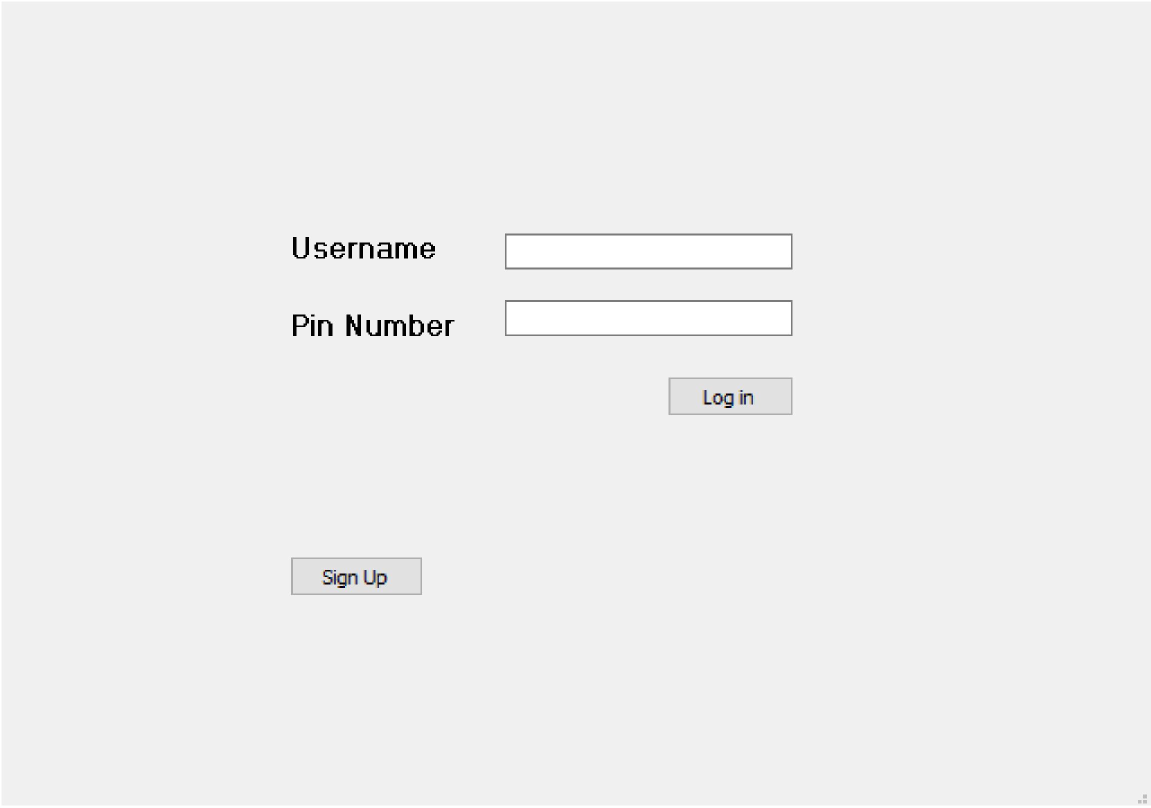

Figure 5.2: login

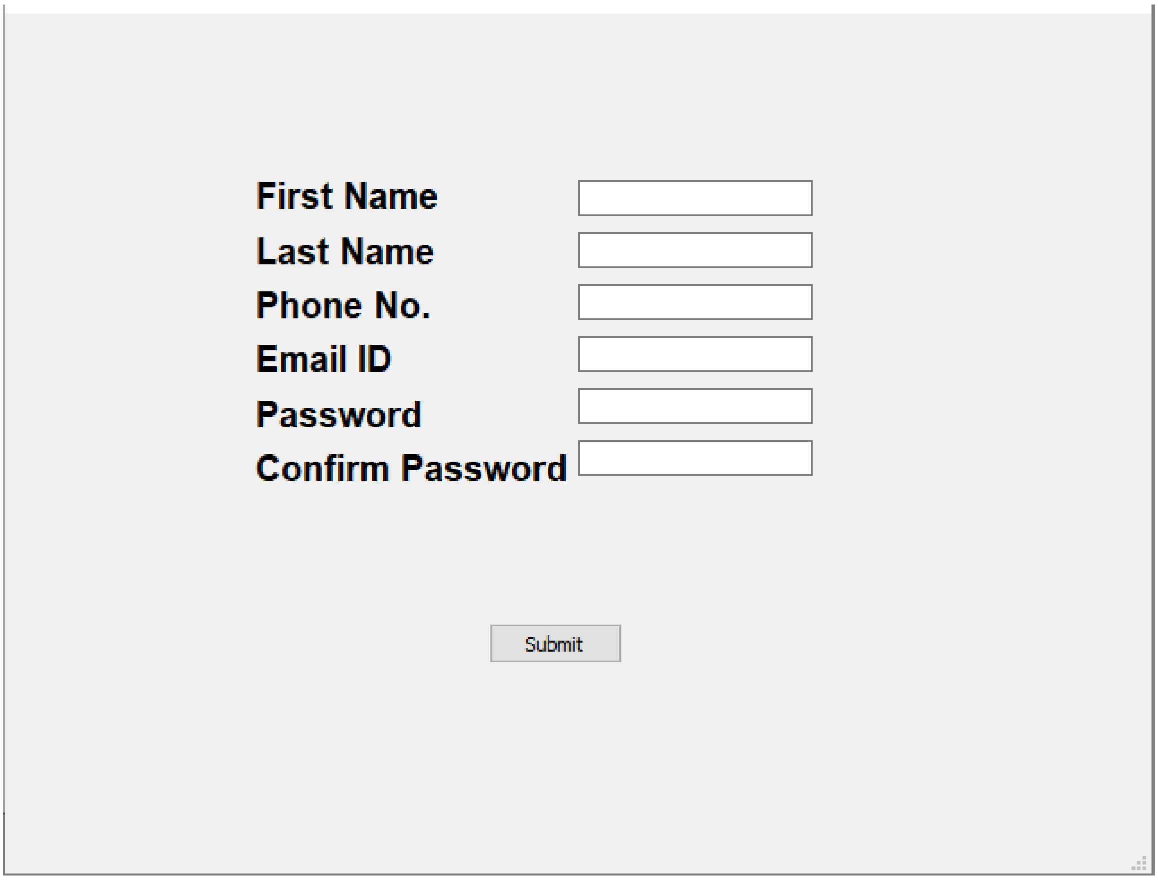

Figure 5.3: Sign up

Figure 5.4: Destination