B.V. Bhoomaraddi College of Engineering and Technology, Hubli

Department of Electronics and Communication

User Centric Bus Management

A Major Project by

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Certificate

This is to certify that **"User Centric Bus Management"** is the bonafide work of the team members, **Akhil A Naik** (2BV12EC007), **Darshan S Patil** (2BV10EC017), **Kamranahmed M Badebade** (2BV12EC037),**Karthik D Prabhu** (2BV12EC038), **Vivekanand O Kulkarni** (2BV12EC124) of 7th semester BE, Department of Electronics and Communication. The above team members have completed the project as per norms of B.V. Bhoomaraddi College of Engineering and Technology and the Vishweshwaraiah Technological University.

Guide	**HOD**
Prof. Kiran M R	**Dr. Uma Mudenagudi**

Examiners

1. .....

2. .....

ACKNOWLEDGEMENT

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Abstract

The primary challenge for an urban bus system is to maintain constant headways between successive buses. Most bus systems try to achieve this by adherence to a schedule; but this is undermined by the tendency of headways to collapse, so that buses travel in bunches. Making use of the GPS, the unit which are freshly incorporated in the bus transport system, we can find the real time position of the bus. By making use of simple timer system (basically a micro-controller) which is loaded with time interval (pre-calculated for various traffic conditions) for traveling from one stop to adjacent. This time interval is displayed to the driver using display board which suggests him, about timing he has to maintain so that he efficiently maintains regularity and bus bunching problem is solved. Using Internet of things(IOT) the transportation system can be made more effective and reliable.

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Chapter 1

Introduction

1.1 Objective of the project

The objective of the project is to find the real time location of buses and taking the distance between the buses as constant parameter, we are calculating the timings which are to be maintained in order to avoid bunching of buses. These timings will be displayed on to the driver so as to notify him and this timing is calculated based on other bus locations and traffic conditions.

1.2 General Description

The project makes use of GPS and GSM module along with the support of a dedicated server which runs the algorithm, written to monitor actual locations of the buses and maintain the scheduling in order to avoid bus bunching.

Chapter 2

Literature Survey

2.1 Existing Methodology

The existing methodology to solve the concerned problem basically consists of following the schedule maintained by the bus transit system.

2.2 Proposed Methodology

To solve bus bunching, we are making use of GPS units to find the location of the bus, after learning the location of the bus we send that information to the server which will have record of real time location of all the buses, server is designed with algorithm which calculates the timings which driver needs to follow while traveling to the successive stop. Timings are calculated keeping the location of the preceding and successive buses, also making sure the timings are comfortable with traffic conditions. By doing this we efficiently reduce the over crowded buses and buses traveling in bunches.

2.3 Problem Statement

The primary challenge for an urban bus system is to maintain constant headways between successive buses. Most bus systems try to achieve this by adherence to a schedule; but this is undermined by the tendency of headways to collapse, so that buses travel in bunches. Bus bunching is a serious problem, often observed in public transport system where buses are unscheduled and travel in bunched manner causing losses to transport management and discomfort to travelers.

Chapter 3

Methodology

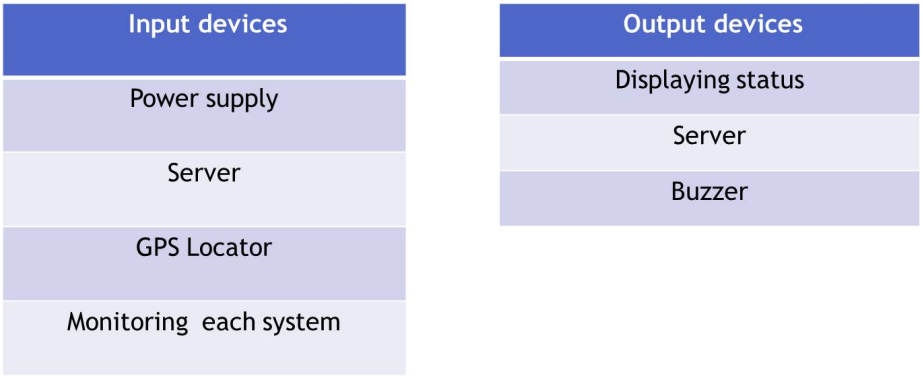

Figure 3.1: Inputs and Outputs to the project

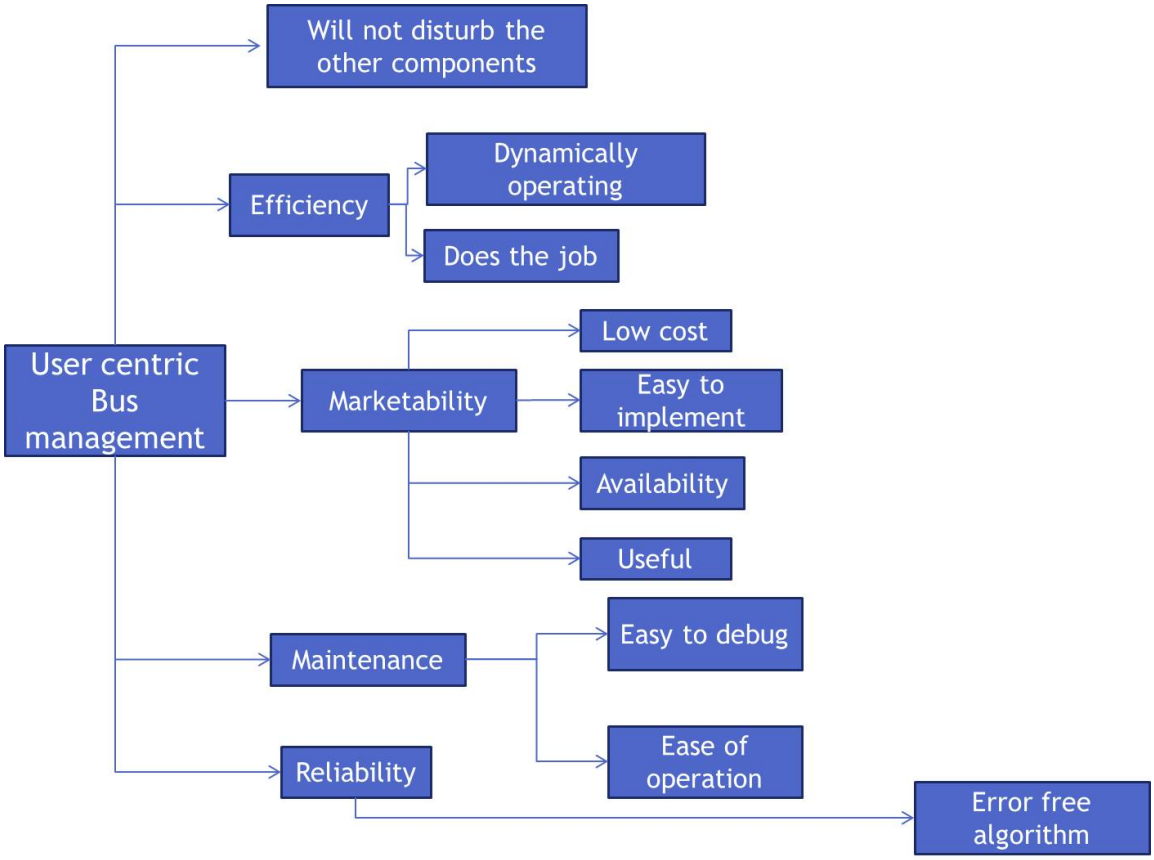

Figure 3.2: Objective Tree

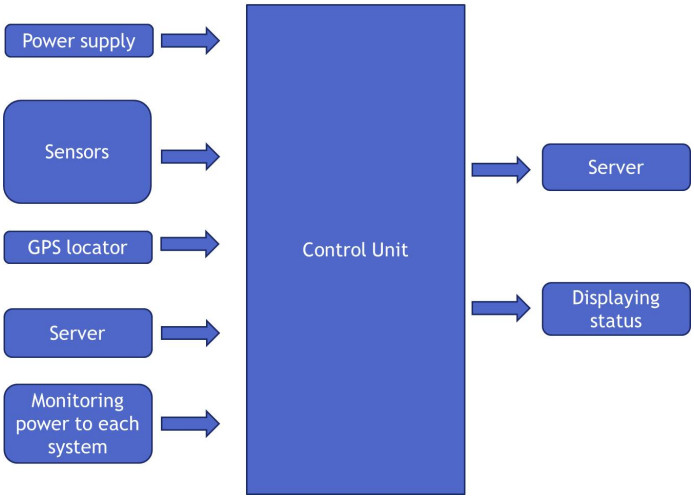

Figure 3.3: Black box

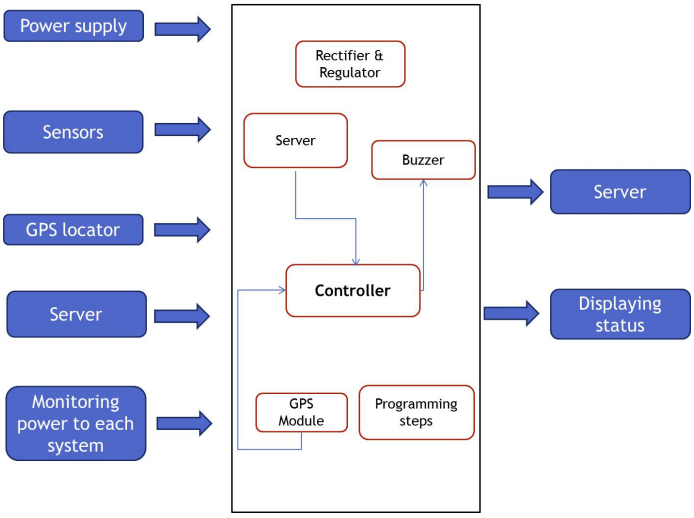

Figure 3.4: Transparent box

Chapter 4

Proposed Methodology

4.1 Specifications

4.1.1 LCD

The name indicates that display size is 16x2 characters, which is frequently used. It has 4-bit and 8- bit operation modes, 8-bit mode being easy to use, also oers various functions with its 16 pin conguration like power, contrast, control lines, data lines and backlight. There are 255 ASCII values and the LCD accepts any character as input in the form of hexadecimal code through its 8 data pins (DB0-DB7) and displays the desired string (e.g.: zon A or zone B), character by character by incrementing the address at the 1x1 position of LCD.

4.1.2 Arduino

The controlling of the system is done using the Arduino board. The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the micro-

controller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

4.1.3 GPRS Shield

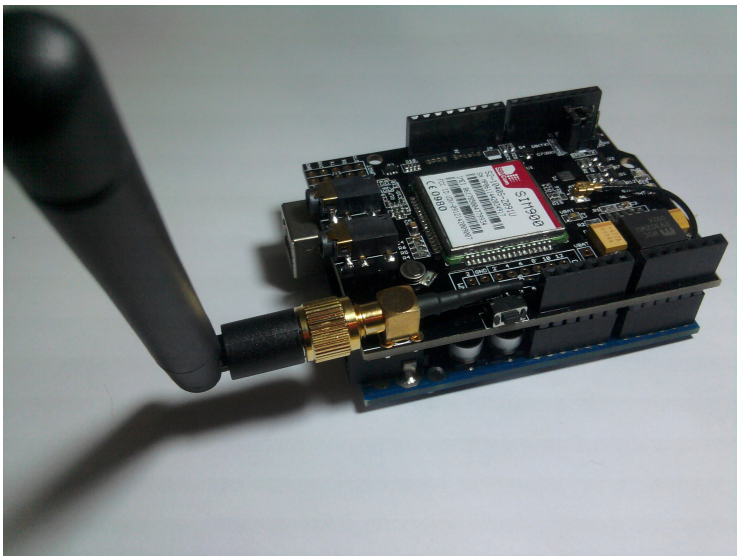

Figure 4.1: GPRS Shield mounted on Arduino

The GPRS Shield provides you a way to use the GSM cell phone network to receive data from a remote location. The shield allows you to achieve this via any of the three methods:

- Short Message Service.
- Audio.
- GPRS Service.

The GPRS Shield is compatible with all boards which have the same form factor (and pinout) as a standard Arduino Board. The GPRS Shield is configured and controlled via its UART using simple AT commands. Based on the SIM900 module from SIMCOM, the GPRS Shield is like a cell phone.

Besides the communications features, the GPRS Shield has 12 GPIOs, 2 PWMs and an ADC.

Features

- Based on SIMCom's SIM900 Module.
- Quad-Band 850 / 900/ 1800 / 1900 MHz - would work on GSM networks in all countries across the world.
- Control via AT commands - Standard Commands: GSM 07.07 and 07.05 — Enhanced Commands: SIMCOM AT Commands.
- Embedded TCP/UDP stack - allows you to upload data to a web server.
- SIM Card holder and GSM Antenna - present onboard.
- Low power consumption - 1.5mA(sleep mode)
- 12 GPIOs, 2 PWMs and an ADC (all 2.8 volt logic) - to augment your Arduino.

4.2 Block Diagrams

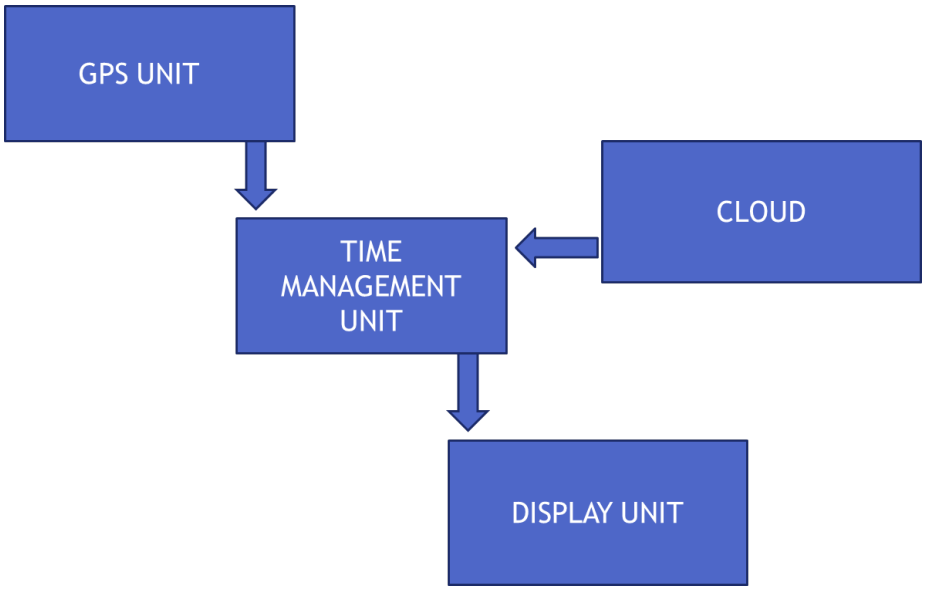

Figure 4.2: For Bus

4.3 Working

Making use of the GPS unit which are freshly incorporated in the bus transport system, we can find the real time position of the bus. GPS stands for Global Postioning System. GPS module is used to get the location interms of latitude and longitude. However GPS also gives a lot of information like date,time(in UTC), no of satellites which are coded in NMEA(National Marine Electronics Association)string. GPS module can communicate with the host system(or the microcontroller) in binary or via NMEA01823 protocol. All current GPS modules are based on NMEA protocol.

To send the GPS data(i.e latitude and longitude) to server GSM/GPRS module is used. The GSM/GPRS module connects microcontroller to the internet using the GPRS wireless network. Just connect the module to the microcontroller, plug in a SIM card from an operator offering GPRS coverage and this helps us to monitor bus position through a dedicated server. By making use of simple timer system (basically a microcontroller) which is loaded with time interval (decided by the algorithm in the server) for travelling from one stop to adjacent. This time interval is displayed to the driver using display board which suggests him, about timing he has to maintain so that he efficiently maintains regularity and bus bunching problem is solved.

What does server do?

- There are a number of different types of servers, including Web servers, mail servers, and file servers. A web server serves Web pages to computers that connect to it. It also can parse scripting languages such as PHP, ASP, and JSP.
- We are going to develop a web server to monitor the bus location and look for bus bunching occurrence, store the information about the buses in database and provides the calculated timing information to the micro-controller which loads it and displays on the timer LCD board.
- We are using WAMP tool to create a Apache web server.
- WAMP is abbreviation for Windows, Apache, MySQL, and PHP, These abbreviations describe a fully functioning setup used for developing dynamic Internet web pages.
- The real beauty of PHP, MySQL, JavaScript, CSS, and HTML5 is the wonderful way in which they all work together to produce dynamic web content: PHP handles all the main work on the web server, MySQL manages all the data, and the combination of CSS and JavaScript looks after web page presentation. JavaScript can also interact with PHP code on the web server whenever it needs to update something.
- The combination of PHP and MySQL is the most convenient approach to dynamic, database-driven web design, holding its own in the face of challenges from integrated frameworks. Due to its open source roots, it is free to implement and is therefore an extremely popular option for web development.

4.4 Simulation

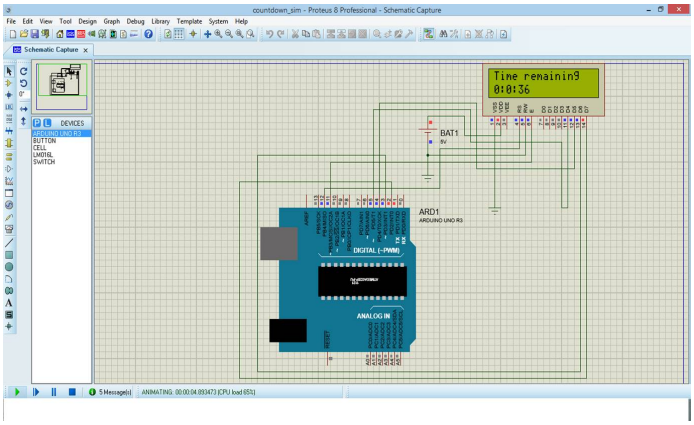

Figure 4.3: Simulation

The above picture shows the simulation carried out in simulation tool Proteus 8 Professional. It shows the time that is alloted to reach the next bus stop. This time will be displayed on the screen mounted in the bus in order to notify the bus driver.

Chapter 5

Results

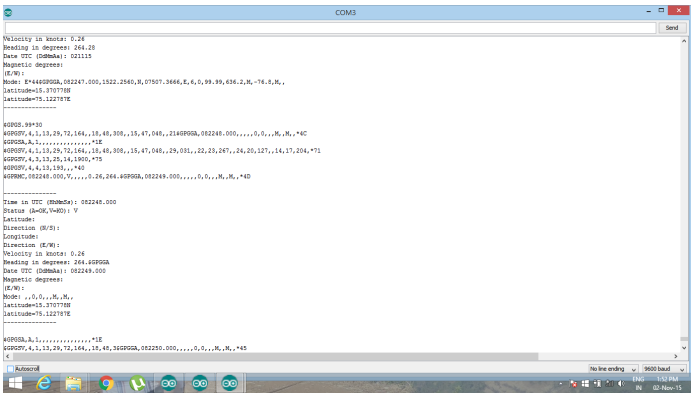

Figure 5.1: Showing co-ordinates of a location

The above picture shows the co ordinates of Novel store in LCH Building.

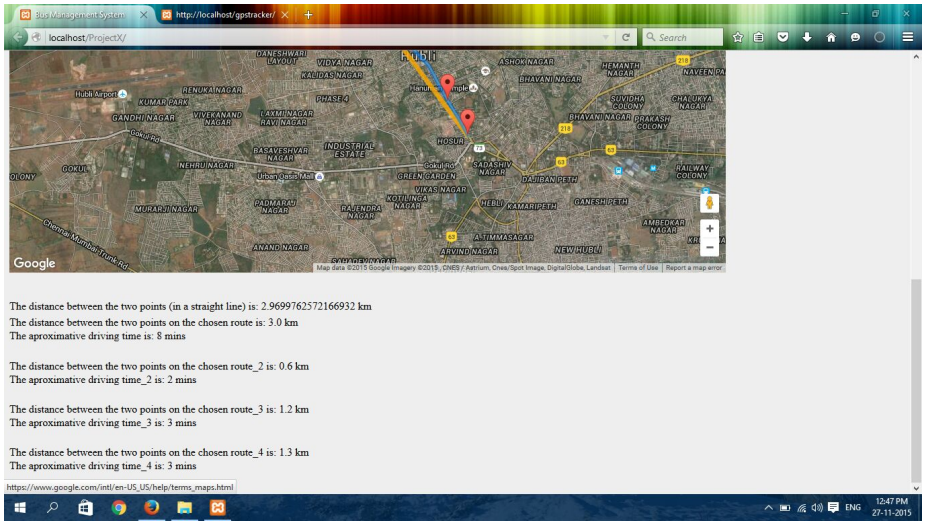

Figure 5.2: Mapping the distance

The figure shows the distance between the 2 bus stops.

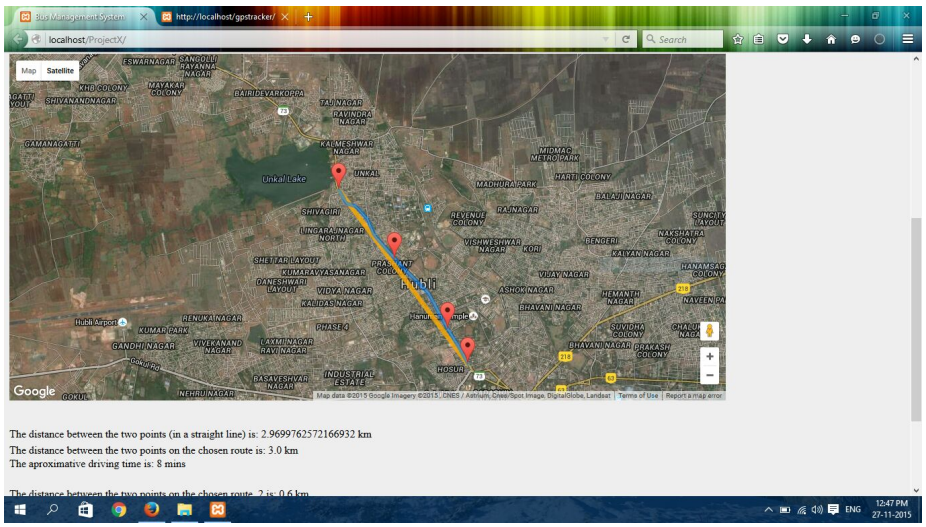

Figure 5.3: Locations Mapped

The figure shows the location of the bus stops between the source and destination.

Chapter 6

Conclusion

Using Internet of things(IOT) the transportation system can be made more effective and reliable. Making use of a dedicated server which runs the algorithm and thus making the technology more efficient and reliable without any glitches. With bus bunching solved the number buses for efficient transportation can be reduced in turn reducing the heavy traffic. Hence traffic decongestion is observed.

Bibliography

[1] Shekhar Shinde. *"Design of E-City Bus Tracking System."* Int. Journal of Engineering Research and Applications

[2] Dr. Saylee Gharge, Manal Chhaya, Gaurav Chheda , Jitesh Deshpande , Niket Gajra.*"Real Time Bus Monitoring System Using GPS."* IRACST Engineering Science and Technology: An International Journal.

[3] Jason C. Dudley. *"Building a Real Time Bus Tracking Data Display System."* University of North Carolina Wilmington

[4] D. J. Dailey, S. D. Maclean, F. W. Cathey, S. R. Wall.*"Transit Vehicle Arrival Prediction: An Algorithm and a Large Scale Implementation."* Transportation Research Board, 80th Annual Meeting, January 2001, Washington, D. C.

[5] Brendan Kidwell. *"Predicting Transit Vehicle Arrival Times."* GeoGraphics Laboratory, Bridgewater State College, Bridgewater, MA, USA.

[6] http://w3school.org/

[7] http://cookinghacks.com/geolocationtracer

[8] http://www.dhlcourierservices.co.uk/blue-dart-tracking.html