SMART BUS AND BUS STOPS FOR SMART INDIAN CITIES

S.Muthukumar[1], W.Sherine Mary[2], Rajkumar.R[3], Moorthy.N[4], Harishni.J[5]
Department of Electronics and Communication Engineering
Adithya Institute of Technology, Coimbatore, India

Abstract

Time is a very essential factor in all our lives. Many a times this resource is wasted while waiting to access the public transport system, as we move from one place to another. The common man whose only means of transport is the public transport system will be the most affected. Every day a man who accesses the public transport system on an average wastes about half an hour of his time by just waiting for buses or other means of transport. Our work has considered this problem and provides a solution by retrofitting the public transport system. In our work we have developed a hardware module which can be fitted inside the bus and this module provides location information of the bus. The location information is sent to a remote server and the is integrated to a mobile app which will let the user of the mobile application know the current location of the public transport system and also provides an approximate estimate of the time the bus is expected to arrive at a particular bus station. Additionally the hardware module inside the bus will also provide functionality like voice alerts and display alerts about the next approaching bus station to passengers inside the bus. These alerts can be very useful to audio and visually challenged people who access public transport systems. Additionally this system can be very useful to people who are new to the place like tourists, who need not rely on anyone and can navigate from place to place independently. The bonus advantage of the proposed system is that it makes public transport usable thereby leading to more people using public transport rather that private vehicles. This can create a positive impact on the air pollution status of our country.

Keywords: navigation; hardware; mobile application; public transport; retrofitting;

I. INTRODUCTION

Public transport systems are the main mode of transport used by millions of people on a daily basis in our country India. Our work has considered the woes of accessing public transport system and has developed a solution to make travel hassle free for the common man.

The solution constitutes of a GPS and GSM based hardware module which is fitted inside the public transport system. This is an independent module which can be integrated into all existing buses. The GPS module of the system inputs latitude and longitude information and this was used to determine the current location of the public transport system.

The current location was then relayed to a centralized server using GSM. This information at the centralized server was used to develop a mobile application which provides the exact location of the bus and its estimated arrival to a particular bus station. This work also provide benefits to audio and visually challenged people .This was implemented by including a speaker and a display system which will announce and display the next bus station depending on the current location. Thus this developed system will help audio and visually challenged people to access public transport systems independently, as they are aware of location through the voice alert and display systems.

Thus our work not only saves the valuable time of common man but also provides independence to audio and visually challenged people while accessing public transport systems. The work has also included a feature where location information of the bus can also be seen at bus stations by building smart bus stations with display and public announcement systems.

Thereby any person can get bus information independently even though they do not have access to a smart phone. The model of application and bus stop is shown in Fig.1.The system not only saves time but also make the public transport system more desirable as people are aware of where a particular bus is. This can lead to a transition from private vehicles to public transport systems. This can have a huge impact in traffic congestion and air pollution. Such a system is the need of the day as statistics show that India occupies eighth place among the top 20 polluted countries in the world [1].

II. PROPOSED SYSTEM

A. Block diagram

The block diagram of the proposed the system is considered.Fig.2 shows the bus-section and Fig.3 shows the bus station section of the proposed system. The proposed system acquires inputs from the GPS and provides this to the control section which is already programmed with a huge database directory.

The latitude longitude information is then compared with the already programmed information inside the directory and current location is identified. This information is then transmitted to the remote server. The developed mobile application uses this data to provide location indication to users. This information is also transmitted to smart bus stations which display the time of arrival of the bus.

This is an easily implementable model because most of our bus stations are already equipped with displays which can be seen in Fig.1. The location information is also disseminated within the bus through the display and public announcement systems which is interfaced with the control unit inside the bus.

These alerts make sure that people accessing public transport are aware of the next bus station where the bus stops.

The use case of the proposed system is shown in Fig.4. The flow chart is shown in Fig.5 and Fig.6.Though a number of existing systems are available[2] none of them have combined everything to provide details through a smart phone.
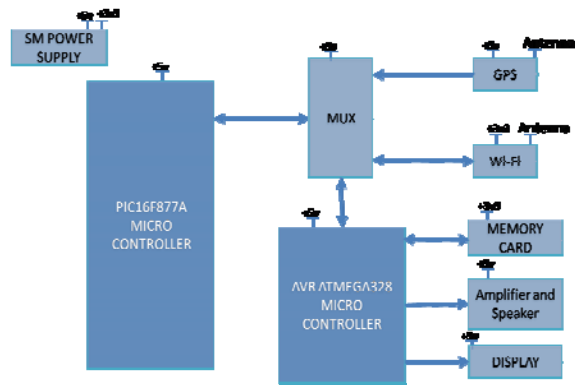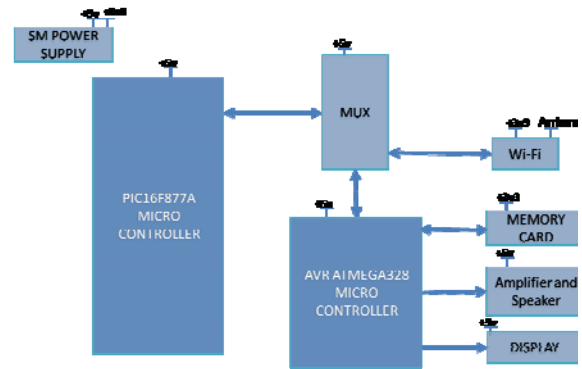

Fig.2.Block Diagram of Proposed system-Bus section

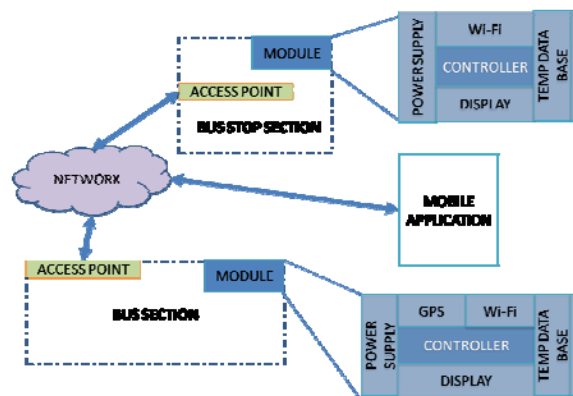

Fig.3.Block Diagram of Proposed system-Bus station

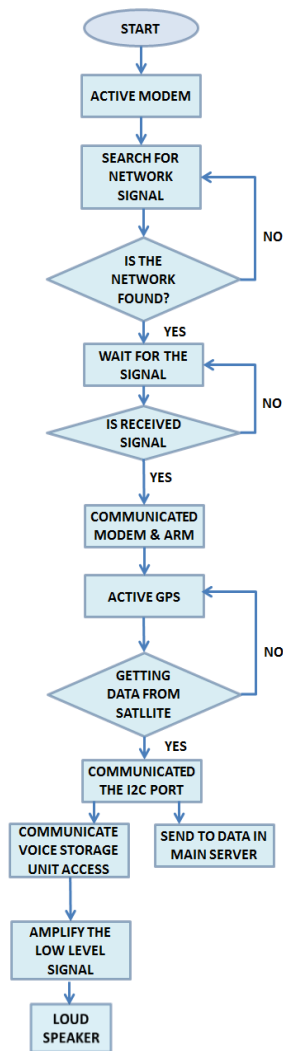Fig.4.Use case diagram of proposed system
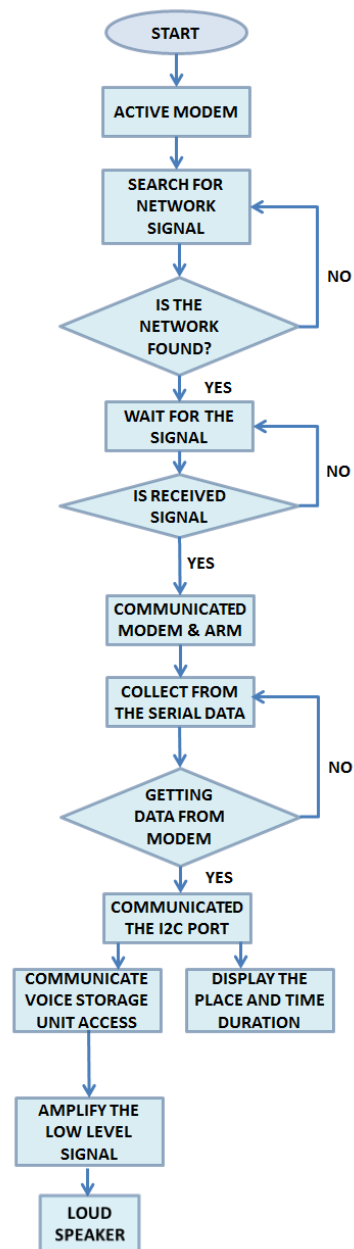
Fig.5.Flow chart –Bus Section

Fig.6.Flow chart –Bus Station Section

B. Experimental Setup

The proposed system was prototyped using PIC16F877A and ATmega8.

The proposed system acquired inputs from the GPS receiver and this was provided as input to the control unit (PIC16F877A) which contained a directory of latitudes and longitudes vs names of places. The inputs were compared with the database directory and the location status is sent to the remote server using GSM or Wifi and also to the display and alert system inside the bus. The data from the remote server was used for the mobile application. The remote server

also transmitted the data to the bus station where the status of buses could be displayed. The experimental setup of the proposed system is shown in Fig.7.
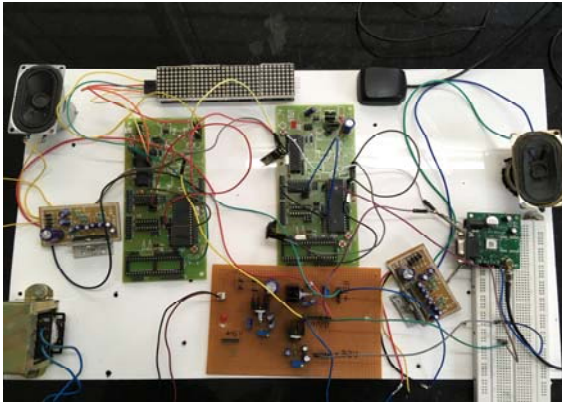

Fig.7.Experimental setup of proposed system

III. RESULS AND DISCUSION

A. Testcase
The designed system was tested for the following test cases
TestCase1: Bus and bus station display
TestCase2: Signal transmission using Wifi.
TestCase3: Bus and bus station voice alert
TestCase4: Mobile application Testing

Test case2 of proposed system in shown in Fig.8. Test case4 of proposed system in shown in Fig.9.
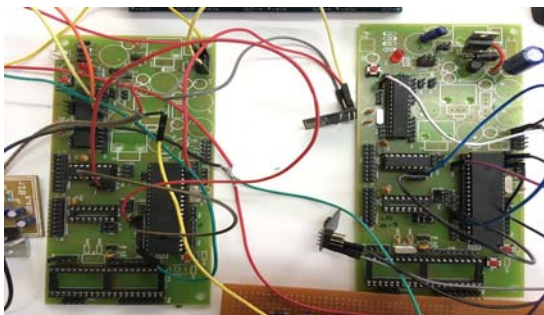
.

Fig.8. Test case-1

Fig.9. Test case-2

IV. CONCLUSION

The proposed system was developed and tested .The developed system is the need of the day which will help people save time and navigate independently because of the next bus stop announcement feature in the system. Such a system is also very beneficial for people with disabilities. The major highlight of this system is that the user can know the location of bus with just a swipe of his finger which means that this system will put the public transport system in a favorable spot for people. This system can thus motivate many more people to use public transport system and thereby reduces traffic congestion. The major feature provided if this system can be implemented in place is reduction in number of private vehicles and therefore air pollution. With India taking the eighth spot for air pollution such a system if implemented can create a huge positive impact on the pollution scenario.

V. FUTURE WORK

The proposed system can be further improved by integrating an exhaustive database for efficiency.

REFERENCES

[1] Oliver Smith, ' Mapped: The world's most polluted countries ', Jan 02, 2017. [Online]. Available:https://www.telegraph.co.uk/travel/maps-and-graphics/most-polluted countries/ [Accessed: 05- Feb- 2018].
[2] Rose Mary John,Finky Francis ,Joe Neelankavil,Alwyn Antony,Ancy Devassy ,K. J. Jinesh, "Smart Public Transport System" International Conference on Embedded Systems - (ICES 2014),pp.166-170.

[3] Umar Farooq,ul Haq, T. , Amar, M., Asad, M.U. "GPS-GSM integration for Enhancing Public Transportation Management Services
Second International Conference on Computer Engineering and Applications, pp. 142 - 147, 19-21 March 2010.

[4] James C. Reynolds, Robert P. Denero, and Rudolph M. kalafus, "GPS-based vesel position monitoring and display system. Aerospace and Electronic Systems Magazine, IEEE, Jul 1990.

[5] Ioan Lita, Ion Bogdan Cioc and Daniel Alexandru Visan, "A New Approach of Automobile Localization System Using GPS and GSM/GPRS Transmission," Proc. ISSE '06, pp. 115-119, 2006.

[6] J.E.Marca, C.R. Rindt, M.Mcnally, and S. T. Doherty, "A GPS enhanced in-Automobile extensible data collection unit,"

Inst. Transp. Studies, Univ.California, Irvine, CA, Uci-*Its-As-Wp-00-9,2000.*

[7] Hapsari, A.T., E.Y. Syamsudin, and I. Pramana, "Design of Automobile Position Tracking System Using Short Message Services and Its Implementation on FPGA," Proceedings of the Conference on Asia South Pacific Design Automation, Shanghai, China,2005

[8] Gupta.A.Kumar, S.Qadeer,M.A., "Location based services using android(LBSOID)," IEEE International conference on Multimedia services architecture and applications,pp 1-5,2009.

[9] M. A. Al-Taee, O.B.Khader, and N. A. Al-Saber," Remote monitoring of Automobile diagnostics and location using a smart box with Global Positioning System and General Packet Radio Service," inProc.IEEE/ACS AICCSA, May 13-16,2007, pp.385-388.