International Journal Of Engineering Research & Management Technology ISSN: 2348-4039

IJERMT

Email: editor@ijermt.org March 2014 Volume-1, Issue-2 Website: ijermt.org

Automatic Transit System Using Microcontroller

Karan Garg **Kamakshi Josh** **Hitesh Paliwal** **Nidhi Singh**

Department of Electronics & Communication Engineering

SRM University, NCR Campus,

Abstract-

The rapid growth in vehicles population has put enormous strains in all urban roads in Indian cities with population between 1 to 2 million. The major factors influencing public transport ridership are poor service quality and more travelling time. A weighed regression model using data of public preferences in travel time, travel cost, and other quality related parameters is build. This study presents a quantitative model to eliminate these issues and suggests an effective and efficient solution.

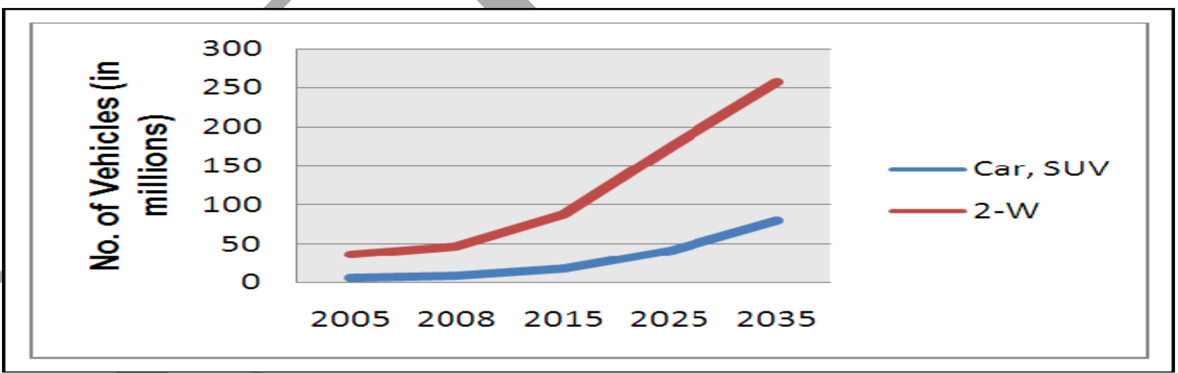
Keywords: Public transport demand estimation,

Transit system, microcontroller, transmitter, receiver, smoke detector, IC Timer 555

I. INTRODUCTION

Traffic congestion is one of the most important and critical problems in most of large cities in developing countries. This is due to high urbanization, increase in number of vehicles, rapid growth of population, improvement of income level, inefficient public transport service, poor traffic management etc. Figure 1 shows the growth of vehicles in India.

Fig. 1: Forecast of Vehicle Populations in India



Source: Ministry of urban transport 2010

In large cities especially more than one million populations such as Nagpur, Pune, Surat, Indore, Bhopal etc which will be the metropolitan towns in near future. Delay, congestion, air pollution and vibration are challenging issues [1]. In order to alleviate these problems, various measures and actions have been planned and implemented such as road-network extension, transport management schemes, traffic restraints, public transport policies, etc. It is therefore necessary to understand the travel pattern of commuters and develop a system of mass transport.

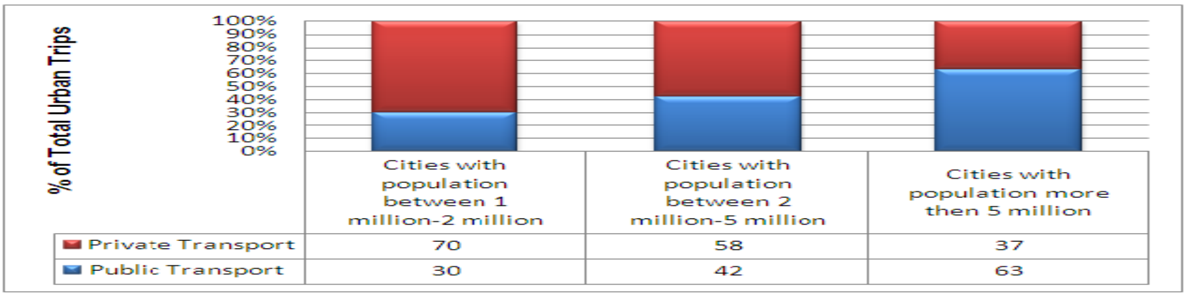


Fig. 2: Details of Urban Trips in Indian Cities (Based on City Size)

It is evident from Figure 2 that more people prefer private transport to public in medium sized cities specially cities ranging population between one to two million [2]. This is mainly due to poor service quality and more travel time.

The present transportation system lacks the presence of circuits that aid in the detection of smoke and are also not very reliable as the system is dependent upon human intervention. As seen in the present transport system the trains lack reliability as they are unable to detect fog and due to this the efficiency of the system deteriorates. The proposed system removes the above disadvantages and thus creates a system that is automatic, reliable and efficient. Due to the fact that the transit system is automatic; it eliminates the dependence on humans for the operation thereby increasing the reliability of the system and proves an efficient mode of transportation. It will not interfere with the other traffic as they require separate infrastructure.
It can improve both the usefulness and efficiency of the public transit system as well as result in increased business for commercial developments and thus improve the economy of the country.

II. TRANSIT SYSTEM

The system uses a microcontroller which controls the overall functioning of the automatic transit system. The IR sensor inside the transit system acts as a smoke detector which helps in the detection of smoke inside the train and the door of the transit system will open. The system would in this state until the reset button is pressed. The IR sensor present outside helps in the detection of fog. In the presence of fog, the speed of the transit system is reduced thereby ensuring the reliability of the system.

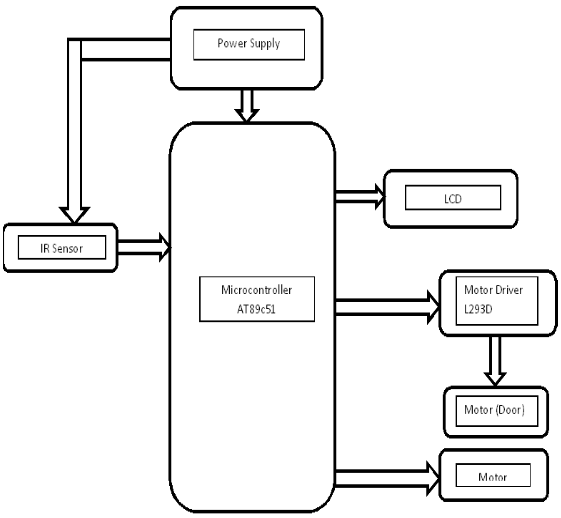


Fig 3: Block Diagram of Automatic Transit System using Microcontroller

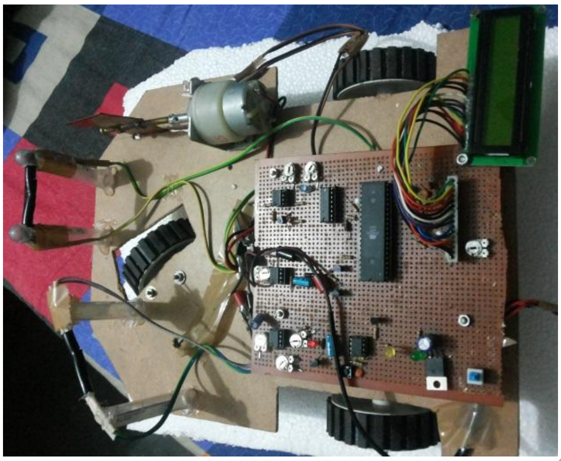


Fig 4: Implementation of Automatic Transit System

The position of the transit system can be detected by the help of a transmitter and receiver section. The transmitter section transmits the location through RF link to the receiver. The receiver then decodes the RF signal and the LED corresponding to the position of the system is illuminated.

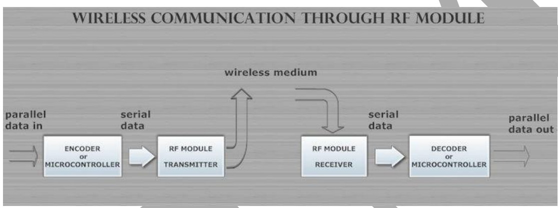


Fig 5: Block Diagram for transmitter and receiver

The whole system runs on a supply voltage of 6V which is regulated with the help of a voltage regulator. The motion of the transit system is due to microcontroller AT89c52. The output from port 2 of the microcontroller drives the L293D motor driver which helps in the rotation of the DC motor (door) in clockwise and anti-clockwise direction. Two back to back transistors are used in CE configuration to amplify the signal which helps in the motion of the system. The IR sensor works with the help of IC Timer

555. The IC Timer 555 in the IR sensor used for the detection of smoke inside the transit system works in the monostable mode. The npn transistor amplifies the signal and sends it to another IC Timer 555, working in bistable mode with some delay. This timer sends a signal to pin 9 of the microcontroller so as to stop the transit system. Another part of the same signal is sent to the motor driver L293D which opens the doors immediately. The IC Timer 555 in the IR sensor used for the detection of smoke/fog outside the transit system also works in the monostable mode. This timer 555 sends the signal to the L293D driver to slow the motor thereby reducing the speed. The Timer 555 which works in the stable mode is adjacent to this timer. This stable timer sends a signal to the transistors which lowers its base bias voltage and thus reduces the speed.

III. TRANSMITTER AND RECEIVER SECTION

The transmitter and receiver section operate on 5V which is regulated with the help of voltage regulator 7805.It is used for detecting the location of the transit system. The RF link has a frequency of 434 MHz. The transmitter section consists of a transmitter TX-433.The RF transmitter TX-433 is an AM/ASK transmitter.

Its features include:-

1. 5V-12V single supply operation
2. On-off-keying (OOK) / amplitude shift keying (ASK) data format
3. Up to 9.6kbps data rate
4. +9dBm output power (about 200m range)

5. For antenna, a 45cm wire is adequate.

The encoder encodes the IR signals received depicting the position of the transit system. The encoded signal is transmitted via the TX-433 to the receiver side.

The receiver section consists of a receiver RX-433.Its features include:-

1. Frequency Range: 434 MHZ
2. Modulation Mode: ASK
3. Date Rate: 48000 bps
4. Selectivity: -106 dB
5. Channel Spacing: 1MHZ
6. Supply Voltage: 5V
7. Antenna: Whip, strip line or helical

The receiver RX-433 receives the signal which is further sent to the decoder which decodes the signal and the LED corresponding to the location of the system glows.

IV. CONCLUSION

With the growing population, it is needed to develop a system of rapid transit which will not only help the people to commute from one place to another but also ensure accuracy in operation. It should be more environment friendly than other public transport facilities. The above model provides one such solution. It improves both the usefulness and efficiency of the public transit system as well as results in increased business for commercial developments and thus improves the economy of the country.

The proposed model gives a prototype of driverless automatic rapid transit system which eliminates the dependency on humans, thereby ensuring accuracy of operation.

REFERENCES

1. P.Vamsi Krishna, D.Yugandhar(2014), “An Enhanced Railway Transport System using FPGA through GPS & GSM”, International Journal of Soft Computing and Engineering (IJSCE)
ISSN: 2231-2307, Volume-2, Issue-6

2. DeeptiGoel,Sonam Gupta (2013), “The effect of metro rail on air pollution in Delhi”, Food and Resource Economics Department, University of Florida

3. Joseph Duperre, Gordon Burgett, Rajesh Garg and Sunil P Khatri (2012), “RF Receiver and Transmitter for Insect Mounted SensorPlatform”, Department of Computer Science and Electrical Engineering, West VirginiaUniversity, Morgantown and Department of Electrical and Computer Engineering, Texas A&M University, College Station.

4. ArAnujJaiswal, AshutoshSharma, JigyasaBisaria, (2012), “Estimation of Public Transport Demand in Million Plus Indian Cities based on Travel Behavior”, International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-2, Issue-1, October 2012

5. Akshima, T and Sunder, S (2010), “A Focus on the Passenger Transport Sector in Million-Plus Cities”, India Infrastructure Report.

6. M N Murty, Kishore Kumar Dhavala, MeenakshiGhosh and Rashmi Singh (2008), “Social Cost-Benefit Analysis of Delhi Metro” ,Institute of Economic Growth Delhi University Enclave , Delhi

7. Muhammad Ali Mazidi and Janice Gillispe Mazidi, (2007), “The 8051microcontroller and embedded systems”, Pearson education ltd., India, 2007.

8. RijurekhaSen, BhaskaranRaman(2006), “Intelligent Transport Systems for Indian Cities”, Indian Institute of Technology, Bombay

9. Pucher, J andIttyerah, N (2004), “The crises of public transport in India: Overwhelming needs but limited resources”, Journal of Public Transportation, vol. 7, no. 4, pp 1-20