International journal of management and economics invention
||Volume||2||Issue||08||Pages-716-720||Aug-2016|| ISSN (e): 2395-7220
www.rajournals.in

Innovation In Monitoring Public Transport System In Real-Time

Dheeraj Jawahar Patil
Department of Information Technology Smt. Kashibai Navale College of Engineering Pune, India.

Abstract: The paper aims at developing a passenger counting system application using key information collected through the means of IR Sensors and RFID tags/readers, which in turn, will enhance the efficiency of the entire transportation system. Currently, there is no transparency in the public transportation system. The paper puts forth the concept of accurately counting and monitoring passengers while they either enter or exit the bus/tram. The system framework revolves around people detection and further tracking. The application detects every person using IR-Sensors when he or she enters the bus/tram. The person is then tracked using these sensors until he/she leaves the bus/tram. Moreover, the paper helps to propose the methodology through which information will be provided about the bus/tram to the passengers waiting for the bus/tram along with the information containing the location of the bus/tram, emphasizing on whether the bus/tram running on time or is delayed.

INTRODUCTION

Accurate passenger count is crucial for traffic management and decision making. In the past, passenger count was mostly done manually and was both, labor and cost intensive. In the last few years, the effective development of automatic people-counting systems based on digital image processing techniques aroused considerable research interest [8],[9],[10],[11]. Instead of detecting individual object instances, the researchers introduced a supervised learning framework for counting objects in an image posing the counting problem as estimating a continuous density function integral for which over any image region provides object count within the region.

Currently, as the population is increasing day by day, the number of passengers using the public transportation system is also increasing. The current public transportation system is being ineffective in providing smooth service to all the passengers. The bus/tram are carrying passengers beyond their respective capacity, they do not run on time and the passengers at the public transportation stations have no idea whether the bus/tram they are waiting for is full or not. This very issue at hand is causing considerable frustration amongst the people and will eventually lead to complete loss in faith in the transportation system.

A transit system uses statistical information about its ridership in order to plan routes and schedule transportation. Several methods of obtaining this information exist, ranging from a driver counting the number of people who get on at each stop to approaches requiring far more sophisticated technology. A system that counts the number of people entering and exiting a given area is known as an Automatic People Counter (APC) [5]

SCOPE OF PROJECT

The papers aims to increase the efficiency of the entire transportation system by implementing a system which provides real time information of the bus/tram the passengers wish to travel by. The objective is to provide a real time system to the passengers which will help them in fetching all the real time information about the bus/tram to save their precious time. Unlike the existing system, the system will be fully automated and the information will be available public and not just the administrator. This system will provide information about the exact number of passengers which are travelling in the bus/tram. This information is critical because if the bus/tram is already full, the passengers will get to know about it well in advance and hence they can change the bus/tram which they were planning to travel by before. This will save their precious time as they won't wait for another bus/tram travelling to the same location, but they will be able to choose an alternative way to travel to their location by taking another bus/tram through different route.

Furthermore, the above mentioned system not only makes the public transport system more efficient but also saves a huge chunk of the passenger's time. By the extensive use of RFID readers and RFID tags, people will know approximately the exact source and destination of the bus/tram and the last and upcoming bus/tram stops so that the travelling people would take another way to reach their destination if they are in hurry.

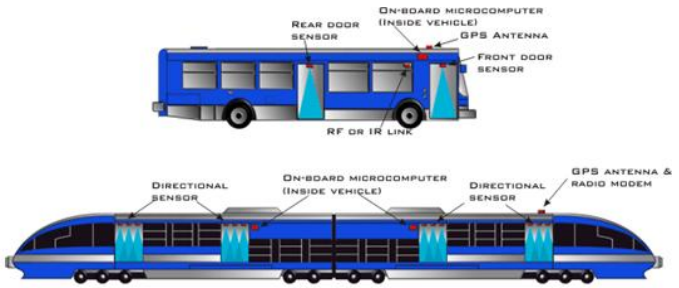
EXISTING SYSTEM

As we have seen in the existing methodologies, all the systems that have been implemented work at the administrator level. That is only the administrator gets to know the information about the bus/tram i.e. what is the exact location of the bus/tram, the various stops it has made,

International journal of management and economics invention
||Volume||2||Issue||08||Pages-716-720||Aug-2016|| ISSN (e): 2395-7220
www.rajournals.in

the number of passengers it is carrying etc. our aim is to provide this information to the common passengers through an web application. People have lost faith in the public transport system because of the inefficiency and also the misinformation about the timings of the bus/tram. Our aim is restore this faith of common people in public transport by providing the real time information about the bus/tram which earlier only the administrator knew. This system will prove to be efficient as well as it will save the valuable time of the passengers.

Fig.1 demonstrates the existing system where the crucial information about the count of passengers and location of



the vehicle is displayed solely on the on-board microcomputer.

Fig.1 – Existing bus/tram system

The above mentioned existing system lacks:

a) To provide the exact count of passengers travelling in the bus/tram in real time.

b) To provide approximately the exact location of the bus/tram and the information of the bus/tram whether it is late or on time.

c) To provide more flexibility with regard to changing traffic demand.

d) To improve the operational reliability and adherence to the published schedule.

e) To assist the passengers in using the system and also improve the quality of service.

IV. SYSTEM ARCHITECTURE

Fig.2 displays the system architecture of the mentioned application. The 32-bit microcontroller (Advanced Virtual RISC) is serially connected with all the IR Sensors, LCD and RFID reader. The IR sensors detect the passenger when a passenger enters the bus/tram and consequently increase the count of passengers by one. Moreover, the RFID will provide the exact location of the bus/tram. IR and RFID Sensors are serially connected to the Microcontroller and this information is displayed on the LCD of the bus/tram. Furthermore, an additional solution, as mentioned later on in the paper, is to display all the crucial information on a webpage which can be accessed by anyone who pleases to do so.

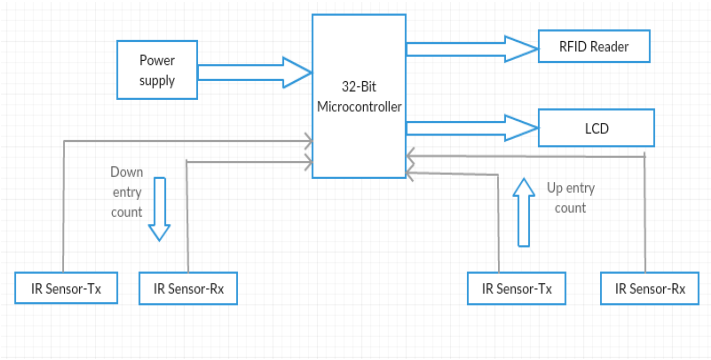


Fig.2 – Architecture Diagram

V. PROJECT IMPLEMENTATION

This system uses simple technologies for their operational working. The use of simple technology will be cost efficient and hence easy to maintain. The different technologies utilized are IR sensors, RFID sensors, AVR microcontroller and Arduino Board.

A. INFRARED SENSORS

Infrared sensors are capable of measuring the heat being emitted by an object and detecting motion. Considering this project, these sensors will be situated at the entry and exit points of the bus/tram. Whenever a person enters a bus/tram, the IR sensor will detect the incoming person and will count up by one. Similarly, whenever a person exits the bus/tram the IR sensor will detect the exiting person and will decrement by one.

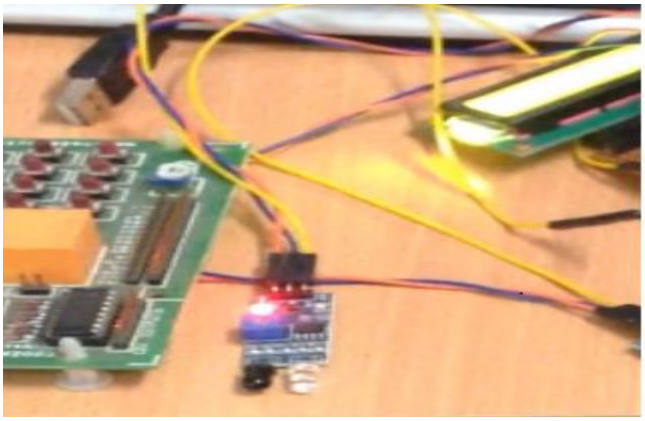


Fig.3 – Infrared Sensor

International journal of management and economics invention
||Volume||2||Issue||08||Pages-716-720||Aug-2016|| ISSN (e): 2395-7220
www.rajournals.in

B. RFID SENSORS

In a basic RFID system, tags are attached to all items that are to be tracked. These tags are made from a tiny tag-chip, sometimes called an integrated circuit (IC) that is connected to an antenna that can be built into many different kinds of tags including apparel hang tags, labels, and security tags, as well as a wide variety of industrial asset tags. The tag chip contains memory which stores the product's electronic product code (EPC) and other variable information so that it can be read and tracked by RFID readers anywhere.

C. AVR MICROCONTROLLER

The AVR is a type of microcontroller where program and data are stored in separate physical memory systems that appear in different address spaces, but having the ability to read data items from program memory using special instructions. AVR is one of the first microcontroller families to use on-chip flash memory for program storage.

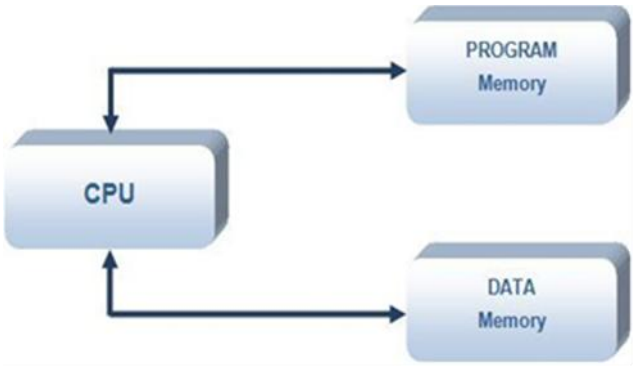


Fig.4 – Simplified AVR Harvard architecture

AVR follows Harvard Architecture format in which the processor is equipped with separate memories for Program and the Data information.

D. ARDUINO BOARD

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Some of the advantages of this board are it being inexpensive, cross-platform compliant and has a user friendly programming environment. Arduino boards are able to read inputs (light on a sensor), and turn it into an output (turning on an LED) along with publishing it online. One can instruct the Arduino board with a set of instructions to seek a desired output by sending it across to the microcontroller on the board. The two most important aspects of Arduino board are the Arduino programming language and the Arduino Software (IDE). Lately, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for Internet of Things (IoT) applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs.

Fig.5 is a snapshot taken from the application built to display the output of real-time transport monitoring system. As demonstrated in Fig. 5, the webpage displays the exact bus/tram routine stop along with the count of passengers travelling in the bus/tram. For instance, if we consider Fig.5, the bus/tram has an attendance of thirty four passengers and has either reached or crossed “Swargate” routine stop. Also, as the maximum passenger carrying capacity of the bus/tram is 45 as given in the figure, only a total of eleven passengers can now board the bus/tram.

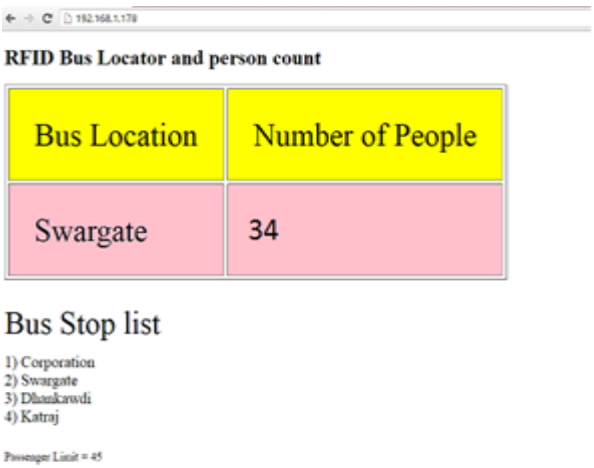


Fig.5 – Webpage Application

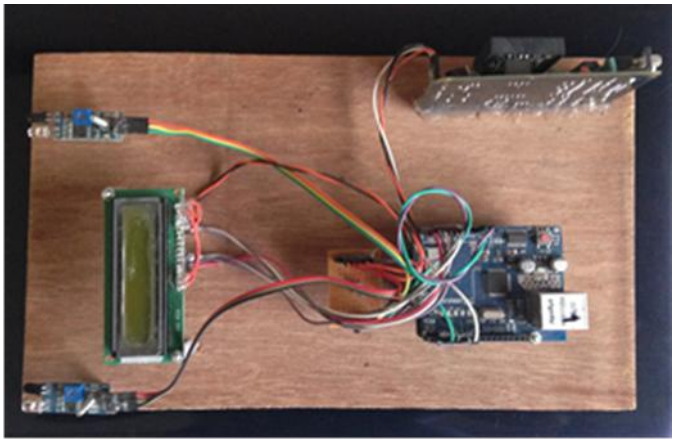


Fig. 6 – Virtual Assembly symbolizing the components in bus/tram

International journal of management and economics invention
||Volume||2||Issue||08||Pages-716-720||Aug-2016|| ISSN (e): 2395-7220
www.rajournals.in

Fig. 6 demonstrates the stereotype model of the real-time transport monitoring system. To execute the process of detecting and tracking passengers in the stereotype model, the Arduino board is mounted on 32-bit AVR microcontroller. The RFID reader and IR sensors are connected serially to the microcontroller. The AVR microcontroller along with the other components process the count of passengers and act as the input providers to the LCD.

Fig. 7 displays the output as the count of passengers on board in the bus/tram.

Fig. 7 – Liquid Crystal Display Component

VI. FUTURE SCOPE AND LIMITATIONS

With a future horizon in mind, the microcomputer will display the list of all the other bus/tram nearby and also their routine stops, routes and their destination. Nonetheless, for maximum utilization of all the information at hand, an android/OS application will be the key factor. Also, this application can be integrated with Google Maps and using the bus/tram's Global Positing System, the passengers could get detailed information about the location of the bus/tram.

While there are many merits to the above mentioned system, some of the limitations can be jotted down as below: The IR Sensors can unintentionally detect luggage bags on either entrances and consider them as a passenger thereby incrementing the count erroneously.

VII. CONCLUSION

Taking into account all the factors, one can conclude that the real time passenger counting system in bus/tram is feasible using IR sensors, RFID and web application. This system will be highly useful for the day-to-day travelling passengers because of the real time information they will get. This, in turn, will save their precious time as they won't wait for another bus/tram travelling to the same location, but they will be able to choose an alternative way to travel to their location by taking another bus/tram through different route. This application is of utmost significance for many as it saves time and keeps everyone well informed about the so called "Lifeline" for travelling, public transportation system. Moreover, passengers will be innately satisfied as this application will be of great usage for them. Furthermore, assuming that the bus/tram is overloaded, it is highly likely that the bus/tram will consume more fuel than required. As the system provides us with the count of passengers in a bus/tram, it is simple arithmetic to calculate by how many passengers the maximum capacity count for the bus/tram is exceeding. Thus, this system gives the opportunity to save on fuel consumption.

REFERENCES

[1] BaidyanathSaha, Iqbal Jamal, Satarupa Mukherjee "A Novel Framework for Automated Passenger Counting", Department of Computer Sciences, University of Alberta, Canada. ISSN-1522-4880, pp. 2969 – 2972, 2011.

[2] Jang won Seo, Daegyu Hwang, Kyung hee Lee, Ki seong Kim, InhoJeon, Changqiang Jing, Youngok Kim, "Development of Passenger Hi-pass and Automatic Counting for Public Transportation" Vol. 20, pp. 123 - 127, 2013.

[3] Jin-Seok Kim, Ho-seung Gwak: Considerations of Automatic Passenger Counting System Using Infrared Sensors at doorway in Overseas Railway Transit. Korean Society for Railway Spring Conf. 2009.

[4] K. Tsubouchi, H. Yamato, K. Hiekata: Innovative on-demand bus/tram system in Japan, IET Intell. Transp. Syst., Vol. 4, No. 4, pp. 270–279, 2010.

[5] John Sallay, "Automatic People Counting and Matching", Utah State University Logan,Utah, year-2009.

[6] Lee, K.C., Kim, M.H., Lee, S., Lee, H.H.: IEEE 1451 based smart module for in vehicle Networking systems of intelligent vehicles, IEEE Trans. Ind. Electron., 51, pp. 1150–1158, 2004.

[7] Public transportation Survey results released, MLTM in

International journal of management and economics invention
||Volume||2||Issue||08||Pages-716-720||Aug-2016|| ISSN (e): 2395-7220
www.rajournals.in

Korea, 2012.

[8] A. B. Chan, Z. J. Liang and N. Vasconcelos, "Privacy Preserving Crowd Monitoring: Counting People without people Models or Tracking," IEEE CVPR, 2008.

[9] N. Dalal and B. Triggs, "Histograms of Oriented Gradients for Human Detection," IEEE CVPR, vol. 2, pp. 886-893, 2005.

[10] C. Hua, Y. Makihara and Y. Yagi, "Pedestrian Detection by Combining the Spatio and Temporal Features", MIRU, 2010.

[11] V. Lempitsky and A. Zisserman, "Learning to Count Objects in Images", NIPS, 2010.