

Advanced Bus Automation System

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Abstract- The aim of this project is to introduce a conductor-less bus automation system. Paper proposes supervisory system to guarantee the safety of public transport and effectiveness in operation of bus monitoring system. The innovation in technology today has made our lifestyle much easier and fun. Presently, public transportation is mainly depends on driver's manual operation, such as capacity of the passengers and arrival time on bus stop. This paper involves the combined usage of RFID and GSM to make travelling smarter. The system consist of three modules: Bus module, Bus stop module and Bus depot module. GSM can transmit Voice, SMS and data information with low power consumption. Here RFID tag is rechargeable one, where as it can be recharged in any nearby bus depot. In IR transmitter and receiver, initially IR transmitter and receiver are placed straight to each other so the transmitted IR ray are received by IR receiver, the ray received will be interrupted and count will be incremented and decremented. This module receives bus location information coming towards that stop from bus module and display the information on a LCD display. The bus stop module is installed at every bus stop and consist of RFID reader and LCD display all are interfaced with ARM and ARDUINO microcontroller.

Keywords- RFID card and Reader, GSM module, LCD display, IR Module, Keypad, DC Motor.

I. INTRODUCTION

Buses are provided by Government as a public service, quality of which will directly determine the convenience of public travel. Due to non-availability of prior information about the buses arrival schedule, in the morning people waits on bus stops. The buses are overloaded for most of the times which often results in some kind of fault occurrence in buses and people get late further[2]. It is important criterion for quality of service standards that bus reaches the station on time and reports which station it is located accurately. It might be a good idea using GSM technology for monitoring the bus when it is moving[1]. In this paper automatic bus fare collecting system using electronic ticket explained that a system that uses the same RFID-based location information give the indications depending on his current location, provided that the user has indicated beforehand the places he intends to visit[2].

Collected data can be used to predict bus moment timing in order to provide better service. However problem of passenger overloading is commonly faced[3]. To solve that, paper provides solution; it develops a system of advanced bus monitoring and management based on wireless protocols such as GSM technology. ARM microcontroller and Arduino microcontroller can be used to program this system by interfacing GSM and RFID reader .



Fig - 1: Bus Scenario.

The conductor will collect money from each passenger and issue ticket. Initially, printed papers or tokens are used as tickets. Nowadays, handheld machines are used to print tickets[3]. This system has many disadvantages. The passenger have to carry the ticket till the end of travel, the conductor should ensure that everyone has got the ticket, the time taken for ticketing is comparatively more and more amount of paper is needed to print the Ticket. Nowadays conductors are trained to operate the handheld ticketing machine. For example, if a passenger wish to travel in bus. He has to carry money with him. Then conductor will collect the money and he will give ticket. This has to repeat for all passengers. This will take more time and waste of human resource as well as energy. Even handheld ticketing machine is comparatively slow and need trained person to operate it.

II. PROPOSED METHODOLOGY

To monitor the moving bus, the firstly important solution of that is to detect the time of every bus's arrival on station in time. Low-cost is one of the GSM technology's characteristics, besides that the cost of wireless identification device installed on bus is also very low; and the number of station monitor is much less, the overall cost of this system will be quite low. GSM using AT&T command technology,

especially suitable for intermittent, sudden and frequent, small amounts of data transfer. On the one hand, the station monitor receives signal sent by wireless identification device from bus, detects the bus's identification number and identifies which bus comes up to station; then, the station monitor displays the information of bus's arrival time and identification number to monitoring display.

2.1. HARDWARE DESIGN

For implementing such kind of system we can use advanced micro-controllers with greater speed such as PIC, AVR and ARM[1]. To interface various sensors and peripherals it is always essential to have controllers with greater memory, speed and I/O capabilities. Each bus operated with various automated functions such as automatic door on-off depending upon passenger count at each station. To remove overloading of passengers we have up-down counters along with Infra-Red counter at both in/out doors. This count will updated on machine with ticket conductor and also display on LCD in front of driver control panel. As per vacant seats, numbers of passengers are taken into bus. When the passengers requested stations on bus stop count is updated. There are total three LCD displays; one is in front of driver to display vacant seats, next station and number of leaving passengers[1]. This data send to main system via GSM wireless connectivity.

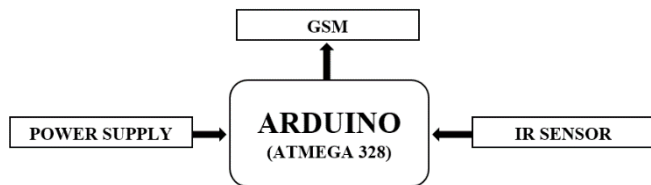


Fig -2: Block Diagram Of BUS Module.

In Bus module the IR sensor works as an counter where the passenger increment and decrement is counted and the updates are send to the bus stop through GSM; all interfaced to ARDUINO microcontroller.

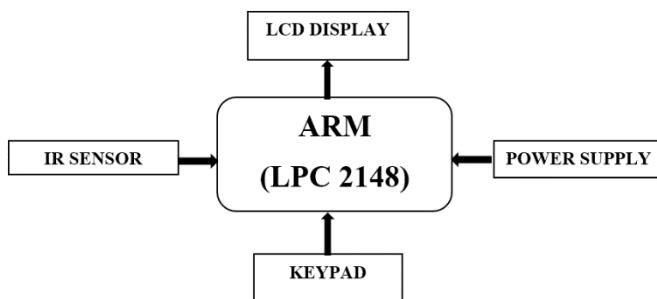


Fig -3: Block Diagram Of BUS Stop Module.

Bus-Stop module is installed at every Bus-Stop to let the passenger know about the location of buses coming

towards that stop. It comprises of a GSM modem, LCD display; all interfaced to ARM 7 microcontroller. Microcontroller after retrieving the stored information displays it on LCD display[2].

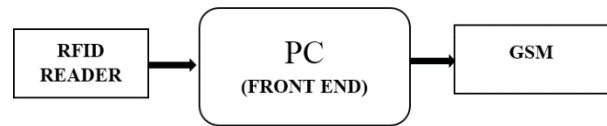


Fig -4: Block Diagram Of BUS Depot Module.

Bus Depot module receives the request from RFID reader to verify passenger fare and destination. If there is no balance then the passenger can recharge the card at bus depot and if there is sufficient balance then GSM will send the data to the bus stop. These travelling records are stored in the Database.

2.2. DATA PROCESSING CYCLE

The complete system is divided into mainly two processing cycles. One is at bus module in which entire bus automation is included while other one is at bus stop module which will connect every bus with bus depot. At station level system every bus is get connected with station[1]. For the proposed system, the theories for RFID and sensing technologies are integrated on a bus platform to monitor and manage bus transportation.

The theoretical framework of the bus monitoring and management system is based on data communication among an RFID tag and reader[7]. Flow chart shown below gives exact information about work flow of system.

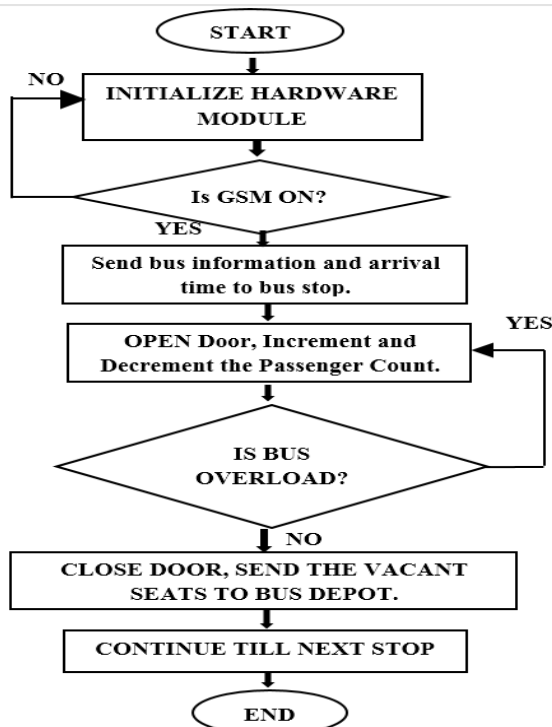


Fig -5: Flow Diagram Of BUS Module

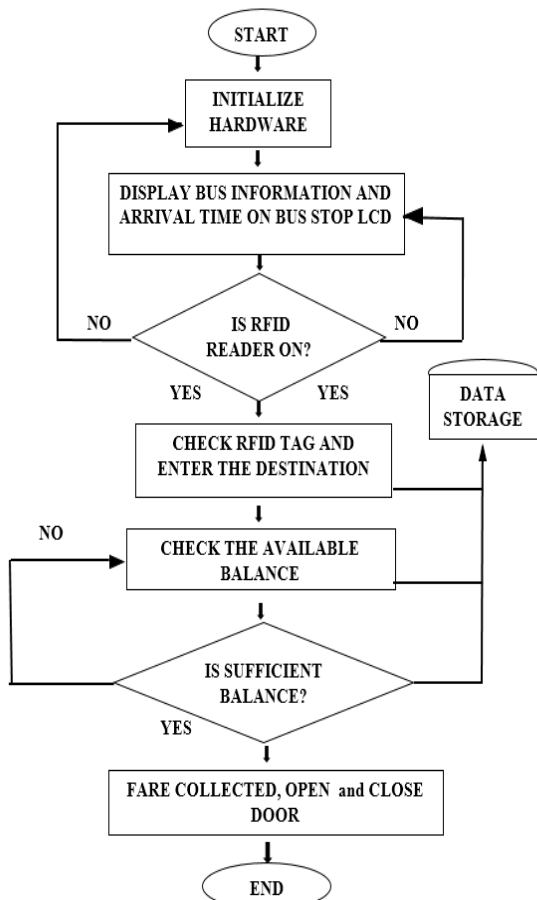


Fig -6: Flow Diagram Of BUS Stop Module

III.RESULT

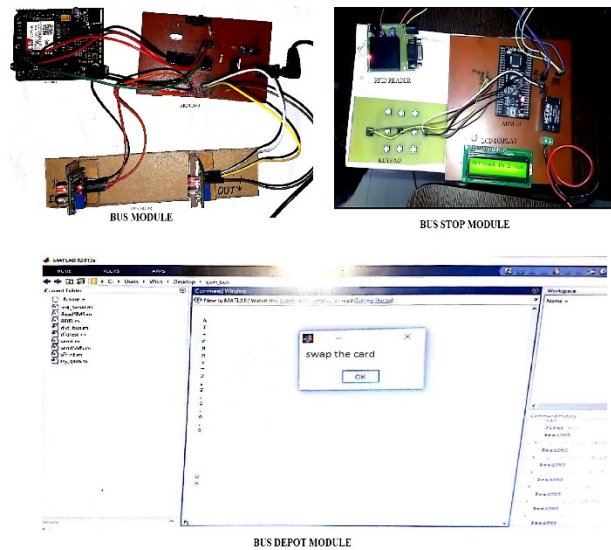


Fig -7.Model Of Proposed System

The complete result of our project have been taken to reduce the total cost of the system including devices and services which is based on integration of RFID and GSM. SMS service of GSM network is very cost effective so it is used for the transfer of data between the modules. LCD are placed on Bus-Stop to display the bus information and the time taken by bus to arrive at the stop. Every RFID based card will be provided by an unique ID number. When the RFID tag is read by the reader at the bus stop, the request is send to the bus depot for verification of the data. Only after the verification processes the passenger can enter into the bus. If there is vacant space in the bus the passenger will be allowed to enter or else the card won't be accepted by the RFID reader to minimize the overloading problem. The record of all those passengers travelled will be saved in the database of the system. These entire system process of collecting fare and storing data gets competed in very few seconds hence it is time consuming and hence overloading problem is also solved.

IV. ADVANTAGE

- a) It has user friendly interface.
- b) Fast, accurate and transparent ticket validation.
- c) Less cash handling.
- d) Useful data, real time information and pricing.
- e) Flexible source and destination.
- f) No use of papers.
- g) Low cost validation equipment.

V. CONCLUSION

The entire system is to make conductor-less system, so that it can reduces the human efforts. The ability of the system to act on its own can reduce the manpower required at

the monitoring center. Bus drivers will also be more punctual to the bus schedules that have been established, resulting in a more efficient bus circulation system. Bus service quality and operational efficiency will improved a lot and there will be no stress on driver. The cabin facility design at the bus stop made system more effective.

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