Special Issue Published in International Journal of Trend in Research and Development (IJTRD), ISSN: 2394-9333, www.ijtrd.com

Automatic Bus Ticketing System

[1]K.S.Vairavel, [2]D.R.Jayashree and [3]P. Manimekalai,
[1]Assistant Professor (Senior Grade), [2,3]Final Years Bachelor of Engineering,
[1,2,3]Department of Electronics & Instrumentation Engineering, Bannari Amman Institute of Technology, Sathyamangalam, TamilNadu, India

Abstract:-This paper presents an automatic fare collection system using Radio Frequency Identification (RFID) without need of a conductor according to the distance travelled by the passenger. The system uses PIC microcontroller and is used for controlling an interface purposes. The IR sensor is used for counting the number of passengers entering the bus and the count will be send to the PIC microcontroller which processes it. U-slot sensor and motor is used to calculate the distance and the respective amount will be debited from the RFID .The RFID is a rechargeable one which can be done in the bus depot using a microcontroller and Liquid Crystal Display (LCD).

Keywords: *RFID, IR Sensor, U-Slot Sensor, PIC Microcontroller, LCD.*

I. INTRODUCTION

This work helps in situations like overpopulation in transportation systems. At these situations, the conductor may not be able to give proper tickets to all the passengers and also he/she cannot verify if proper change is given to the passenger and all passengers have got their tickets. So we can use an efficient method as RFIDs by not giving the ticket in the form of paper instead collecting the fare from it according to their distance travelled and it also reduces the consumption of papers that are used for printing the tickets as the passenger is always carrying the RFID.The RFID contains the data's of the passenger and also the fare is also debited it from it. RFID is one of the known technologies which are nowadays used in many areas for identification and security purposes. The passengers carrying the RFID are advised to swipe it in the RFID reader, so that the fare can be collected from it. Infrared sensors are generally used for the detection of the presence of any persons or objects, so using this concept we are counting the number of passengers entering the bus. These sensors are placed at the entry levels of the bus at both sides. The distance is calculated using the U-slot sensor and motor. Generally slot sensors are used to find the position of any non-contact objects and it is combined with motor to find the distance according to the areas the bus was travelling.

II. LITERATURE SURVEY

Paul Hamilton and Suresh Sankaranarayanan (2013) proposed in this paper consists of a RFID which is used for recording the timings of the buses and it is done with the help of sensors situated in the traffic stop lights, intersections and other places. This timings will be send to the person's mobile phone whose RFID is used for getting the bus timings and also the persons details is also stored in the RFID for future details.

Arun Das .S .V and K. Lingeswaran (2014)proposed in this paper consists of a smartcard which contains the information about the users and Global Positioning System (GPS) is used to track the locations, so that the distance can be calculated and the amount is debited from the smart card.

Paul Hamilton and Suresh Sankaranarayanan (2014) proposed in this paper consists of RFID,Global Positioning System (GPS) and LCD.The location of the buses are identified by the GPS and the arrival time of the buses are send to the bus stops where it is displayed using LCD's. The RFID is also used for tracking of the buses.

T.Manikandan,P.G.Kalaiyarasi,P.P.K.Priyadharshini, P.R.Priyanga (2015) proposed in this paper consist of IR sensor, slot sensors, GPS, Global System for Mobile Communication (GSM), RFID and microcontroller. The sensors are used for calculating the distance and counting the number of passengers travelling in the bus and the amount is debited from the RFID.The accident notification is also send to the nearest hospital with the help of GPS and GSM.The RFID can be recharged in a nearby bus depot or in other shops using a keypad and a LCD.

Prof. A. U. Deshmukh, Priyanka Kokil, Dhanashri Khadtar, Bhagyashri Khadtar (2016) proposed in this paper consists of a camera which captures the image of the passengers entering the bus and checks the availability of the passenger in the database.If the information about the passenger is present in the database then the respective amount according to their distance is debuted from the account of the passenger and the message will be send to the passenger regarding the amount. If the information is no present in the database then the passenger has to carry a RFID with him/her while travelling in the bus.

III. EXISTING SYSTEM

In our country there is always a presence of problems regarding the buses related to ticketing method. The conductor will give the tickets to the passengers who are all travelling in the bus .Based on the count and the amount given to the conductor, he/she will issue the tickets to the passengers. This will include many papers for printing the tickets and the use of hand held machine also creates many problems.

The passenger also has to carry the correct amount within during his/her travel. The conductor should also have the correct change when any passenger is not having the correct amount. Sometimes some conductors will not give the correct change to the passenger. For example, when we travel from erode to Coimbatore the charge for the ticket is only 59 rupees but when the passenger travelling in that bus gives the conductor an amount of 60 rupees. Then the conductor has to give the passenger 1 rupee. Some conductors are giving the correct change to the passenger but many are not giving.

The existing system overcomes these difficulties by using a RFID with keyboard in which the passenger has to enter the designation where he/she is going to get down. The RFID reader will read the respective information about the passenger from the RFID tag. The respective amount is debited from the passenger with the help of that RFID tag.

IV. PROPOSED SYSTEM

Nowadays, automation is seen in every nook and corner of the world. Hence we can apply it in buses to generate automatic fare collection and ticketing system using RFID.The RFID is one of the best technologies in getting the details of a

person by just using the tag and the amount is debuted from it according to the distance travelled by the passenger. RFID reader which helps in indentifying the owner of the tag once the tag is punched in it. When a passenger enters into the bus, their presence is detected by the IR sensor which is placed at the entrance of the bus. The IR sensor has a transmitter and a receiver which continuously passes infrared rays when a person crosses these signals/rays, they are interrupted. These interrupted signals are send to the PIC microcontroller where the count value will be incremented and this intimates the number of passenger entering the bus. Then the passenger will punch his/her RFID in the reader. The distance travelled by the passenger is calculated using a U-slot sensor and motor. According to the distance travelled by the passenger, the amount will be debuted from the passenger's account. The amount debuted and balance amount is send as a message to the passenger using Global System for Mobile Communication (GSM).The GPS is used to tracking the bus. RFID can be recharged in the nearby bus depots using a microcontroller and LCD.Figure 4.1 shows the block diagram of the proposed system.

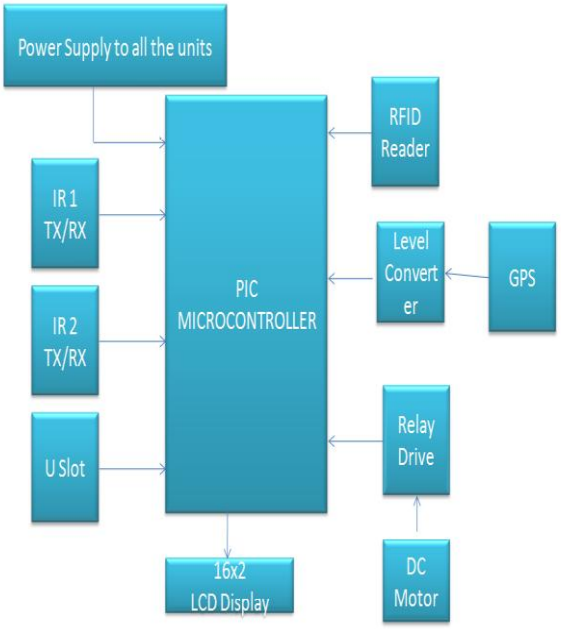


Figure 4.1Block Diagram

V. COMPONENT DESCRIPTION

A. Power Unit

The proposed system uses lead acid battery for the use of power supply. Battery Cells are the most basic individual component of a battery. They consist of a container in which the electrolyte and the lead plates can interact. Each lead-acid cell fluctuates in voltage from about 2.12 Volts when full to about 1.75 volts when empty.

A lead-acid battery is an electrical storage device that uses a reversible chemical reaction to store energy. It uses a combination of lead plates or grids and an electrolyte consisting of a diluted sulphuric acid to convert electrical energy into potential chemical energy and back again.

Lead-acid batteries are composed of a Lead-dioxide cathode, a sponge metallic Lead anode and a Sulphuric acid solution electrolyte. This heavy metal element makes them toxic and improper disposal can be hazardous to the environment. The cell voltage is 2 Volts.

During discharge, the lead dioxide (positive plate) and lead (negative plate) react with the electrolyte of sulphuric acid to create lead sulphate, water and energy.

During charging, the cycle is reversed: the lead sulphate and water are electro-chemically converted to lead, lead oxide and sulphuric acid by an external electrical charging source.

B. Radio Frequency Identification

RFID stands for Radio Frequency Identification. It is one of the members of Automatic Identification and Data Capture (ADIC) technologies and is a fastest and reliable in identifying the objects. There are two main components: The Interrogator (RFID Reader) which transmits and receives the signal and Transponder (tag) that attached to that object. An RFID tag is composed of a miniscule microchip and antenna. RFID tags can be active or passive. Communication between the RFID reader and tag occurs wirelessly. The reader emits a low power radio wave field which is used to power up the tag so that the information n the tag can be passed. Here we are using a passive tag which is less expensive and lighter and can be applied in the harsh environment and are maintenance free and will last for years. An RFID reader is a device that is used to interrogate an RFID tag. The reader has an antenna that emits radio waves, the tag responds by sending back its data. When they are within range of the reader unit they are able to draw sufficient power from the electromagnetic field to power their own internal electronics. The passenger punches his/her tag while entering the bus and the amount will be debuted from it based on the distance travelled by the passenger.

C. Relay Driver Circuit

A relay is an electro-magnetic switch which is useful if we want to use a low voltage circuit to switch on and off a light bulb (or anything else) connected to the 220v mains supply. The diagram below shows a typical relay (with "normally-open" contacts). The current needed to operate the relay coil is more than can be supplied by most chips (op. amps etc), so a transistor is usually needed. Figure 5.1 shows the Circuit Diagram for Driver,

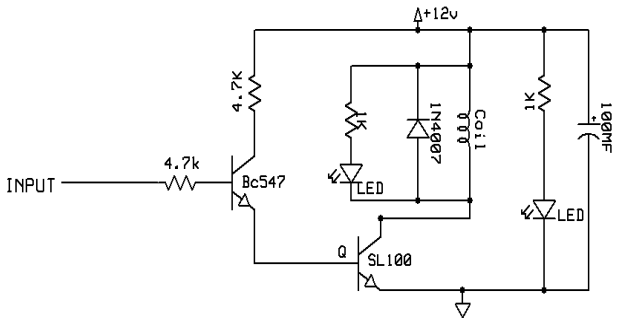


Figure 5.1 Circuit Diagram for Driver

D. PIC Microcontroller

PIC is referred as "Programmable Interface Controller". PIC16F877A is used in this proposed system and it is a 40 pin microcontroller PDIP and its operating frequency is DC-20MHz.There are five I/O Ports port A,B,C,D,E and 15 Interrupts. It has parallel slave port implemented on it and has a capability for reprogramming as it uses a flash memory. The signals from all the units are sent to the PIC and they are processed and controlled. The pin diagram for PIC13F877A is shown below in Figure 5.2.

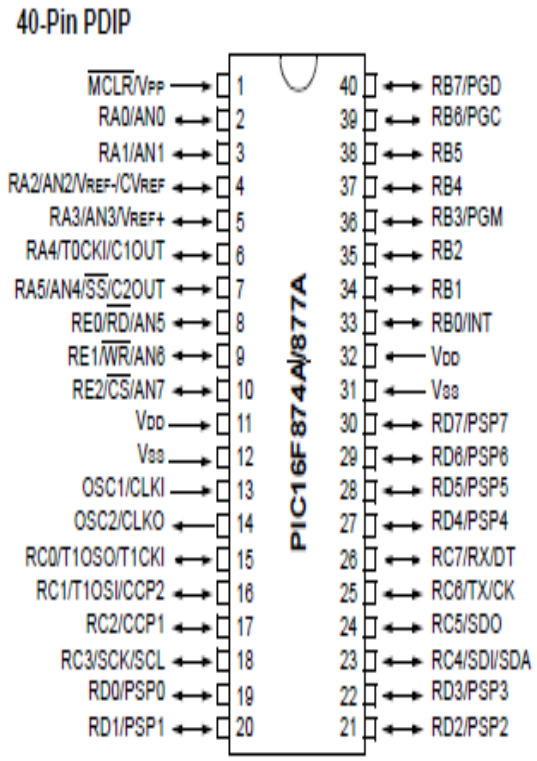


Figure 5.2 Pin Diagram for PIC16F877A

E. RS232

In telecommunication and computer science, serial communication is the process of sending data one bit at one time, sequentially, over a communication channel or computer bus. The most common form of communication between electronic devices is serial communication. Communicating serially involves sending a series of digital pulses back and forth between devices at a mutually agreed-upon rate. The sender sends pulses representing the data to be sent at the agreed-upon data rate, and the receiver listens for pulses at that same rate. since the data rate is 9600 bits per second (sometimes called 9600 *baud*), the receiver will continually read the voltage that the sender is putting out, and every 1/9600th of a second, and it will interpret that voltage as a new bit of data. If the voltage is high (+5V in the case of Wiring/Arduino, the PIC, and BX-24), it will interpret that bit of data as a 1. If it is low (0V in the case of Wiring/Arduino, the PIC, and BX-24), it will interpret that bit of data as a 0. By interpreting several bits of data over time, the receiver can get a detailed message from the sender at 9600 baud.The graph is shown in Figure 5.3.

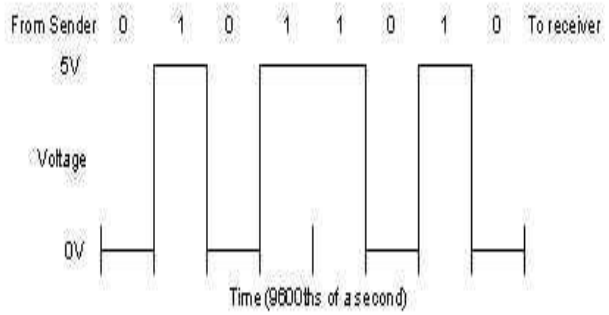
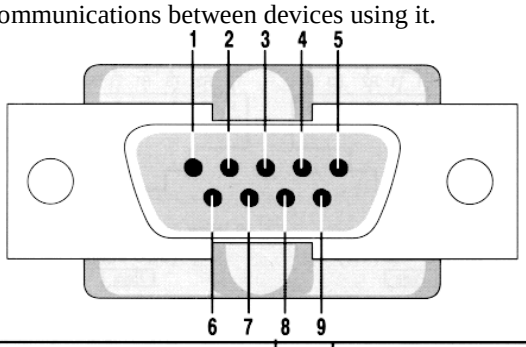


Figure 5.3: Graph for RS232

From this diagram, both devices also have to agree on the order of the bits. Usually the sender sends the highest bit (or most significant bit) first in time, and the lowest (or least significant bit) last in time. For the data transmission above, a high voltage indicates a bit value of 1, and a low voltage indicates a voltage of 0. This is known as true logic. Many serial protocols use inverted logic, meaning that a high voltage indicates logic 0, and a low voltage indicates logic 1. The RS-232 standard defines voltages and general baud rate ranges for serial communications between devices using it.



Pin	Signal	Pin	Signal
1	Data Carrier Detect	6	Data Set Ready
2	Received Data	7	Request to Send
3	Transmitted Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicator
5	Signal Ground		

Figure 5.4: Diagram of Rs232

F. MAX232

The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply via on-chip charge pumps and external capacitors. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated just for driving the RS-232 in this case. The receivers reduce RS-232 inputs (which may be as high as ± 25 V), to standard 5 V TTL levels. These receivers have a typical threshold of 1.3 V, and a typical hysteresis of 0.5 V. The later MAX232A is backwards compatible with the original MAX232 but may operate at higher baud rates and can use smaller external capacitors – 0.1 µF in place of the 1.0 µF capacitors used with the original device. When a MAX232 IC receives a TTL level to convert, it changes a TTL Logic 0 to between +3 and +15V, and changes TTL Logic 1 to between -3 to -15V, and vice versa for converting from RS232 to TTL. The RS232 Data Transmission voltages at a certain logic state are opposite from the RS232 Control Line voltages at the same logic state. The pin diagram for the MAX232 is shown below.

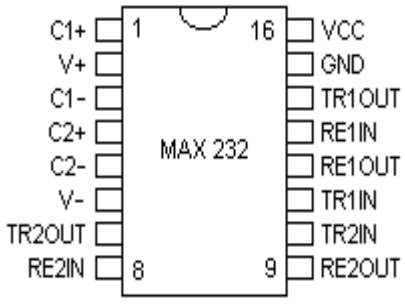


Figure 5.5 Pin Diagram for MAX 232

G. LCD

Liquid crystal cell displays (LCDs) are used in similar applications where LEDs are used. These applications are display of display of numeric and alphanumeric characters in dot matrix and segmental displays.The function of each pins of

LCD are VCC, VSS and VEE while v and v provide +5v and ground, respectively, v is used for controlling LCD contrast. There are two very important registers inside the LCD. The RS pin is used for their selection as follows. If RS=0, the instruction code register is selected, allowing the user to send a command such as clear display, cursor at home, etc. if RS=1 the data register is selected, allowing the user to send data to be displayed on the LCD. R/W input allows the user to write information to the LCD or read information from it. R/W=1 when reading; R/W=0 when writing. The enable pin is used by the LCD to latch information presented on its data pins. When data is supplied to data pins, a high to low pulse must be applied to this pin in order for the LCD to latch in the data present at the data pins. The 8-bit data pins, D0 – D7, are used to send information to the LCD or read contents of the LCD'S internal registers. There are also instruction codes that can be sent to the LCD to clear the display or force the cursor to the home position or blink the cursor. RS=0 is used to check the busy flag bit to see if the LCD is ready to receive information. The busy flag is D7 and can be read when R/W=1 and RS=0, as follows: if R/W=1, RS=0.when D7=1, the LCD is busy taking care of internal operation and will not accept any new information, when D7=0, the LCD is ready to receive new information.

Figure 5.6 LCD

VI. RESULT AND DISCUSSION

CONCLUSION

By implementing this project as real time project, many disadvantage in ticketing system is rectified and the implementation of sending accident occurrence information automatically to the nearest hospital may save many life. Fare is debited from RFID tag where tag is rechargeable one.

References

[1]. T. Manikandan, G. Kalaiyarasi, P K. Priyadharshini, P R.Priyanga," Conductor less Bus Ticketing System Using RFID and Accident Information through GPS and GSM", IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 9, September 2015.

[2]. Prof. A. U. Deshmukh1 Priyanka Kokil Dhanashri Khadtar Bhagyashri Khadtar," Conductor Less Bus using Image Processing", IJSRD - International Journal for Scientific Research & Development| Vol. 4, Issue 02, 2016.

[3]. Ciripireddi Durgaprasad, G. Rajesh, "Automatic Fare Collection System in Public Transportation", International Journal of Scientific Engineering and Technology Research, Vol.05, Issue.47 December-2016.

[4]. Arun Das .S .V, K. Lingeswaran, "GPS Based Automated Public Transport Fare Collection Systems Based On Distance Travelled By Passenger Using Smart Card", International Journal of Scientific Engineering and Research, Volume 2 Issue 3, March 2014.

[5]. Suresh Sankarananrayanan, Paul Hamilton," Mobile Enabled Bus Tracking and Ticketing System", International Conference on Information and Communication Technology,2014.

[6]. Paul Hamilton and Suresh Sankaranarayanan, "Intelligent Agent Based RFID System for on Demand Bus Scheduling and Ticketing", International Journal of Future Computer and Communication, Vol. 2, No. 5, October 2013.