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Smart Bus Tracking System Using RFID

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***Abstract:** When it comes to taking the public transportation, time & patience are of essence. As it has become a part of live. Now-a-days many people are using public transportation system as buses, have experienced time loss because of waiting at bus-stops to reach at destination. The no. of buses running daily is huge. Hence it is a big challenge to keep the track of all the buses in front of depot authorities. In this paper, we proposed smart bus tracking system that any passenger with a smart phone or mobile having ANDROID application can be used to view estimated bus arrival times, bus delay, bus damage, bus cancel. Anyone can access this information and have the option to sign up to receive free messages using GSM. The system is based on RFID tag which is used to read as well as transmit the information of the bus & bus stop to the depot manager. Also the same information can be accessed by using ANDROID application.*

***Keywords:** RFID tag, RFID Reader (EM18), RS485, ANDROID, GSM, LCD.*

I. INTRODUCTION

In today's world transportation system has a very vital role to play in day to-day life. Most of the people are being carried by the bus transportation system. Because of the ever increasing development the requirement of this system is increasing day by day. To resolve the problem of keeping track of the entire buses we have come up with a solution of BUS TRACKING [1]. This system basically consisting of 3 units namely, Bus unit, Bus-stop unit, Bus depot (Master) unit. The Bus unit consists of RFID tag, 4 key keyboard & GSM. The Bus stop unit consisting of RFID reader along with LCD. The 2 Bus stops are interconnected with RS485 interface.

Here as soon as the Bus comes near the Bus -stop it transmits its own id to the Bus stop. The Bus-stop consisting of LCD which will display the Bus id & Bus-stop name. The Bus-stop then sends all this information to the master terminal. On the master terminal we have a pc which will indicate the position of bus graphically on VISUAL BASIC Software. Also the user will get the information about the bus on his/her ANDROID application. The authorized people will get the short messages on their respective smart phones.

Radio Frequency Identification (RFID) is an automatic identification method, based on Storing and remotely retrieving data using devices called RFID tags or transponders. The technology requires the cooperation of an RFID reader and an RFID tag. An RFID tag is an object that can be applied to an object for the purpose of identification and tracking. This can be done by using radio waves [2].

RFID (RADIO FREQUENCY IDENTIFICATION)

RFID tracking system is also called as Vehicle Tracking application. There is a relative lack of research concerning tracking and monitoring of vehicle movement. This study aims at assessing the feasibility of applying RFID for vehicle tracking purposes. There are different types of tracking devices available in market today. Radio Frequency Identification (RFID) is an emerging technology that uses wireless radio waves to identify objects from a distance [1]. RFID enables the user to capture real-time information in fast moving and bulky product flows with the aim of achieving a

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high degree of efficiency and assuring high quality. The components of a typical RFID system include an RFID tag, an RFID reader, an RFID middleware and the backend system. The RFID tag is the identification device attached to the item to be tracked. The RFID reader and antenna are devices that can recognize the presence of RFID tags and read the information stored on them. The lower costs and the increasing capabilities of the RFID technique attract attention in keeping track and monitoring the vehicles on the road [2].

A basic RFID system consists of three components [3]:

- ✓ An antenna or coil
- ✓ A transceiver (with decoder)
- ✓ A transponder (RF tag) electronically programmed with unique information [4]

These are described below:

ANTENNA

The antenna emits radio signals to activate the tag and read and write data to it. Antennas are the conduits between the tag and the transceiver, which controls the system's data acquisition and communication. Antennas are available in a variety of shapes and sizes. These are mounted on bus-stops, bus.

Interrogation is not required; a sensor device can activate the field. Often the antenna is packaged with the transceiver and decoder to become a reader, which can be configured either as a handheld or a fixed mount device. The reader emits radio waves in ranges of anywhere from one inch to 100 feet or more, depending upon its power output and the radio frequency used. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit (silicon chip) and the data is passed to the host computer for processing.

TAGS (TRANSPONDERS)

An RFID tag is comprised of a microchip containing identifying information and an antenna that transmits this data wirelessly to a reader. (As shown in Fig. :1), At its most basic, the chip will contain a serialized identifier, or license plate number, that uniquely identifies that item, similar to the way many bar codes are used today. A key difference, however is that RFID tags have a higher data capacity than their bar code counterparts. These increase the options for the type of information that can be encoded on the tag. The amount of data storage on a tag can vary, ranging from 16 bits on the low end to as much as several thousand bits on the high end. Of course, the greater the storage capacity, the higher the price per tag. Like all wireless communications, there are a variety of frequencies or spectrum through which RFID tags can communicate with readers. Low frequency tags are cheaper than ultra-high frequency (UHF) tags, that uses less power and are better able to penetrate nonmetallic substances.

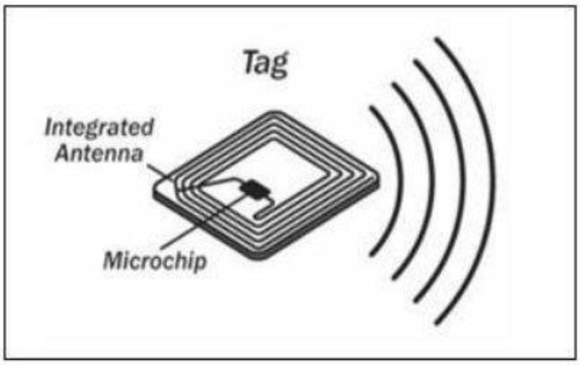

Figure 1: RFID tag

II. PROPOSED SYSTEM

There are 3 terminals

- ✓ Device on the Bus
- ✓ Device on Bus Stop
- ✓ Device on bus stand (master)

DEVICE ON THE BUS

This is a µc based kit which sends its id and other data wirelessly to the device on the bus s top. Once the bus stops in front of bus stop it transmits its own id. The RFID tag will transmit the bus id to bus stop. Also we have 4 keys to determine conditions such as bus cancel, bus delay, bus break down etc. These conditions are sending to the base station via SMS using GSM modem, as shown in fig.2.

DEVICE ON BUS STOP

This device will receive the data from the device on the bus via RFID card and then transmit it through RS 485 using a dedicated RS 485 interface. The data frame will contain the bus id and the bus stop id, as shown in fig.3.

This device will receive the data from the device on the bus stop which contains the bus id and the bus stop id and then transmits it to PC. PC will have a VB based map indicate the location of the bus. As shown. Also the base station will receive the SMS and display the bus status to all the bus - stops, as shown in fig.4. [5].

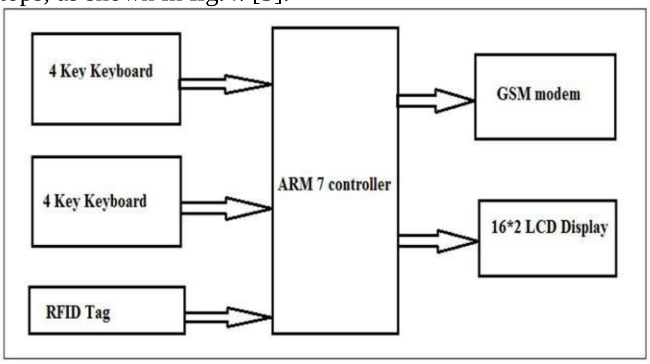

Figure 2: Transmitter (Bus Unit)

Android app based enquiry: Here the user can enquire about the bus status from anywhere to get the bus status like delay, cancel, etc. This way the commuter can plan the journey ahead of time. (As shown in fig.2, 3, and 4)

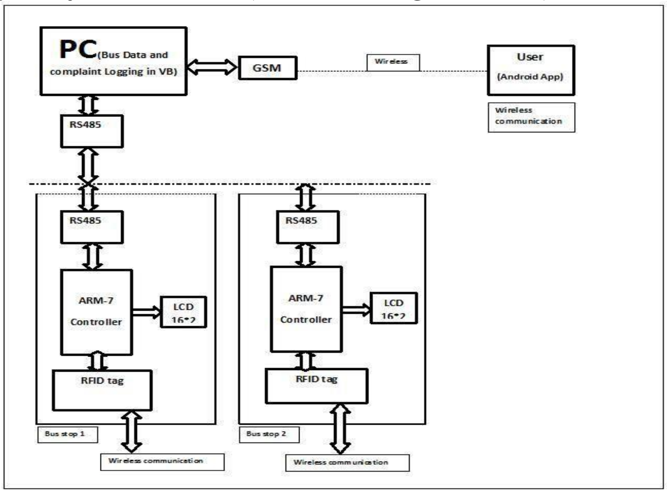

Figure 3: Receiver

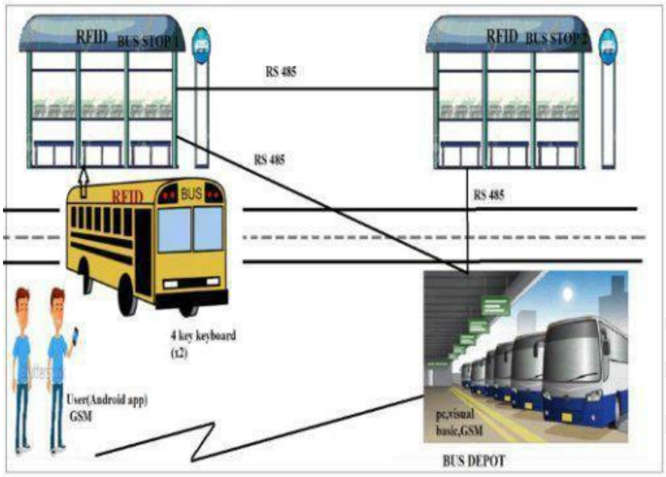

Figure 4: Pictorial representation

III. SYSTEM DESIGN

WORKING OF THE RFID TAG

This module directly connects to any microcontroller UART or through a RS232 converter to PC. It gives UART/Wiegand26 output. This RFID Reader Module works with any 125 KHz RFID tags. (Figure 5)[3].

SPECIFICATION

5VDC through USB (External 5V supply will boost range of the module)

Current: <50mA

Operating Frequency: 125 KHz

Read Distance: 10cmSize of RFID reader module: 2mm (length) * 32mm (width) * 8mm (height).

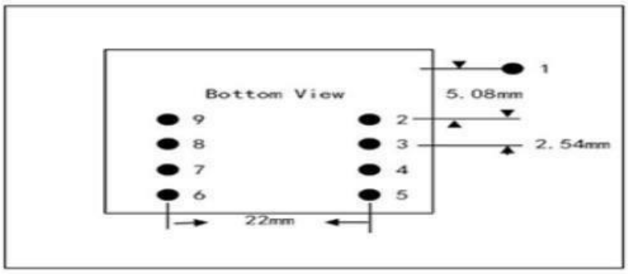

Figure 5: RFID tag

RFID READER: EM18 (WIGAND PROTOCOL)

RFID reader is interfaced with the microcontroller. RFID reader works on Wigand protocol and transmit the wireless signal at 125 KHz. RFID reader have two data line i.e. DATA0 and DATA1. Both the line is active low and is connected at the external interrupt pins (INT0, INT1) of the microcontroller. Logic 1 is transmitted on DATA1 line and logic 0 is transmitted on DATA0 line. Interfaced RFID readers continuously transmit the electromagnetic field across it. The range is max of10cm.when the RFID tag/card comes within this range the RFID card gets powered up and provides their 26 bit ID data to the RFID reader. (Figure 6)

RFID

RFID READER (Dedicated INT0 (RB0 and INT1 RB3))

WIEGAND PROTOCOL

Voltage: 5V and current 50 mA

IV. RF ID PROXIMITY READER CONNECTIONS

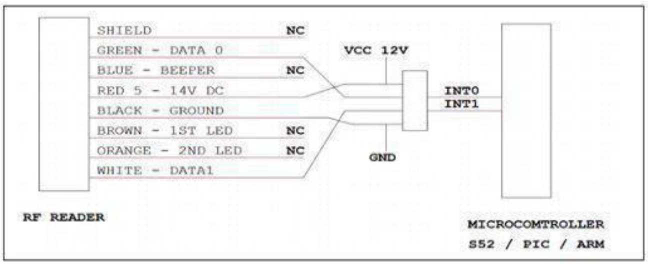

Figure 6: RFID reader

As shown, the RFID reader comes with the following connections as shown in the diagram above. In this we only connect 4 connections namely VCC, GND, DATA 1, DATA 2.Here the data 1 and data 2 are connected to the interrupt pins of the µC. The Weigand protocol is an Interrupt based

V. WIEGAND PROTOCOL WORKING

According to previous information, the Weigand protocol is an Interrupt based protocol in which the data is given to the µC in the form of interrupts .Which means that the data is not transferred directly to the µC .The µC has to interpret the data from the interrupts that it gets from data 1 and data 0 line of

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RF reader, which are connected to the INT1 and INT 0 of the µC respectively. (Figure 7)

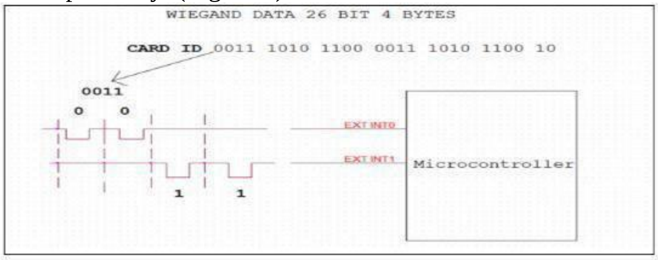

Figure 7: Weigand protocolworking

Here as seen from the above diagram, the data is coming in the form of interrupts to the µC.

ARM7 LPC2138

The LPC2131/32/34/36/38 microcontrollers are based on a 16/32-bit ARM7TDMI-S CPU with real-time embedded trace support, that combine the microcontroller with 32 kB, 64 kB,

128 kB, 256 kB and 512 kB of embedded high-speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance. Due to tiny size and low power consumption, these microcontrollers are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale performance. With wide ranges of serial communication interfaces and on-chip SRAM options of 8 KB, 16 KB, and 32 KB, they are very well suited for communication gateways and protocol converters, soft modems, voice recognition and low-end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit 8-channel ADC(s), 10-bit DAC, PWM channels and 47 GPIO lines with up to 9 edge or level sensitive external interrupt pins make these microcontrollers particularly suitable for industrial and medical systems.

SOFTWARE IMPLEMENTATION

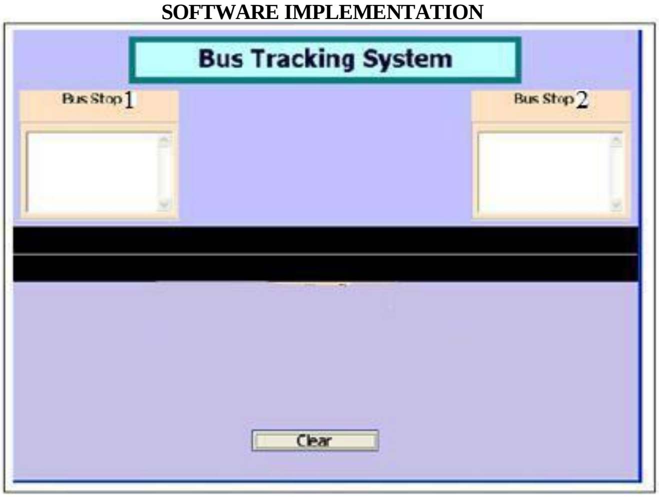

Figure 8: VB software

VI. CONCLUSION & FUTURE SCOPE

The system provides the efficient way for Bus tracking, as it includes the less time delays. The information is obtained from the master terminal quickly. Also this system has low power consumption as compared to other implemented systems. And finally the system gives correct high end result which is efficient way for guiding tourist.

In the future, we are planning to enhance the system with some other estimation tools and statistical analysis. This might be used not only by public users but also by decision makers in the local municipalities. Moreover, since the system is developed with open standards and open sources, it is easily extended with future technologies according to users' needs.

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REFERENCES

[1] International Journal of Engineering Research and General Science Volume 4, Issue 2, March April, 2016,"Vehical tracking system".
[2] Mahammad Abdul Hannan, Aishah Mustapha, AiniHussain, ―RFID and communication technologies for an intelligent bus monitoringand management system,‖ Turkish Journalof Electrical Engineering and Computer Science, pp: 106120, 2012.
[3] Wikipedia "RFID" (2004), Wikipedia, the Free Encyclopedia. 4 Dec. 2004 http://en.wikipedia.org/wiki/ RFID
[4] 2015 International Conference on Innovation Information in Computing Technologies(ICIICT), Chennai, India, An RFID Based System For Bus Location Tracking And Display.
[5] Ngai, E.W.T., Li, C.L., Cheng, T.C.E., LunY.H.V., Lai, K.H., Cao, J. et al. (2010). Design and development of an intelligent Context aware decision support system for real time monitoring of container terminal operations. International Journal of Production Research, 49(12), 35013526. http://dx.doi.org/10.1080/002075410038