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Priority Based Vehicle Traffic Control System using RFID And GSM Technology

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Abstract: Traffic congestion represents a major problem for most urban areas. This project presents an intelligent traffic control system to pass emergency vehicles smoothly. In these days we know the traffic is more in the rush hours and we may struck in the traffic for a while. Where coming to the point in the case of emergency vehicles like ambulances, VIP vehicles also may wait in the signal for a long time until the red signal turns into green signal. This may also leads to loss of human lives because of not reaching their destinations in proper time. To overcome this problems we are implementing a new trend technology by categorizing the vehicles mainly into three type's namely High priority, Normal, Stolen vehicles we may also increase the category depending up on the priorities. These technologies represent an easy way to make the user aware about a traffic jam in a specific road. The purpose of this project is to fill-up this gap and contribute to reducing traffic congestion in big cities by proposing a sequential approach intended to identify, control, and manage traffic congestion. The suggested system considers active Radio Frequency Identification (RFID), and GSM technologies. Each individual vehicle is equipped with special radio frequency identification (RFID) tag, which makes it not easy to remove. We use RFID reader, ARM system-on-chip to read the RFID tags of the vehicle. It also determines the network congestion, and hence the green light duration for that path. If the RFID-tag-read belongs to the stolen vehicle, then a alarm is raised and then the nearby polices will get alerted. In addition, when an ambulance is approaching the junction, it will communicate to the traffic controller in the junction to turn ON the green light. We also had traffic control for the VIP vehicles. Here we are making a setup of Green signal by identifying the which type of vehicle is in the traffic if the vehicle is a high priority one and then if the signal is in red it automatically turns into green by giving way to that vehicle here we are making an arrangement at every traffic signal for monitoring the high priority vehicle. Thus we implement this setup for both the emergency vehicles and stolen vehicles.

Keywords: RFID, GSM, VIP vehicles, ZigBee.

I. INTRODUCTION

Traffic congestion represents a major problem for most urban areas. This project presents an intelligent traffic control system to pass emergency vehicles smoothly. In these days we know the traffic is more in the rush hours and we may strike in the traffic for a while. Where coming to the point in the case of emergency vehicles like ambulances, VIP vehicles also may wait in the signal for a long time until the red signal turns into green signal. This may also leads to loss of human lives because of not reaching their destinations in proper time. India is the second most populour Country in the World and is a fast growing economy. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints. Also, Indian traffic is non-lane based and chaotic. It needs a traffic control solutions, which are different from the developed Countries. Intelligent management of traffic flows can reduce the negative impact of congestion. In recent years, wireless networks are widely used in the road transport as they provide more cost effective options. Technologies like ZigBee, RFID and GSM can be used in traffic control to provide cost effective solutions. RFID is a wireless technology that uses radio frequency electromagnetic energy to carry information between the RFID tag and RFID reader. The main aim of this project is to control the traffic in an easy way. It is very useful for fast transportation. In this project we are implementing a new trend technology by categorizing the vehicles mainly into three type's namely High priority, Normal, Stolen vehicles we may also increase the category depending up on the priorities. These technologies represent an easy way to make the user aware about a traffic jam in a specific road. The purpose of this project is to fill-up this gap and contribute to reducing traffic congestion in big cities by proposing a sequential approach intended to identify, control, and manage traffic congestion. The suggested system considers active Radio FrequencyIdentification(RFID),andGSM technologies.

II. EXISTING SYSTEM

A system has been investigated for the detection of incoming direction of an emergency vehicle. Acoustic detection methods based on a cross microphone array have been implemented. It is shown that source detection based on time delay estimation outperforms sound intensity techniques, although both techniques perform well for the application. The relaying of information to the driver as a warning signal has been investigated through the use of ambi-sonic technology and a 4 speaker array which is ubiquitous in most modern vehicles. Simulations show that accurate warning information may be relayed to the driver and afford correct action.

III. PROPOSED SYSTEM

The block diagram of the project is shown below, consists of RFID reader RFID tag. Here we are using a high frequency RFID reader to cover a wide area of the traffic. The RFID Tag is embedded into the dash board of the vehicle. During the registration of the vehicle the RFID Tag is provided with the details of the vehicle model, unique ID number and its category is stored. The priority of the vehicle is categorized with the help of the unique number. RFID readers are fixed at every junctions on top of the road. The reader read the data of the Tags and checks the appropriate Tag with the data present in the main microcontroller system. The main system is connected to the police to update about the stolen vehicle to change its priority from normal to stolen.

A. Application:

- Military and aerospace embedded software application.
- Communication Applications.
- Industrial automation and process control software.
- Mastering and complexity of application.
- Reduction of product design time.
- Real time processing of ever increasing amounts of data.
- Intelligent , autonomous sensors.

B. Block Diagram

An Embedded System is a combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a specific function. An embedded system is a microcontroller-based, software driven, reliable, real-time control system, autonomous, or human or network interactive, operating on diverse physical variables and in diverse environments and sold into a competitive and cost conscious market. A computer-on-a-chip is also a variation of a small chip which mixes the processor core (CPU), some memory, and I/O (input/output) lines, all on one chip. The laptop-on-a-chip is named the PC who's correct that means may be a computer employing a (number of) microprocessor(s) as its CPUs, whereas the idea of the PC is thought to be a microcontroller. A microcontroller is often viewed as a collection of digital logic circuits integrated on one microchip. This chip is employed for less than specific applications.

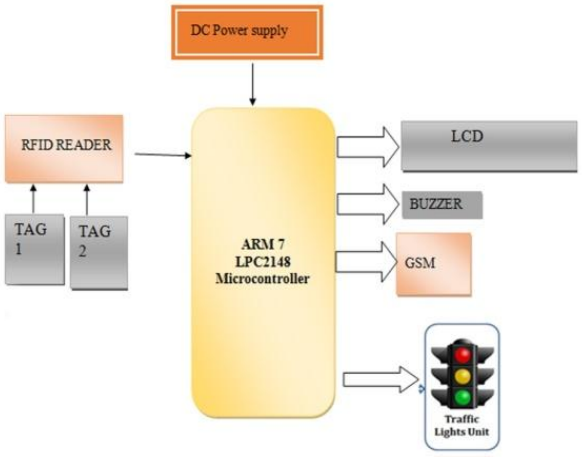

Fig1. Block Diagram.

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. This power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage(no frequency) with the amplitude of +5V and +12V for various applications. In this section we have Transformer, Bridge rectifier, are connected serially and voltage regulators for +5V and +12V (7805 and 7812) via a capacitor (1000µF) in parallel are connected parallel as shown in the circuit diagram below. Each voltage regulator output is again is connected to the capacitors of values (100µF, 10µF, 1 µF, 0.1 µF) are connected parallel through which the corresponding output(+5V or +12V) are taken into consideration.

C. RFID

RFID is short for Radio Frequency Identification. Generally a RFID system consists of 2 parts. A Reader, and one or more Transponders, also known as Tags. RFID systems evolved from barcode labels as a means to automatically identify and track products and people. You will be generally familiar with RFID systems as seen in Fig2.

Fig2.RFID Reader.

Contact less Payment Systems: RFID tags used to carry payment information. RFIDs are particular suited to electronic Toll collection systems. Tags attached to vehicles, or carried by people transmit payment information to a fixed reader attached to a Toll station. Payments are then routinely deducted from a users account, or information is changed directly on the RFID tag.

Access Control: RFID Readers placed at entrances that require a person to pass their proximity card (RF tag) to be "read' before the access can be made.

Product Tracking and Inventory Control: RFID systems are commonly used to track and record the movement of ordinary items such as library books, clothes, factory pallets, electrical goods and numerous items.

D. GSM (Global System for Mobile communications)

GSM(Global System for Mobile communications) is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. GSM networks operate in four different frequency ranges. Most GSM networks operate in the 900 MHz or 1800 MHz bands. Some countries in the Americas use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated. The rarer 400 and 450 MHz frequency bands are assigned in some countries, where these frequencies were previously used for first-generation systems. GSM-900 uses 890–915 MHz to send information from the mobile station to the base station (uplink) and 935–960 MHz for the other direction (downlink), providing 124 RF channels (channel numbers 1 to 124) spaced at 200 kHz. Duplex spacing of 45 MHz is used. In some countries the GSM-900 band has been extended to cover a larger frequency range. This 'extended GSM', E-GSM, uses 880–915 MHz (uplink) and 925–960 MHz (downlink), adding 50 channels (channel numbers 975 to 1023 and 0) to the original GSM-900 band. Time division multiplexing is used to allow eight full-rate or sixteen half-rate speech channels per radio frequency channel. There are eight radio timeslots (giving eight burst periods) grouped into what is called a TDMA frame. Half rate channels use alternate frames in the same timeslot. The channel data rate is 270.833 kbit/s, and the frame duration is 4.615 ms.

GSM Advantages: GSM also pioneered a low-cost, to the network carrier, alternative to voice calls, the Shortt message service (SMS, also called), which is now supported on other mobile standards as well. Another advantage is that the standard includes one worldwide Emergency telephone number, 112. This makes it easier for international travelers to connect to emergency services without knowing the local emergency number.

IV. WORKING PROCEDURE

In this project we are using ARM 7 LPC2148 Microcontroller which consumes very low power which can operate with only 3.3 v DC and high number of GPIO Pins. Our project specifies the "Priority Based Vehicle Traffic Control System Using RFID Technology". On which we are making to control traffic signals automatically based on priority of vehicles. The modules are connected to the microcontroller through serial ports. The RFID module is connected to the serial port 1 i.e.UART0 and GSM module to the serial port 2 i.e.UART1. The color LEDs are connected to the GPIO pins. The Vehicle consists of RFID tags which are integrated in it. The RFID readers are placed in every junction by interfacing with microcontroller. When the registered vehicle is arrived to the particular junction the RFID reader reads the tag unique identification number and the signals are sent to the microcontroller. The microcontroller receives the signal and does the processing to the required unique number. Based on vehicle priority the traffic signals will be operated. The project has been implemented successfully and executed the project and here are the final result pics of our project.

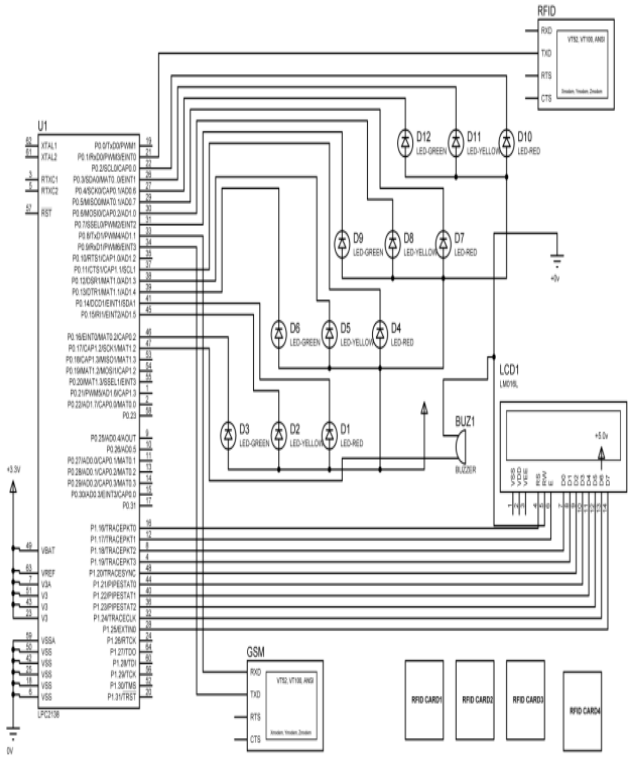

Fig3. Schemetic Diagram

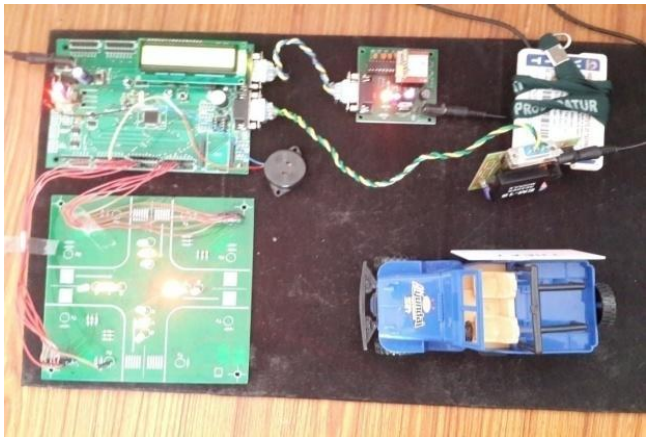

Fig4. Project Functioning.

Advantages

- Automatic controlling
- Route clearance
- Theft vehicle can be easily identified
- Timing saving and life saving
- Fast transportation.

V. CONCLUSION

The project we have undertaken has helped us gain a better perspective on various aspects related to our course of study as well as practical knowledge of electronic equipments and communication. We became familiar with software Analysis, designing, implementation, testing and maintenance concerned with our project. The dynamic change of state

using background referencing method is successful in solving the issue of fixed timing of controller in controlling traffic and consequently will minimize the traffic congestion on the roads. The use of real time data obtained through RFID sensor technique that serves as input to traffic light will be an innovative way of controlling traffic volume in developing countries. If they spend a lot of time in traffic jams, precious lives of many people may be in danger. With emergency vehicle clearance, the traffic signal turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through. The end product will have a simplistic design making it easy for user to interact with this will be essential because of the wide range of technical knowledge.

VI. REFERENCES

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