

Innovative Congestion Control System for Ambulance Using Raspberry Pi

P.Divya

M.Tech-ES,

Department of ECE,

Sree Rama Engineering College, Tirupathi.

A.M.GunaSekhar, B.Tech, ME, MISTE

Associate professor ,

Department of ECE,

Sree Rama Engineering College, Tirupathi.

Abstract:

The project aims in designing a system which is capable identifying the emergency situation in ambulance and automatically controls the traffic at the signal point. This feature helps in decreasing the death rate which occurs mostly due to traffic congestion in emergency situation. In case of vehicle theft situations the owner can know the vehicles current location and based on that he can stop the vehicle by sending a predefined SMS message to this system. The modules in the project are: Zigbee for establishing wireless communication between system in ambulance and the system at signal point, few control buttons in ambulance for indicating emergency situation, traffic signal indicators which are to be controlled depending on emergency situation in the ambulance. The controlling device of the whole system is a Microcontroller.

This system makes use of two Microcontrollers; Raspberry pi in the ambulance and PIC at the signal point. Control buttons, Zigbee modules and traffic signal indicators are interfaced to the Microcontroller. The emergency situation in the ambulance can be transmitted by just pressing a control button. The data will be transmitted from ambulance by a Zigbee module present in the ambulance. This data will be received by the Zigbee module present at signal point and this data is processed by controller and according action will be done on the traffic signal indicators. Through GSM from signal point status of signal is given to driver. The Microcontroller is programmed using Embedded C language which provides effective environment in performing the task.

Introduction:

Now a days, traffic congestion is increasing in this world because of this we are seeing so many deaths. So that only we introduced this project. Traffic congestion is a condition on transport networks that occurs as use increases and is characterized by slower speeds, longer trip times , and increased vehicular queuing. Congested roads can be seen as an example of the tragedy of the commons. Because roads in most places are free at the point of usage, there is little financial incentive for drivers not to over-use them, up to the point where traffic collapses into a jam, when demand becomes limited by opportunity cost. Increases the level of traffic only we used traffic signals and roads became 2-3 ways. Blocked traffic may interfere with the passage of emergency vehicles traveling to their destinations where they are urgently needed. Because of these emergency vehicles only we introduce the concept called "Innovative Congestion Control System For Ambulance Using Raspberry Pi".

Related work:

An Intelligent Automatic Traffic Light Controller Using Embedded Systems (IJIRSET, Volume4, Issue4, April 2015):

G.Monika and N.Kalpna et al proposed an idea of monitoring and controlling the traffic system based on density of the traffic. Here IR sensor is used to analysis the density of the vehicle and it is processed by 16F877A controller. Additionally vehicles which break the traffic rules during stop signal is observed by using OCR techniques and the information will be forward to the nearby police control room.

Density Based Traffic Signal System:

K.Vidhya and A.BazilaBanu et al describes the design to develop a density based dynamic traffic signal system. The density of the vehicle is given as an input by comparing four side of the image. The image are captured using the camera and it is converted into gray scale image for calculating the number of vehicles and corresponding signal timing will be changed. The above functions by using the Raspberry pi controller.

Road Traffic Congestion Monitoring And Measurement Using Active RFID And GSM Technology :

KoushikMandal and ArindamSez et al propose a method for calculating the waiting time in order to find the traffic congestion in the road through simulation. Here the probe vehicle is used for collecting real time traffic data using RFID tag.This information is then forwarded to the PC for further processing

Density Based Traffic Control System With Advanced Monitoring Techniques :

Mrs. AshwiniSawant and Rishi Hemdev et al simulated a framework for an automatic and dynamic traffic light control system. During traffic congestion the green signal timing are increased or decreased based on the density of the vehicles. This density of the vehicle is achieved by using IR sensor. Omni vision camera is used for monitoring traffic violation.

Intelligent Traffic Light And Density Control Using IR Sensors And Microcontroller :

MsPromilaSinhmar implemented a multiple traffic light control and monitoring system. The microcontroller used in the system is 89V51RD2 which is aMCS-51 family. The density of the vehicle is measured by using IR transmitter and IR receiver. According to the density the microcontroller is used to change the time delay in traffic system.

Design of an Intelligent Auto Traffic Signal Controller with Emergency Override:

Geetha.E and V.Viswanadha et al proposed a smart traffic signal controller, to minimize the traffic jams and provide the clearance for emergency vehicle. This system is based on PIC 16F877A microcontroller.IR

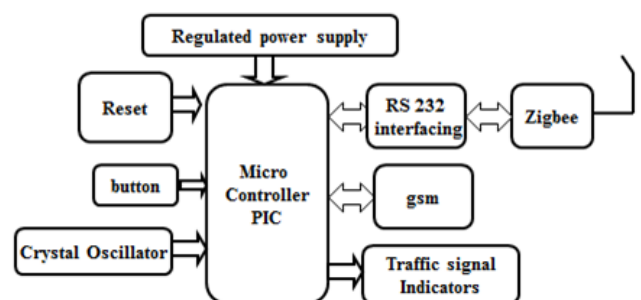
sensor is used for measuring the density of the vehicle and RFID is used for monitoring the emergency vehicle.

An Adaptive Traffic Light Control Scheme and Its Implementation in WSN-Based ITS:

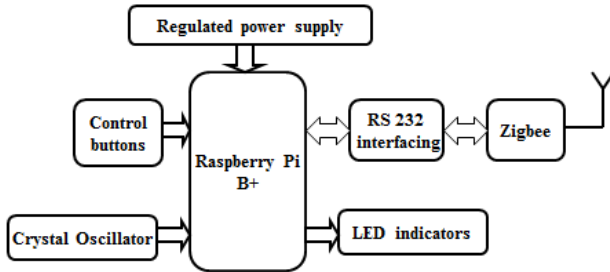
Binbin Zhou and Jiannong Cao et al presented an adaptive traffic light control scheme to adjust the traffic light based on the real time traffic detected including traffic volume, waiting time and vehicle density. This paper proposes an idea to implement this system using wireless sensor network based ITS. The project aims at a system which helps in ambulance .It have four control buttons which indicates south , north, east ,west buttons .when driver press this buttons that signals go to receiver then the traffic lights control with respect to the control buttons. Normally, traffic lights are operate with 2sec,when request is receive from ambulance that respected side green led will glow for 7sec and remaining lights are red. And also I am using theft alerts i.e., whenever some unauthorized persons are trying to open the door at that time the message alert will send to the owner of the vehicle, so that we can take security of that vehicle from unauthorized persons through GSM.

Block diagram:

1. At signal



2. In Ambulance



An embedded system is a computer system designed to perform one or a few dedicated functions often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer (PC), is designed to be flexible and to meet a wide range of end-user needs. Embedded systems control many devices in common use today.

Embedded systems are controlled by one or more main processing cores that are typically either microcontrollers or digital signal processors (DSP). The key characteristic, however, is being dedicated to handle a particular task, which may require very powerful processors. For example, air traffic control systems may usefully be viewed as embedded, even though they involve mainframe computers and dedicated regional and national networks between airports and radar sites. (Each radar probably includes one or more embedded systems of its own.)

Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. Physically embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

The main blocks of this project are:

- Micro controller
- Reset button
- Crystal oscillator
- Regulated power supply (RPS)
- LED indicators
- Zigbee module

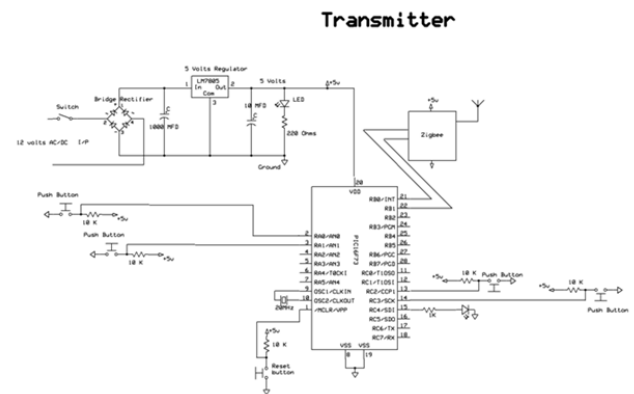
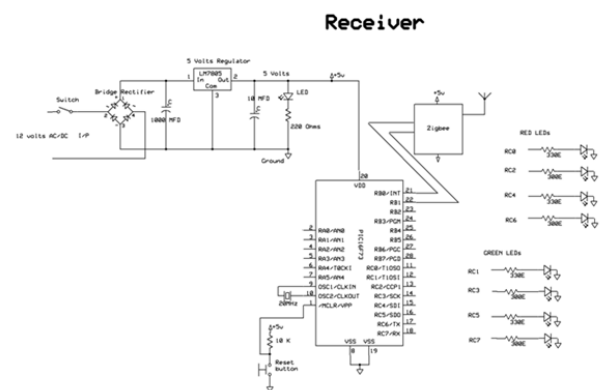


Fig 5.1: Schematic diagram of Innovative congestion control system for ambulance using zigbee



Advantages:

1. Used for ambulance in serious conditions
2. Sending request from zigbee wirelessly.
3. Traffic control by traffic police will be eliminated.

4. Traffic lights automatically control when request is received by ambulance.
5. Easy to install.
6. Efficient and low cost design.
7. Low power consumption.

Disadvantages:

1. The range of Zigbee is limited.

Applications:

This system can be practically implemented in real time ambulance. by this we can save many lives in emergency condition using wireless zigbee technology.

Result:

The project “Innovative congestion control system for ambulance using zigbee” is designed such that identifying the emergency situation in ambulance and automatically controls the traffic at the signal point and vehicle theft states given to the owner using GSM.

Conclusion:

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC’s with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

Future Scope:

Our project “Innovative congestion control system for ambulance using zigbee” The project can be extended by adding blood pressure measuring; temperature of the person etc. This project can be extended by using GPRS and 4G technologies. Through GPRS, we can monitor the house from anywhere in the world and 4G technologies can be used to view the person through video calling option. This helps in finding out the person and fast responding to the situation.

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