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IOT Based Intelligent Traffic Signal and Vehicle Tracking System

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ABSTRACT:

The motive of this paper is to design and implement "Intelligent Traffic with Emergency Control and Stolen Vehicle Tracking System" using RFID reader. Thus this system is capable to sense the density of vehicles for intelligent traffic management and also able to recognize emergency vehicles as ambulance to allow that signal for emergency control, as well as this system also recognizes stolen vehicles at signal junctions and updated in to IOT. It is significant to identify the density of traffic on real time mainly in metropolitan cities for signals control and active traffic management using traffic mass.

INTRODUCTION

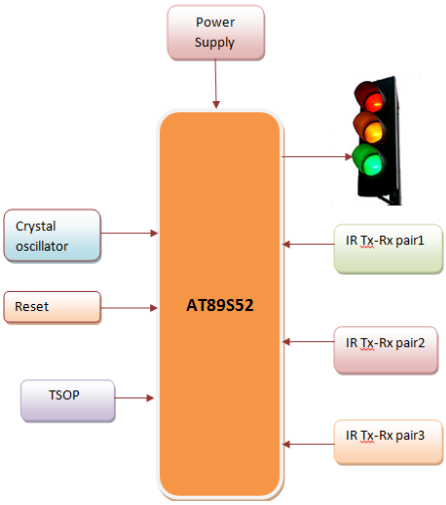
The main aim of this project is to build a system in which the signaling time at traffic signaling junction will be controlled according to the movement of ambulance. The purpose of this project is to implement an automated system for clearing the traffic for ambulance to help the people who met with accidents or the people who are in emergency conditions without any disturbance or delay. By this project we can implement an automatic traffic clearing system for ambulance and can provide medical support to the people with in time who are in critical conditions and can save their lives.

An Image taken at Four Road Junction

EXISTING SYSTEM

The Project is designed to check the density of traffic in particular place and the information is conveyed to traffic control station. The main purpose here is to make the ambulance to move faster even in heavy dense traffic to save the life. This project is designed with AT89S52 microcontroller. Three pairs of IR Tx-Rx are used here to indicate the density of the traffic. The module consists of an IR emitter and TSOP receiver pair. The high precision TSOP receiver always detects a signal of fixed frequency. Due to this, errors due to false detection of ambient light are significantly reduced.

BLOCK DIAGRAM



DRAWBACK

No wireless communication to next junction. No sensor to identify the pollution.

PROPOSED SYSTEM

In Density Control System we allow the Green signal more time on the direction which has the highest density

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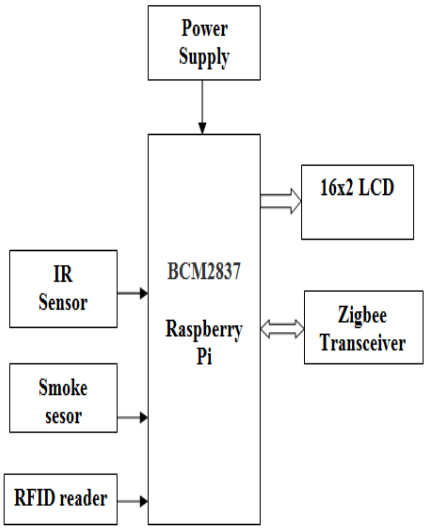
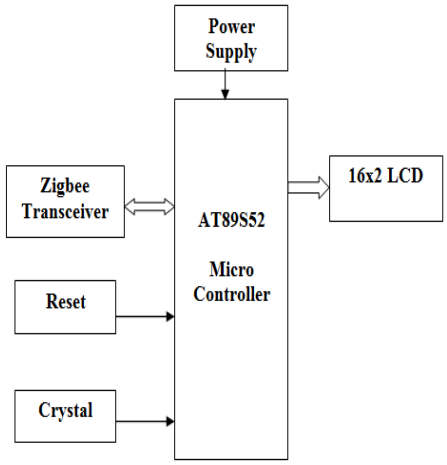
of vehicles. In Emergency Control System we recognize the ambulance using RFID reader among other vehicles from traffic and if system recognized emergency vehicle then that particular signal will be allowed and other signals will become red and an emergency alarm will be generated to indicate the activation of emergency signal. In the proposed system we are also placing the smoke sensors at the junctions to monitor the pollution status at junction. And here we are making the system as IoT which enable the 'traffic status over cloud/internet'. The proposed system also installed with zigbee which will send the traffic information to nearby junctions.

Block diagrams

TRANSMITTER SECTION:



RECEIVER SECTION:



HARDWARE MODULES USED

RASPBERRY-PI

Built on the latest Broadcom 2837 ARMv8 64bit processor, the new generation Raspberry Pi 3 Model B is faster and more powerful than its predecessors. With built-in wireless and Bluetooth connectivity, it becomes the ideal IoT ready solution.

Raspberry pi Board

Description

Model

- Brand: Raspberry Pi
- Model: 3 Model B

Bundle

- CPU: Broadcom BCM2837 64bit ARMv8 QUAD Core 64bit Processor powered Single Board Computer running at 1.2GHz
- Memory: 1GB RAM

Onboard LAN

- Wireless LAN: BCM43438 Wi-Fi on board
- Bluetooth: Bluetooth Low Energy (BLE) on board

Rear Panel Ports

- HDMI: Full size HDMI
- USB 1.1/2.0: 4 x USB 2.0
- Audio Ports: 4 pole Stereo output and Composite video port
- A 1.2GHz 64-bit quad-core ARMv8 CPU
- 802.11n Wireless LAN
- Bluetooth 4.1
- Bluetooth Low Energy (BLE)

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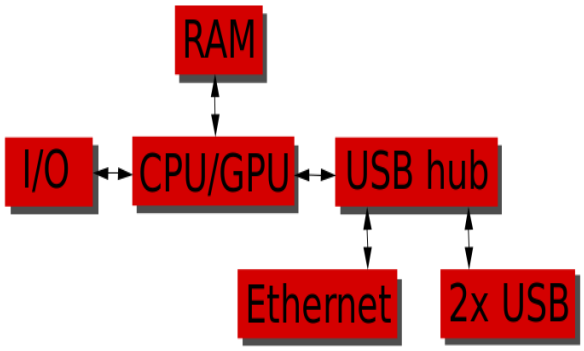
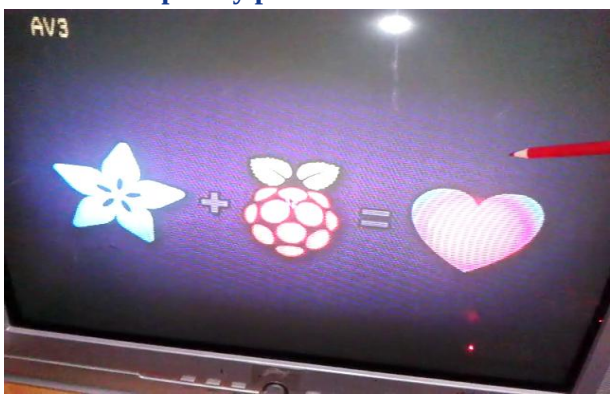
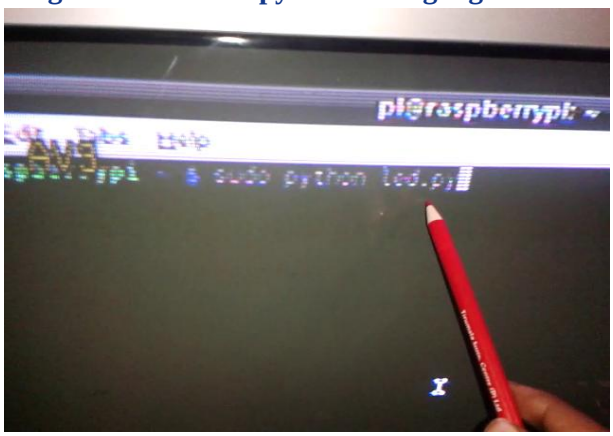
Basic Hardware of Raspberry-PI



OS used in Raspberry pi is Linux



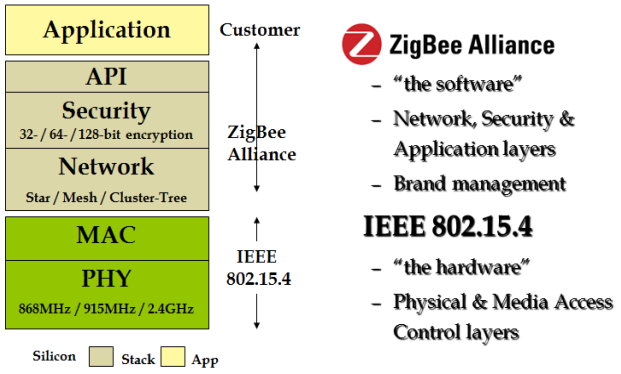
Coding will be done in python/C language



ZIGBEE

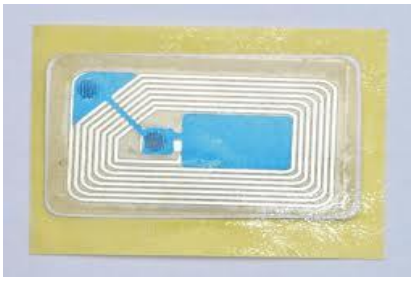
ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4-2003 standard for wireless personal area networks (WPANs), such as wireless headphones connecting with cell phones via short-range radio.

IEEE 802.15.4 & ZigBee In Context

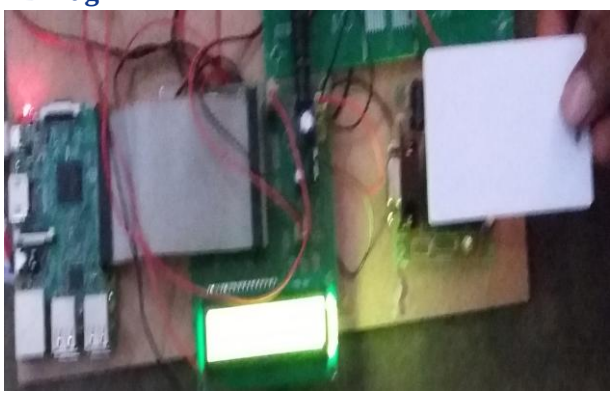


RFID

Radio-frequency identification (RFID) is the use of a wireless non-contact system that uses radio-frequency electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Some tags require no battery and are powered by the electromagnetic fields used to read them. Others use a local power source and emit radio waves (electromagnetic radiation at radio frequencies).



RFID Tag



RFID Tag placed near RFID Reader

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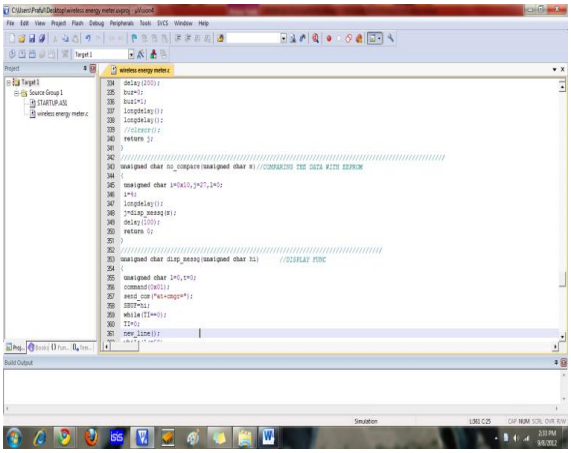
AT89S52

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

SOFTWARE TOOLS FOR AT89S52

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.



Screen shot of Keil uvision with C code

FLASH MAGIC

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller which supports ISP (in system programming) feature. Flash magic supports several chips like **ARM Cortex M0, M3, M4, ARM7 and 8051.**

Screen shot of Flash magic software while dumping

WORKING OF THE PROJECT

- Four Roads are marked with four directions (E,W,N,S).
- At the transmitter side we are using Raspberry pi to control the entire system. This works with 5V.
- Appearance of the vehicle is identified using IR sensor and then counted.
- If the density is more at that side then the Green light will remain for more time to clear the traffic.
- Emergency vehicles (VIP, Ambulance) are identified with RFID tags. If these cards are read by the reader then the signal light will turn green at that side to send them fast and buzzer alert will also be given.
- A smoke sensor is included to recognize the level of pollution in that junction.
- This information will be updated to the cloud by providing internet to Raspberry pi. This can be verified at any place using internet and unique login id and password.
- All these information will be displayed on 16x2 LCD at the receiver section which is transmitted through ZigBee communication.
- At the receiver side we are using AT89S52 as our controller. This works with 5V.

ADVANTAGES

- Accidents will be avoided
- Ambulance will reach faster
- Congestion will be controlled

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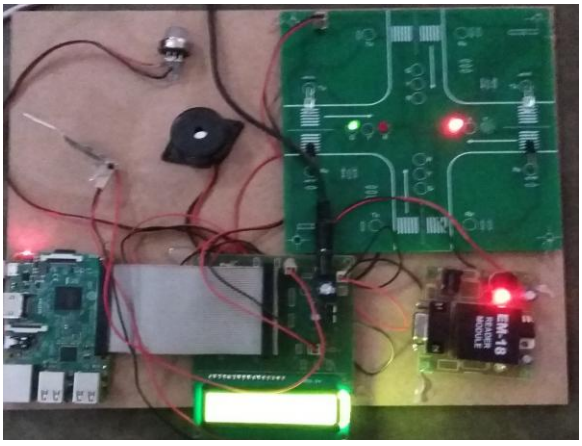
APPLICATIONS

- Public Transportation
- Traffic junctions

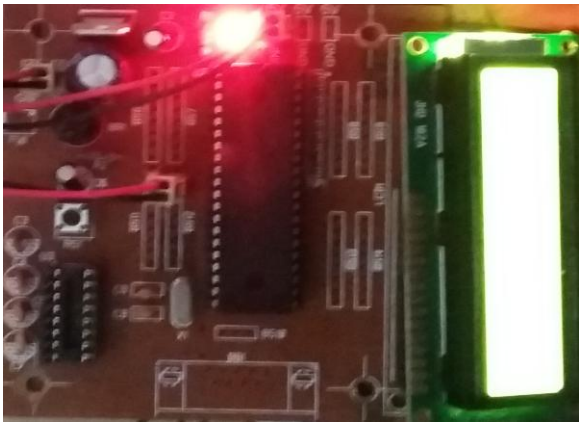
RESULTS OF THE PROJECT

Below picture represents Green signal at East side because of more density



Transmitter section

This picture displays the received information through ZigBee communication



Receiver section

FUTURE SCOPE

A GPS module can be included in vehicles to trace the location in case of Crossing the Red signal.

CONCLUSION

With automatic traffic signal control based on the traffic density in the route, the manual effort on the part of the traffic policeman is saved. As the entire system is automated, it requires very less human intervention. Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance has been implemented with Raspberry pi. Hence the study of RFID and Zigbee technologies are been carried out carefully.

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