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Raspberry Pi Based Self Organizing of Heavy Traffic using Zigbee Communication

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Abstract -- The Embedded Technology is now in its prime and the wealth of Knowledge available is mind-blowing. Embedded System is a combination of hardware and software. Embedded technology plays a major role in integrating the various functions associated with it. This needs to tie up the various sources of the Department in a closed loop system. This proposal greatly reduces the manpower, saves time and operates efficiently without human interference. Based on statistics from the World Health Organization(WHO), there are more than 161 million visually impaired people around the world, and 37 million of them are blind. Choosing clothes with suitable colors and patterns is a challenging task for blind or visually impaired people.

Introduction

With the advances in wireless communication and mobile computing, a future infrastructure less elf-organizing traffic information system, where vehicles can form a network for exchanging traffic information among them, will soon be realized. In an infrastructure less traffic information system, vehicles will act as mobile sensors and collect the traffic data as they travel. Smartphone's are a great choice for traffic sensing devices as they are now equipped with a variety of sensors such as global positioning system (GPS) receiver, accelerometer, gyroscope, Camera and microphone.

These sensors can be exploited to collect traffic data. Although there are many types of sensors available for traffic sensing, past studies have mainly focused on a GPS receiver. However, a GPS receiver consumes a lot of power, and hence it can significantly shorten the battery life. In this paper, we explore a possibility of using other types of sensors on a Smartphone for traffic sensing. Particularly, we investigate whether it is possible and how accurate it is to estimate the average speed of a vehicle from the data sensed by an accelerometer. Two estimation methods will be introduced and their accuracy will be evaluated.

Existing method

It is important to know the road traffic density real time especially in metropolitan cities for signal control and effective traffic management. In recent years, video monitoring and surveillance systems have been widely used in traffic management. Traffic control is a very difficult task for traffic control department, especially in metro cities.

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

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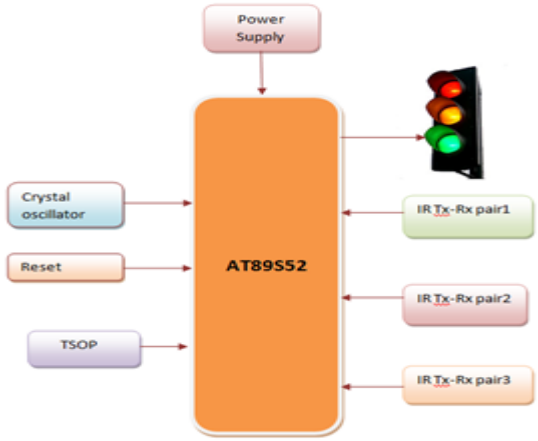


Draw backs

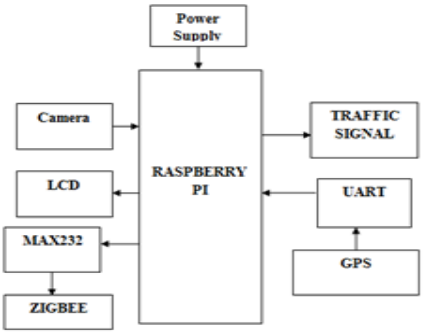
- Pollution created
- Loss of time
- Inefficient traffic system

Proposed method

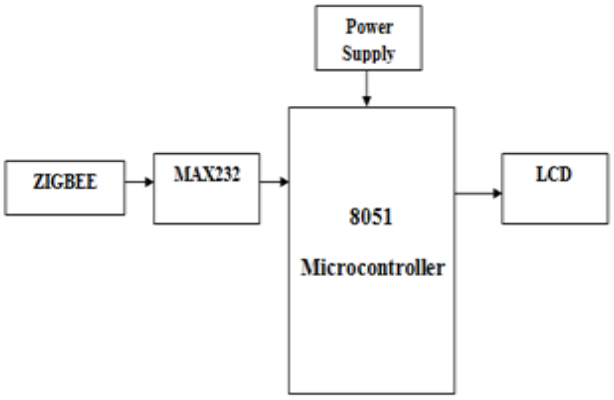
In this system we estimate the traffic level before entering the traffic section by using RASPBERRY PI, GPS and Zigbee. The camera is used to capture the image in traffic section by using MATLAB process we identify the traffic level, then GPS is used for to track the location andthis both information, that is traffic level and location are transmitted through zigbee.In vehicle section Zigbee is used to receive data from the traffic section. From this driver easily identify traffic level of the particular location so they choose the traffic less path.LCD is used to show the status of the project.

Block diagram

TRAFFIC SECTION:



VEHICLE SECTION:



Modules used in this project

RASPBERRY-PI

The **RaspberryPi** has Broadcom **BCM2836** system on a chip (SoC), which includes an a quad-core Cortex-A7 cluster. The Cortex-A7 MP Core processor is a high-performance, low-power processor that implements the ARMv7-A architecture. The Cortex-A7 MPCore processor has one to four processors in a single multiprocessor device with a L1 cache subsystem, an optional integrated GIC, and an optional L2 cache controller.

The Raspberry Pi foundation has finally released an upgraded version of the Raspberry Pi. Raspberry Pi 2 model B features much of the same ports and form factor as Raspberry Pi Model B+, by replaces Broadcom BCM2835 ARM11 processor @ 700 MHz with a much faster Broadcom BCM2836 quad core

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ARMv7 processor @ 900 MHz, and with an upgrade to 1GB RAM.

AT89S52

The AT89S52 is a low-voltage, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcomputer, which provides a highly flexible and cost-effective solution to many embedded control applications.

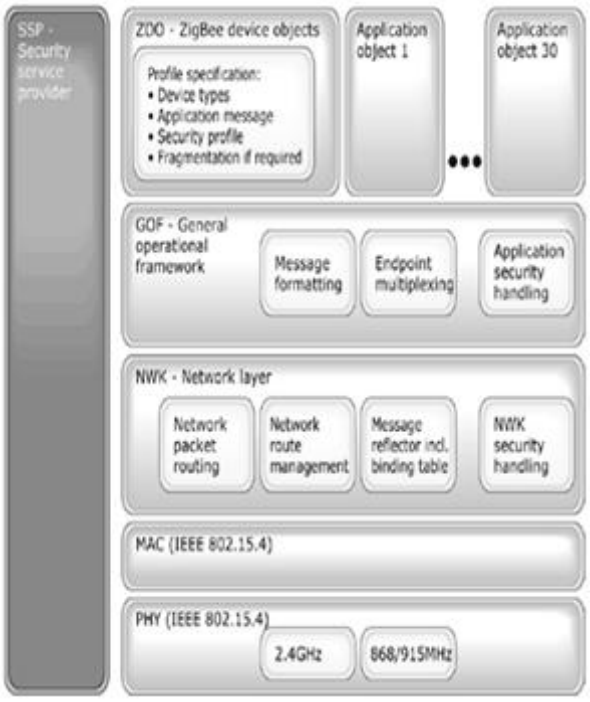
In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

ZIGBEE

ZigBee module. The €1 coin, shown for size reference, is about 23 mm (0.9 inch) in diameter. 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.

The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking. The ZigBee Alliance is a group of companies that maintain and publish the ZigBee standard.

ARCHITECTURE:



ZigBee is a home-area network designed specifically to replace the proliferation of individual remote controls. ZigBee was created to satisfy the market's need for a cost-effective, standards-based wireless network that supports low data rates, low power consumption, security, and reliability.

Basic concept of GPS

A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high

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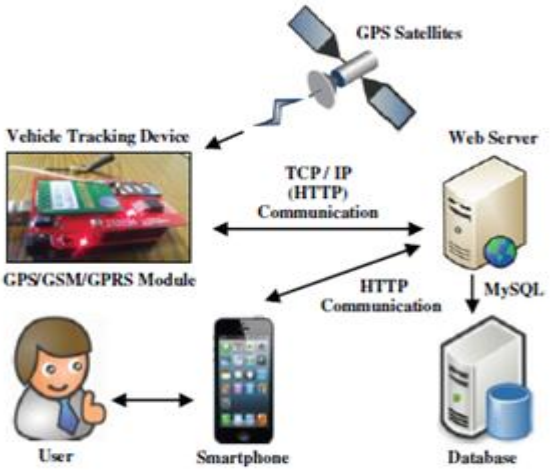
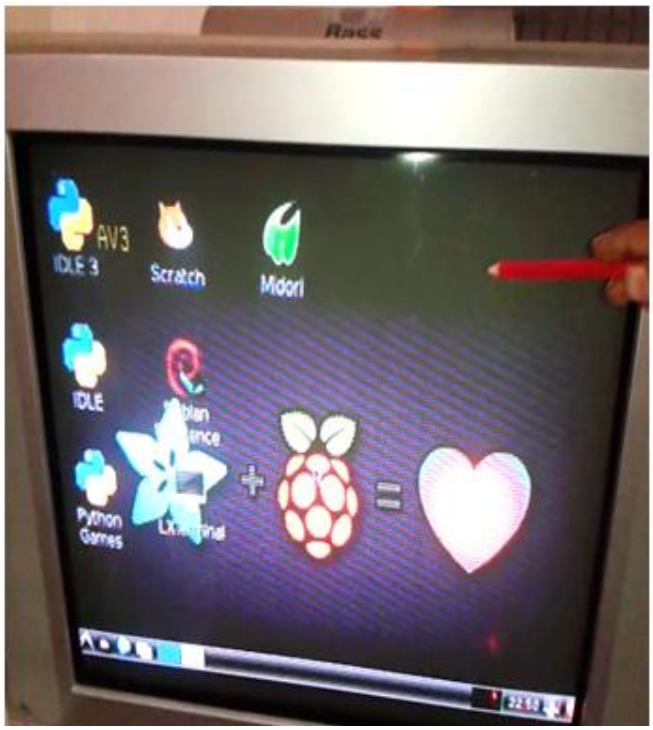
above the Earth. Each satellite continually transmits messages which include

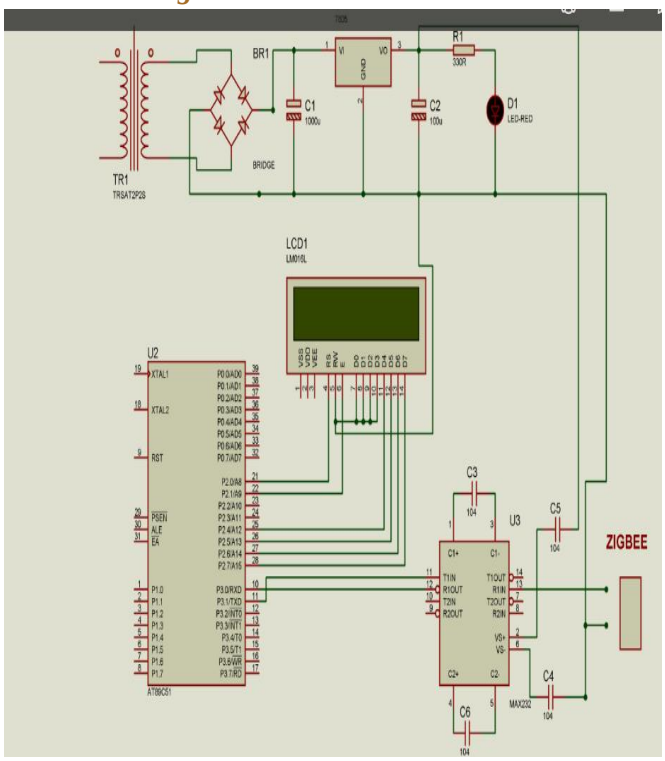
- the time the message was transmitted
- precise orbital information (the ephemeris)
- The general system health and rough orbits of all GPS satellites (the almanac).



OS used in Raspberry pi is Linux



Schematic Diagram:



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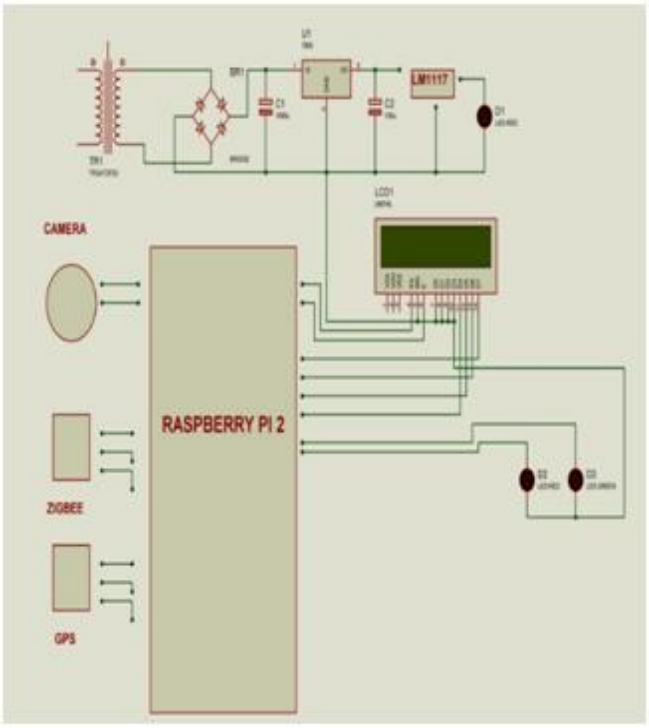

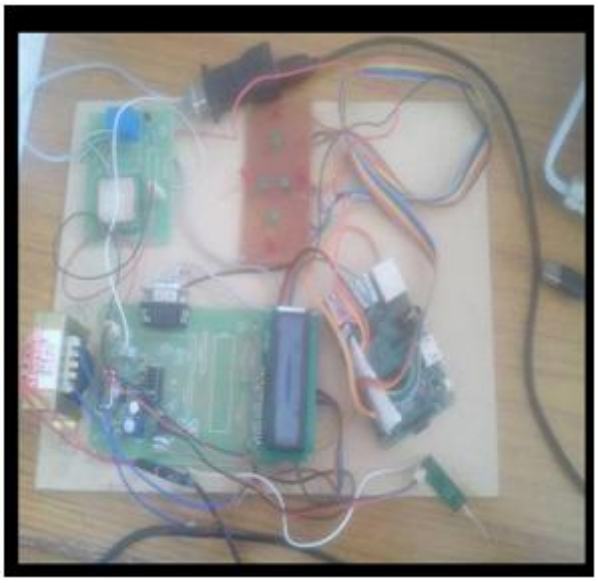

Results:

Advantages

- Enhanced safety
- Saves the human life
- Major accident avoided
- Biometric authentication

Applications:

- In traffic zones

Conclusion

Hence this project provides a best solution for the users about the traffic information in the zones through zigbee communication along with the latitude and longitude values so that user can alert regarding location.

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