

Vehicle Accident Identification System By Using GPS And GSM

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Abstract- Transportation is a basic need of society. It's make human life more easy and comfortable. As far as increasing transportation, accident is also increasing. It cause death of human and damages any part of body. To prevent the particular action, We try to implement a system is Accident detection and messaging system using GPS and GSM. In this system, the vibration sensor is used as an input to the system and corresponding response is analyzing by the Arduino. If accident occurs, sensors reading exceed the threshold and it takes the appropriate action. The SMS is send to the authorities and provide the immediate help to the people who met in an accident. The proposed embedded approach provides the promising result.

I. INTRODUCTION

1.1SYSTEM:

A system is an arrangement in which all its unit assemble work together according to a set of rules. It can also be defined as a way of working, organizing or doing one or many tasks according to a fixed plan. For example, a watch is a time displaying system. Its components follow a set of rules to show time. If one of its parts fails, the watch will stop working. So we can say, in a system, all its subcomponents depend on each other.

1.2 EMBEDDED SYSTEM:

As its name suggests, Embedded means something that is attached to another thing. An embedded system can be thought of as a computer hardware system having software embedded in it. An embedded system can be an independent system or it can be a part of a large system. An embedded system is a microcontroller or microprocessor based system which is designed to perform a specific task. For example, a fire alarm is an embedded system; it will sense only smoke.

1.2.1 Components of Embedded Systems

- It has hardware.
- It has application software.

- It has Real Time Operating system (RTOS) that supervises the application software and provide mechanism to let the processor run a process as per scheduling by following a plan to control the latencies. RTOS defines the way the system works. It sets the rules during the execution of application program. A small scale embedded system may not have RTOS. A Real time operating system is a time bound system which has well defined fixed time constants.

So we can define an embedded system as a Microcontroller based, software driven, reliable, real-time control system. An Embedded system is software embedded into computer hardware that makes a system dedicated for variety of application.

1.2.2 Characteristics of an Embedded System:

- **Single-functioned** – An embedded system usually performs a specialized operation and does the same repeatedly. For example: A pager always functions as a pager.
- **Tightly constrained** – All computing systems have constraints on design metrics, but those on an embedded system can be especially tight. Design metrics is a measure of an implementation's features such as its cost, size, power, and performance. It must be of a size to fit on a single chip, must perform fast enough to process data in real time and consume minimum power to extend battery life.
- **Reactive and Real time** – Many embedded systems must continually react to changes in the system's environment and must compute certain results in real time without any delay. Consider an example of a car cruise controller; it continually monitors and reacts to speed and brake sensors. It must compute acceleration or de-accelerations repeatedly within a limited time; a delayed computation can result in failure to control of the car.

- **Memory** – It must have a memory, as its software usually embeds in ROM. It does not need any secondary memories in the computer.
- **Connected** – It must have connected peripherals to connect input and output devices.
- **HW-SW systems** – Software is used for more features and flexibility. Hardware is used for performance and security.

1.2.3 Basic Structure of an Embedded System:

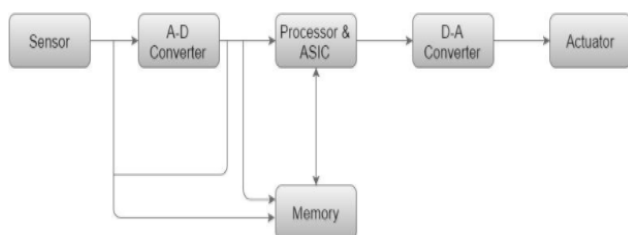


Fig 1.1 Basic structure of Embedded System

- **Sensor** – It measures the physical quantity and converts it to an electrical signal which can be read by an observer or by any electronic instrument like an A2D converter. A sensor stores the measured quantity to the memory.
- **A-D Converter** – An analog-to-digital converter converts the analog signal sent by the sensor into a digital signal.
- **Processor & ASICs** – Processors process the data to measure the output and store it to the memory.
- **D-A Converter** – A digital-to-analog converter converts the digital data fed by the processor to analog data
- **Actuator** – An actuator compares the output given by the D-A Converter to the actual (expected) output stored in it and stores the approved output.

1.3 EMBEDDED SYSTEMS – PROCESSORS:

Processor is the heart of an embedded system. It is the basic unit that takes inputs and produces an output after processing the data. For an embedded system designer, it is necessary to have the knowledge of both microprocessors and microcontrollers.

1.3.1 Processors in a System:

A processor has two essential units –

- Program Flow Control Unit (CU)
- Execution Unit (EU)

The CU includes a fetch unit for fetching instructions from the memory. The EU has circuits that implement the instructions pertaining to data transfer operation and data conversion from one form to another.

The EU includes the Arithmetic and Logical Unit (ALU) and also the circuits that execute instructions for a program control task such as interrupt, or jump to another set of instructions.

A processor runs the cycles of fetch and executes the instructions in the same sequence as they are fetched from memory.

1.4 TYPES OF PROCESSORS:

Processors can be of the following categories

- General Purpose Processor (GPP)
 - Microprocessor
 - Microcontroller

1.4.1 Microprocessor:

- A microprocessor is a single VLSI chip having a CPU. In addition, it may also have other units such as caches, floating point processing arithmetic unit, and pipelining units that help in faster processing of instructions.
- Earlier generation microprocessors' fetch-and-execute cycle was guided by a clock frequency of order of ~1 MHz. Processors now operate at a clock frequency of 2GHz

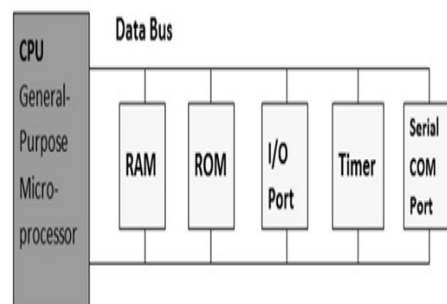


Fig 1.2 Block diagram of Microprocessor

1.4.2 Microcontroller

A microcontroller is a single-chip VLSI unit (also called microcomputer) which, although having limited computational capabilities, possesses enhanced input/output capability and a number of on-chip functional units.

- Microcontrollers are particularly used in embedded systems for real-time control applications with on-chip program memory and devices.

Advantages:

- Easily Customizable
- Low power consumption
- Low cost
- Enhanced performance

Disadvantages:

- High development effort
- Larger time to market

Applications of embedded system:

1. Home control system through voice
2. Real time monitoring of electricity to save from theft
3. Smart energy billing system
4. smart grid monitoring system
5. smart grid station
6. Real time accident protection using gsm
7. Remote monitoring system using gsm and pic microcontroller
8. Smart grid management and visualization.

II. LITERATURE SURVEY

The accident detection system provides emergency responders with crucial information at the earliest possible time. Reducing the time between when an accident takes place and when it is detected can reduce mortality rates. The entire works have to be integrated with the automobile to validate its functionality and reliability. Thus this work will reduce the accident death ratio in considerable amount even in rural roads. Then it has a great importance in day to day life of the people in the country like India. This proposed work will provide vital information about the accidents even in unpopulated area.

An automatic accident detection and reporting system is designed and implemented using wireless technologies like Zigbee to detect accident GSM modem for finding the location of vehicle in terms of latitude and longitude, as well as GSM for sending message on mobile at the receiver end.

The proposed model for accident detection system can prove to be an important aid in constructing smart transport systems in near future if implemented properly Also the system can be used by the owners of the transport

companies etc to monitor the vehicle speed, track its real time location etc using the android app. These features can also help in case of vehicle theft etc.

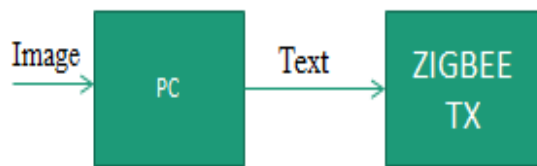
The task of recognizing some object in an image is one of the most difficult in the field of digital image processing. Many factors contribute to this difficulty, including variations in lighting and contrast, differences in orientation or size, variations in the surroundings of the object and other objects covering part of the object. This is also true for the specific recognition task of automatically finding a license plate in the image of a vehicle. The color of the vehicle may be the same as the plate, making the boundary between the plate and the vehicle difficult to detect. The vehicle may have other rectangular shapes such as lights, grills or bumpers that make it harder to distinguish the license from other parts of the vehicle. The plate may also be surrounded by a holder that covers part of it and alters its proportions. The plates vary greatly in size, color and layout from country to country. Some have extra symbols or pictures in the background that make it harder to identify the characters on the plate. The quantity of the characters may vary greatly, and some have all letters, others have all numerals, and the rest have some mixture of the two.

III. PROPOSED SYSTEM

Our project presents review on the accident detection techniques and some future possibilities in this field. Now-a-days lots of accidents happen on highways due to increase in traffic and also due to rash driving of the drivers. And in many situations the family members or the ambulance and police authority is not informed in time. This result in delaying the help reached to the person suffered due to accident. Road accidents constitute the major part of the accident .The purpose of the project is to find the vehicle where it is and locate the vehicle by means of sending a message using a system which is placed inside of vehicle system. Most of the times we may not be able to find accident location because we don't know where accident will happen. Our project which consists of both hardware and software with GSM is designed to avoid such situations.

3.1 BLOCK DIAGRAM:

3.1.1 Transmitter Section:



[1]

[2] Fig:3.1 Block diagram of transmitter Section

3.1.2 Receiver Section:

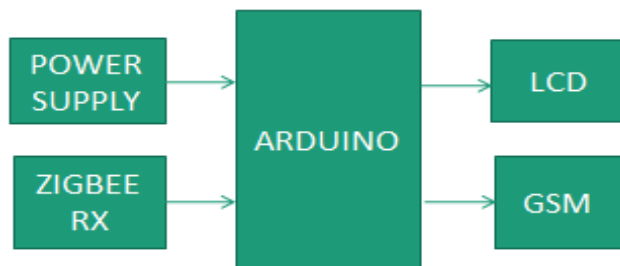


Fig:3.2 Block diagram of Receiver Section

The Block diagram consists of two sections:

1. Transmitter Section
2. Receiver Section

Transmitter Section:

- In Transmitter section, first the license plate image is given as input to the Matlab code. Then the image is converted into text format using some algorithm techniques.
- Algorithm to convert Image format to text:

Algorithm Explanation:

1. Loading Data base:

First, the Code is initialized and the license plate image is given to the Matlab.

2. Image acquisition:

Image acquisition is the process of acquire an image before the image will be process to another stage. It is also to determine the average image quality of the vehicle license plate recognition algorithm to be work on. The accuracy of the recognition will depend on the types of algorithm that had been used.

3. Resizing the input image:

The given input image is resized in such a way that it occupies less memory in the data base. In this stage, it counts the number of horizontal and vertical lines in the image.

4. RGB to Gray Scale Conversion:

The image which is given in the first stage in RGB image. This color image required 3 channels for extracting and also it occupies more space in the memory. Therefore, to reduce these limitations we need to convert RGB to Gray scale. Gray scale image requires only one channel and occupies less space in the memory.

5. Median Filter:

The median filter is a nonlinear digital filtering technique, often used to remove noise from an image or signal. Such noise reduction is a typical pre-processing step to improve the results of later processing (for example, edge detection on an image).

6. Morphological process:

Morphological processing is used for extracting and describing image component regions. It is usually applied to binary images.

7. Convolution:

Convolution is used for improving the quality of an image. Those include the blurring, sharpening, edge detection and noise reduction. By doing more processing on an image the quality of an image is reduced. From convolution we can enhance the quality of an image.

8. Number plate extraction:

The final number plate is extracted from the loaded image.

The text format image is triggered to the Arduino board which consists of Atmega 328 microcontroller through the Zigbee wireless transmission.

Zigbee Transmitter:

Zigbee transmitter is used to collect the required data and transmit the data to zigbee receiver for further process. Its low power consumption limits transmission distance to 10-100 meters line of sight depending on power output.

Receiver Section:

- In receiver section the data transmitted by the zigbee transmitter is received by the zigbee receiver and to the Arduino board.
- . The contrast bit and READ/WRITE are not often used so they can be shorted to ground. This puts LCD in highest contrast and read mode. We just need to control ENABLE and RS pins to send characters and data accordingly.
- with the receive pin (Rx) of the GSM module's RS-232 interface.
- In Arduino board, the given image is compared with the database stored in the microcontroller .If the both the data matched , then the accident location and victim details are send to the concern people and emergency facilities through the GSM in the sms format and data is displayed on the LCD 16 by 2 display.

3.2 LAY OUT DIAGRAM:

3.2.1. Arduino Uno interface 16*2 LCD:

In 16x2 LCD there are 16 pins over all if there is a back light, if there is no back light there will be 14 pins. One can power or leave the back light pins. Now in the 14 pins there are 8 data pins (7-14 or D0-D7), 2 power supply pins (1&2 or VSS&VDD or GND&+5v), 3rd pin for contrast control (VEE-controls how thick the characters should be shown), and 3 control pins (RS&RW&E). In the circuit, you can observe I have only took two control pins, this gives the flexibility. The contrast bit and READ/WRITE are not often used so they can be shorted to ground. This puts LCD in highest contrast and read mode. We just need to control ENABLE and RS pins to send characters and data accordingly.

The connections which are done for LCD are given below:

- PIN1 or VSS to ground
- PIN2 or VDD or VCC to +5v power
- PIN3 or VEE to ground (gives maximum contrast best for a beginner)
- PIN4 or RS (Register Selection) to PIN0 of ARDUINO UNO
- PIN5 or RW (Read/Write) to ground (puts LCD in read mode eases the communication for user)
- PIN6 or E (Enable) to PIN1 of ARDUINO UNO
- PIN11 or D4 to PIN8 of ARDUINO UNO
- PIN12 or D5 to PIN9 of ARDUINO UNO
- PIN13 or D6 to PIN10 of ARDUINO UNO
- PIN14 or D7 to PIN11 of ARDUINO UNO

The ARDUINO IDE allows the user to use LCD in 4 bit mode. This type of communication enables the user to decrease the pin usage on ARDUINO, unlike other the ARDUINO need not to be programmed separately for using it in 4 bit mode because by default the ARDUINO is set up to communicate in 4 bit mode. In the circuit you can see we have used 4bit communication.

3.2.2 GSM and Arduino Connections:

GSM Technology has grown so much, that literally there isn't a place on earth where there is no GSM signal. In such a scenario GSM provides us a wide scope in controlling things remotely from any place just with our finger tips. GSM also provides ease to easily communicate in a more robust way. A GSM module has an RS232 interface for serial communication with an external peripheral. In this case, the transmit pin (Tx) of the computer's Serial port is connected with the receive pin (Rx) of the GSM module's RS-232 interface. The transmit pin (Tx) of the RS-232 of GSM module is connected to receive pin (Rx) of microcontroller's serial transmission pin. And the serial transmit pin of the microcontroller is connected to the receive pin of the computer's Serial port.

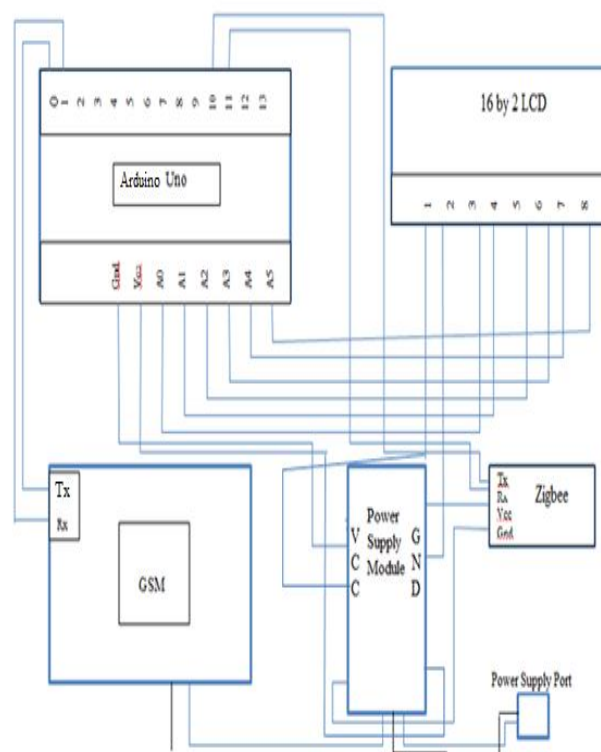


Fig 3.4 Layout Diagram

A GSM Module is basically a GSM Modem (like SIM 900) connected to a PCB with different types of output

taken from the board – say TTL Output (for Arduino, 8051 and other microcontrollers) and RS232 Output to interface directly with a PC (personal computer).

3.2.3 Zigbee interface with Arduino Uno:

Zigbee is a wireless communication module which use IEEE 802.15.4 standard. 802.15.4 is a IEEE standard for low power applications of radio frequency. It used in many products now a days for wireless communication functionality. It can be used as a transmitter and receiver both. It used serial communication to send and receive data. It have two series, series1 and series 2. Series 1 is comparatively easy to use and it is recommended for beginners. Series 1 zigbee module cannot work in mesh network. Mean it cannot talk to more than one zigbee. TX and RX pin of zigbee and Arduino are connected to each other. Arduino will send some instruction to zigbee and according to these instruction zigbee respond. Similarly zigbee receive instructions from other zigbee to which it have address. After receiving instructions or data from other zigbee. It send data to arduino through serial pins as shown in connection. zigbee receive instructions from other zigbee to which it have address. After receiving instructions or data from other zigbee. It send data to arduino through serial pins as shown in connection.

The 5v pin of arduino is connected to the power supply and ground pin is connected to common ground. The Tx and Rx pins in arduino are connected to the Rx and Tx pins in GSM module. TX and RX pin of zigbee and Arduino are connected to each other. Arduino will send some instruction to zigbee and according to these instruction zigbee respond.

In the project, 8 pins are used in 16 by 2 LCD display. In Arduino 5 analog pins, 2 digital pins, one power pin and ground pin is used. LCD is used in 4-bit mode. In four bit only 4 data pins. The four data pins D4,D5,D6,D7 of LCD are connected to the analog pins A2,A3,A4,A5 of arduino.

RS and Enable pins of LCD are connected to digital pins 10 and 11 respectively. The Vcc and ground of LCD are connected to power supply and common ground respectively. The 5v pin of arduino is connected to the power supply and ground pin is connected to common ground. The Tx and Rx pins in arduino are connected to the Rx and Tx pins in GSM.

EXPLANATION:

1. Initialize the GSM and LCD.
2. Load the license plate image from the database.

3. The loaded image is given as input to the Matlabcode .
4. Then the image is converted to text using image processing techniques like RGB to gray scale conversion, Morphological processing, Convolution.
5. The converted text is triggered to the arduinouno board through wireless communication zigbee transmitter and zigbee receiver.
6. This text is compared with the data stored in the arduinouno board.
7. If both data are matched , then victim location is sent through GSM.
8. If both data are not matched , warning message i.e., "Take action soon" is displayed on LCD.

IV. HARDWARE REQUIREMENTS

4.1 HARDWARE REQUIRED:

- Arduinouno
- Zigbee module
- Power supply
- LCD
- GSM module

4.1.1 Arduino:

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources.

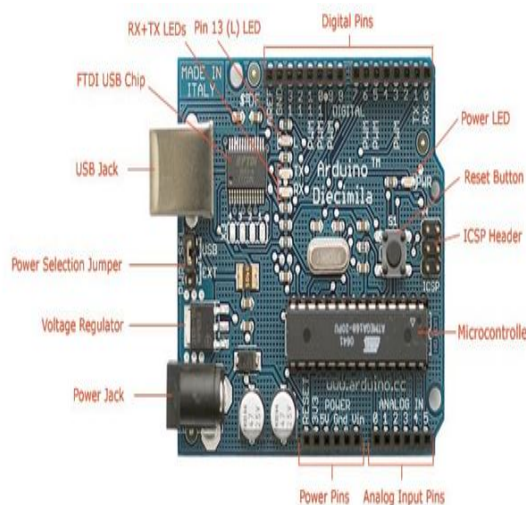


Fig4.1.Arduino Board

- The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions.
- An important feature of the Arduino is that you can create a control program on the host PC, download it to the Arduino and it will run automatically. Remove the USB cable connection to the PC, and the program will still run from the top each time you push the reset button.
- Remove the battery and put the Arduino board in a closet for six months. When you reconnect the battery, the last program you stored will run. This means that you connect the board to the host PC to develop and debug your program, but once that is done, you no longer need the PC to run the program.

Atmega328p features:

- High Performance, Low Power AVR 8-Bit Microcontroller
- Advanced RISC Architecture
 - 131 Powerful Instructions
 - Most Single Clock Cycle Execution
 - 32 x 8 General Purpose Working Registers
 - Fully Static Operation
 - Up to 20 MIPS Throughput at 20 MHz
 - On-chip 2-cycle Multiplier
- High Endurance Non-volatile Memory Segments
 - 4/8/16/32K Bytes of In-System Self-Programmable Flash program memory (ATmega48PA/88PA/168PA/328P)
 - 256/512/512/1K Bytes EEPROM (ATmega48PA/88PA/168PA/328P)
 - 512/1K/1K/2K Bytes Internal SRAM (ATmega48PA/88PA/168PA/328P)
 - Write/Erase Cycles: 10,000 Flash/100,000 EEPROM
 - Data retention: 20 years at 85°C/100 years at 25°C(1)
 - Optional Boot Code Section with Independent Lock Bits In-System Programming by On-chip Boot Program True Read-While-Write Operation
 - Programming Lock for Software Security
- Peripheral Features
 - Two 8-bit Timer/Counters with Separate Prescaler and Compare Mode
 - One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
 - Real Time Counter with Separate Oscillator

- Six PWM Channels – 8-channel 10-bit ADC in TQFP and QFN/MLF package Temperature Measurement – 6-channel 10-bit ADC in PDIP Package Temperature Measurement
- Programmable Serial USART
- Master/Slave SPI Serial Interface
- Byte-oriented 2-wire Serial Interface (Philips I2C compatible)
- Programmable Watchdog Timer with Separate On-chip Oscillator
- On-chip Analog Comparator
- Interrupt and Wake-up on Pin Change
- Special Microcontroller Features
 - Power-on Reset and Programmable Brown-out Detection
 - Internal Calibrated Oscillator
 - External and Internal Interrupt Sources
 - Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby, and Extended Standby
- I/O and Packages
 - 23 Programmable I/O Lines
 - 28-pin PDIP, 32-lead TQFP, 28-pad QFN/MLF and 32-pad QFN/MLF
- Operating Voltage:
 - 1.8 - 5.5V for ATmega48PA/88PA/168PA/328P
- Temperature Range:
 - -40°C to 85°C
- Speed Grade:
 - 0 - 20 MHz @ 1.8 - 5.5V
- Low Power Consumption at 1 MHz, 1.8V, 25°C for ATmega48PA/88PA/168PA/328P:
 - Active Mode: 0.2 mA
 - Power-down Mode: 0.1 μ A
 - Power-save Mode: 0.75 μ A (Including 32 kHz RTC)

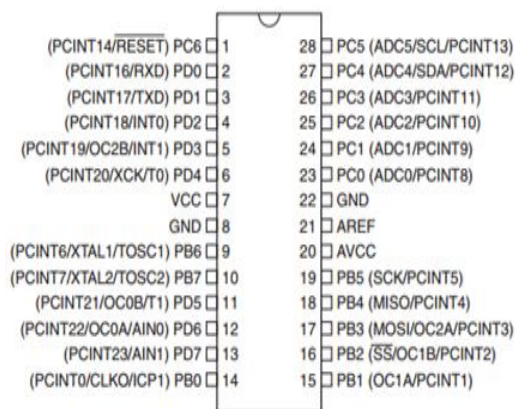


Fig 4.2.Pin diagram

Pin Descriptions:

VCC: Digital supply voltage.

GND: Ground.

voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.

- 3.3V. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

- GND. Ground pins.

Memory:

The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

4.1.2 Zigbee Module:

In our project we are using two Zigbee modules. One at the transmitter and one at the receiver.

ZigBee Module is a low-cost, low-power, wireless mesh networking standard. The low cost allows the technology to be widely deployed in wireless control and monitoring applications, the low power-usage allows longer life with smaller batteries, and the mesh networking provides high reliability and larger range.

Temco has developed a embedded antenna of wireless data communication module, which adopts standard ZigBee wireless technology. This module is in line with the Industry Standard applications of wireless data communication module.

Working of ZigBee:

The ZigBee standard has the capacity to address up to 65535 nodes in a single network. However, the ZigBee Protocol defines three general types of nodes: Coordinators, Routers and End Device, with a requirement of one Coordinator per network. While all nodes can send and receive data, there are differences in the specific roles they play.

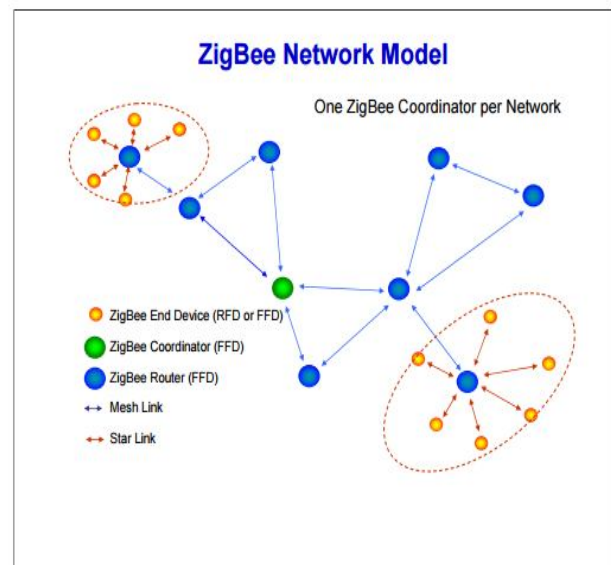


Fig 4.3 Zigbee Network

ZigBee uses two types of devices. Reduced-function devices (RFDs) are sensors that communicate with full-function devices (FFDs). FFDs are complex nodes that conform to the full 802.15.4 standard and can serve as routers. An end device gets its instructions from a ZigBee Coordinator. All ZigBee networks must include a coordinator, which is a full function device that manages the network.

ZigBee technology provides static and dynamic star, cluster tree and mesh networking structures that allow large area network coverage, scalable networks and single point-of-failure avoidance.

4.1.5 LCD:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD.

There are two modes of data transfer supported by LCD displays. One is 4bit mode, another is 8 bit mode. To transfer data in 8 bit mode, first put your data in the 8bit bus,

then put command in the command bus and then pulse the enable signal. To send data in 4bit mode; first put upper 4bit in the 4 bit data bus connected to 4MSB pins of LCD display, then put control signals in the control bus, then pulse the E pin once. Next put the lower 4 bit in the data bus and pulse the E pin again.

4 Bit Mode:

- Only data lines D4 to D7 are used in 4 Bit Mode.
- In code, we need to send the command to select 4 bit mode .

Pin Diagram:

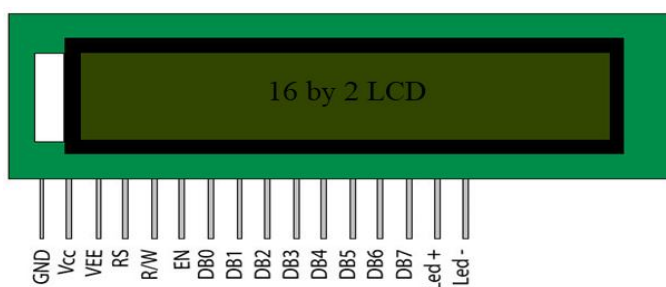


Fig 4.6 Pin diagram of LCD

Pin Description:

Table 4.1 Pin description

Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	V _{cc}
3	Contrast adjustment; through a variable resistor	V _{EE}
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	Backlight V _{cc} (5V)	Led+
16	Backlight Ground (0V)	Led-

V. SOFTWARE REQUIREMENTS

SOFTWARE REQUIRED:

- Arduino IDE
- MATLAB

5.1 ARDUINOIDE:

- Depending on what type of Arduino you have, you may also have a USB connector to enable it to be connected to a PC or Mac to upload or retrieve data. The board exposes the microcontroller's I/O (Input/Output) pins to enable you to connect those pins to other circuits or to sensors, etc.
- Now that you are a proud owner of an Arduino, or an Arduino clone, it might help if you knew what it was and what you can do with it.
- In its simplest form, an Arduino is a tiny computer that you can program to process inputs and outputs going to and from the chip.
- The Arduino board is made of an an Atmel AVR Microprocessor, a crystal or oscillator (basically a crude clock that sends time pulses to the microcontroller to enable it to operate at the correct.
- the Earthshine Design Arduino Starter Kit is a perfect example of where someone has taken the Arduino PCB design, made their own and are selling it under the Fredonia name. You could even make your own.
- Arduino, with just a few cheap components, on a breadboard.
- The only stipulation that the Arduino development team put on outside developers is that the Arduino name can only be used exclusively by them on their own products and hence the clone boards have names such as Fredonia, Boarding, Borodino. As the designs are open source, any clone board, such as the Fredonia, is 100% compatible with the Arduino and therefore any software, hardware, shields, etc. will all be 100% compatible with a genuine Arduino.
- The Arduino can also be extended with the use of shields which are circuit boards containing other
- reasonable price.
- If you do a search on the Internet by simply typing 'Arduino' into the search box of your favorite search engine, you will be amazed at the huge amount of websites dedicated to the Arduino. You can find a mind boggling amount of information on projects made with the Arduino and if you have a project in mind, will easily find information that will help you to get your project up and running easily.

- The Arduino is an amazing device and will enable you to make anything from interactive works of art to robots. With a little enthusiasm to learn how to program the Arduino and make it interact with other components as well as a bit of imagination, you can build anything you want. This book and the kit will give you the necessary skills needed to get started in this exciting and creative hobby. So, now you know what an Arduino is and what you can do with it, let's open up the starter kit and dive right in.
- This section will presume you have a PC running Windows or a Mac running OSX (10.3.9 or later). If you use Linux as your Operating System. Get the Free Arduino and the USB Cable. Graphical MATLAB debugger. The editor can appear in a window by itself, or it can be a sub window in the desktop. M-files are denoted by the extension .m, as in pixelup.m. The MATLAB editor window has numerous pull-down menus for tasks such as saving, viewing, and debugging files.

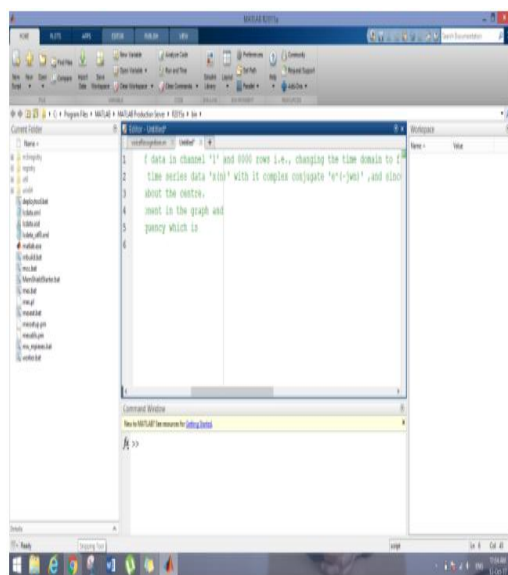


Fig 5.19 MATLAB Editor

Because it performs some simple checks and also uses color to differentiate between various elements of code, this text editor is recommended as the tool of choice for writing and editing M-functions. To open the editor, type `edit` at the prompt opens the M-file filename.m in an editor window, ready for editing. As noted earlier, the file must be in the current directory, or in a directory in the search path.

Getting Help:

The principal way to get help online is to use the MATLAB help browser, opened as a separate window either

by clicking on the question mark symbol (?) on the desktop toolbar, or by typing `help browser` at the prompt in the command window. The help Browser is a web browser integrated into the MATLAB desktop that displays a Hypertext Markup Language (HTML) documents. The Help Browser consists of two panes, the help navigator pane, used to find information, and the display pane, used to view the information. Self-explanatory tabs other than navigator pane are used to perform a search.

VI. RESULTS

Project setup is shown in below figure:

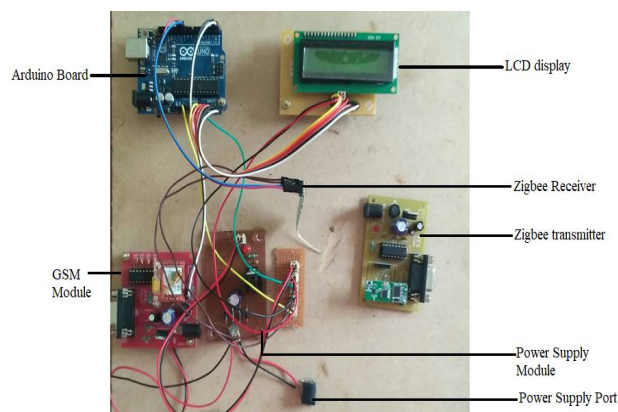


Fig 6.1 Project Setup

Matlab software is opened. Different types of windows are displayed on the screen. Such as Matlab editor, Command window, Command History etc. The Command History window keeps track of everything you have typed. All the variables being used within matlab session are stored in work space. In Matlab editor we need to write program for license plate detection.

Then execute the matlab program. A dialog box is appeared on the screen showing "Train data base is loaded" this indicating that the program and commands are loaded successfully. This shows that the program is now ready for taking the input.

The 'My Computer' window is displayed automatically for choosing the image. The input is given by selecting the desktop folder and then choosing license plate images folder. In that an image is selected for giving input.



Fig 6.2 Known image of License Plate

Then the image is converted to text using image processing techniques like RGB to gray scale conversion, Morphological processing, Convolution. This color image required 3 channels for extracting and also it occupies more space in the memory. Therefore, to reduce these limitations we need to convert RGB to Gray scale. Gray scale image requires only one channel and occupies less space in the memory.

The median filter is a nonlinear digital filtering technique, often used to remove noise from an image or signal. Morphological processing is used for extracting and describing image component regions. It is usually applied to binary images.

Convolution is used for improving the quality of an image. Those include the blurring, sharpening, edge detection and noise reduction. By doing more processing on an image the quality of an image is reduced. From convolution we can enhance the quality of an image. After the successful execution of these techniques, The above number plate is converted into the text as shown below:

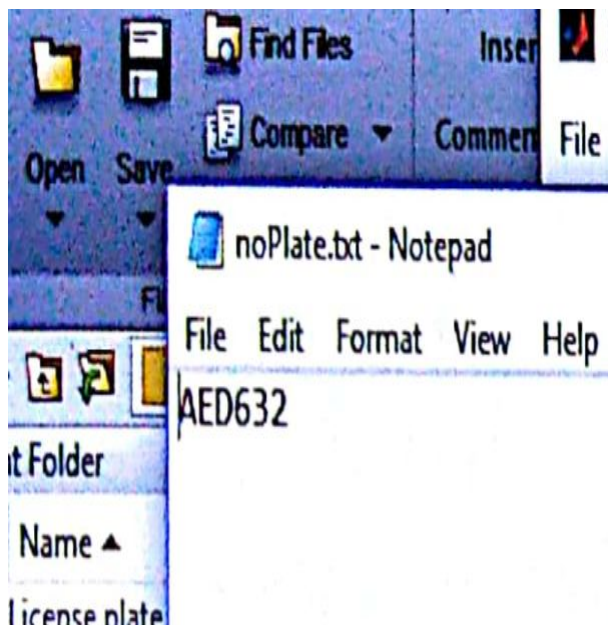


Fig 6.3 Decoded known image of License plate

The decoded number plate is transferred to the arduino board for further processing. This is done by using Zigbee at both the transmitter and the receiver. The ZigBee standard has the capacity to address up to 65535 nodes in a single network. However, the ZigBee Protocol defines three general types of nodes: Coordinators, Routers and End Device, with a requirement of one Coordinator per network.

This module can achieve transparent data transmission between many devices, and it can form a MESH network. This device has the characteristics of small volume, ultra-low power consumption and low-cost. It can be either as an independent data transmission termination or be easily embedded into a variety of products to form a short-range wireless data transmission solution. This device network has the characteristics of electric power-saving, reliability, low cost, large capacity and security, and it can be widely used in various fields of automatic control. Zigbee coordinators are the most capable of the three node type. Zigbee Routers act as intermediate nodes, relaying data from other devices.

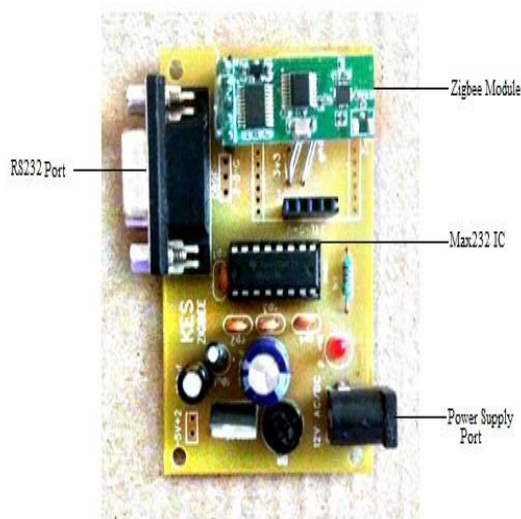


Fig 6.4 Zigbee Module

While all nodes can send and receive data, there are differences in the specific roles they play. The range of the zigbee is between 10cm to 10mts. This means the distance between the Zigbee at transmitter and the Zigbee at receiver should be between 10cm to 10mts.

The text from the matlab is transferred to the arduino for processing. The IC which is present in the arduino converts the human level language to machine level language.

The arduino is switched on by giving supply from adaptor. The atmega328p microcontroller performs various processes and compares the obtained text with the text present

in the database. Initialization of the Arduino IDE code displayed on the LCD.



Fig 6.5 LCD Initialization

If both are matched, the matched text corresponding phone number is sent to the GSM. This message contains the victim's location. This status is displayed on the LCD. If the details of the user is found then the status is displayed on the LCD



Fig 6.6 Status for unknown image in LCD

Alphanumeric LCDs are used to display numbers and alphabets.. After sending the message to the concerned people the "Message Sent" status is displayed. The victim details is sent through the GSM module and status is displayed on the LCD



Fig 6.7 Status in LCD Display

Location of the accident and an intimation message is sent to the concerned people immediately through GSM. The sent message to the phone appears like this.



Fig 6.8 Message in phone

An unknown image is given to the Matlab Program

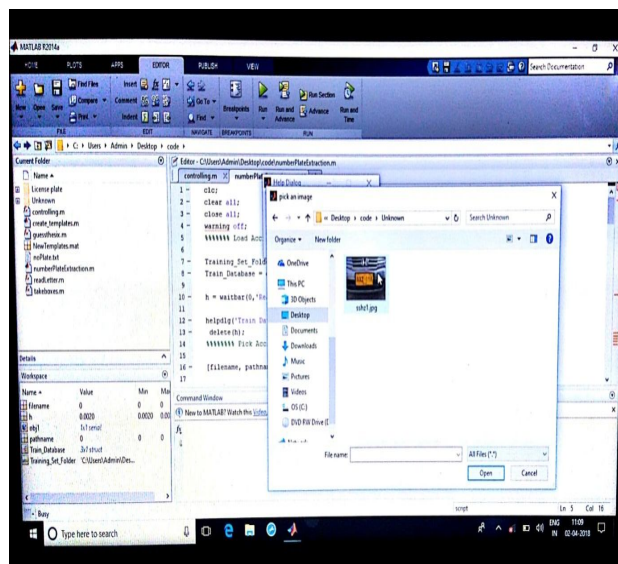


Fig 6.9 unknown image of License plate

The image is converted to text using image processing techniques like RGB to gray scale conversion, Morphological processing, Convolution.

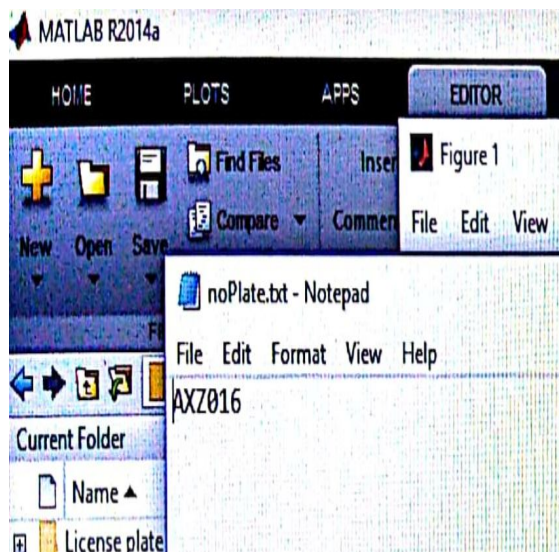


Fig 6.10 Decoded unknown image of License plate

The decoded number plate is transferred to the arduino board for further processing. This is done by using Zigbee at both the transmitter and the receiver.

If both data are not matched, then we cannot send message to the people. GSM doesnot get any network to send message. Arduino cannot get any information. This status is displayed on the LCD. If the details of the user are not found then the status is displayed on the LCD.Arduino compares with stored database and finds that it is unknown. Message cannot be sent through the GSM. Status is displayed on the LCD



Fig 6.11 Status for unknown image in LCD

Instead of sending message to the concerned people through GSM. A warning message is displayed on the LCD.



Fig 6.12 Warning message in LCD

VII. APPLICATIONS

PARKING

One of the main applications is parking automation and parking security: ticketless parking fee management, parking access automation, vehicle location guidance, car theft prevention, "lost ticket" fraud, fraud by changing tickets, simplified, partially or fully automated payment process, among many others.

ACCESS CONTROL

Access control in general is a mechanism for limiting access to areas and resources based on users' identities and their membership in various predefined groups. Access to limited zones, however, may also be managed based on the accessing vehicles alone, or together with personal identity. License plate recognition brings automation of vehicle access control management, providing increased security, car pool management for logistics, security guide assistance, event logging, event management, keeping access diary, possibilities for analysis and data mining.

MOTORWAY ROAD TOLLING

Road Tolling means, that motorists pay directly for the usage of particular segment of road infrastructures. Tolls are a common way of funding the improvements of highways, motorways, roads and bridges: tolls are fees for services. Efficient road tolling increases the level of related road services by reducing travel time overhead, congestion and improve roadways quality. Also, efficient road tolling reduces fraud related to non-payment, makes charging effective, reduces required manpower to process events of exceptions. License plate recognition is mostly used as a very efficient enforcement tool, while there are road tolling systems based solely on license plate recognition too.

BORDER CONTROL

Border Control is an established state-coordinated effort to achieve operational control of the country's state border with the priority mission of supporting the homeland's security against terrorism, illegal cross border traffic, smuggling and criminal activities. Efficient border control significantly decreases the rate of violent crime and increases the society's security. Automatic number plate recognition adds significant value by event logging, establishing investigate-able databases of border crossings, alarming on suspicious passings, at many more.

JOURNEY TIME MEASUREMENT

Journey Time Measurement is a very efficient and widely usable method of understanding traffic, detecting conspicuous situations and events, etc. A computer vision based system has its well known downfalls in Journey Time Measurement, while Automatic Number Plate Recognition has provided its viability: optimizing traffic routes, reducing costs and time, etc.

LAW ENFORCEMENT

Automatic number plate recognition is an ideal technology to be used for law enforcement purposes. It is able to automatically identify stolen cars based on the up-to date blacklist. Other very common law enforcement applications are red-light enforcement and overspeed charging and bus lane control.

ADVANTAGES

1. Real Time Monitoring & Surveillance

Automatic number plate recognition does away with the painful and tedious process of manually recording the numbers. Very few people can spot the number plates and the exact registration numbers when a car speeds by. When there are multiple cars on the road, it is humanly impossible for anyone to record all the numbers. Automatic number plate recognition systems don't just record the numbers and have images but they also do so in real time.

2. Still and Video Footage

Not every automatic number plate recognition system has both still and video footage but many do. Some systems are specially designed to take snapshots when a vehicle speeds or jumps a red light, takes a wrong turn or just goes haywire on the road. The stills and video footage can help law enforcement agencies, traffic departments and can also assist legal counsels.

3. Proactive and Reactive Security

Automatic number plate recognition is a deterrent. Those who are serial traffic offenders would resist from breaking the law. The systems also help with reactive security, including inspections and forensics, investigations and legal proceedings. Whichever perspective you look at it from, automatic number plate recognition seems a necessity and a boon.

DISADVANTAGES

1. Lack of Manned Surveillance

The availability of an automatic system has reduced the importance of manned surveillance. Not only is there less traffic personnel on the streets and major crossroads but those that are there don't bother to check number plates. This may lead to lapse in manned security.

2. Bad Weather or Hindrances

Coupled with the lack of manned surveillance, bad weather or any kind of hindrances and obstructions can make automatic number plate recognition systems ineffective. In such cases, the security measures may go kaput.

3. Privacy Concerns

The fact that images and records are kept and stored for a long time raises privacy concerns. The records of a person's whereabouts in all the footages can be misused.

VIII. CONCLUSION

To find the vehicle where it is and locate the vehicle by means of sending a message by detecting number plate using Matlab and transmitting this to the Embedded system. This system is very reliable and we can save lives of victims quickly. The purpose of the project is to find the vehicle where it is and locate the vehicle by means of sending a message using a system which is placed inside of vehicle system. Most of the times we may not be able to find accident location because we don't know where accident will happen. Our project Vehicle Tracking and Accident Detection with GSM is designed to avoid such situations. The proposed system can also be used for traffic estimation and accidents survey in the country by health department with slight modification.

IX. FUTURE SCOPE

In our system Microcontroller cannot store large number of license plates and it cannot find the details of the people from other states or other country. In future it can be overcome by using high capacity advanced Microcontroller. Thereby we can register the details of the people from other states and other countries.

The Template matching affects the accuracy of number plate recognition. We have found that there are some factors which affect the effectiveness of template matching based on OCR technique i.e. font type, noise in image, tilting

etc. In future the work can be done on these factors and efficiency may be increased further for better results.

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