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Design of Wireless Monitoring System for Moving Vehicles

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***Abstract*—**In this system the speed, type of vehicles is monitored wirelessly. Also the number vehicles in the lane are counted and send to the control section. The RFID reader is use to find the vehicle number. For monitoring purpose pair of IR sensor is used. The first two IR sensors are used to determine the type of the vehicle. These IRs are placed at a particular distance to measure the length of vehicle. The third IR is kept at particular distance (say 100metre). This is used to measure the speed of the vehicle. By using certain formula the speed is calculated. Also the type of the vehicle is determined. All the data's are stored in the control section

***Keywords*—** RFID Reader, IR sensor, Speed of the Vehicle, Number Vehicles etc.

I. Introduction

An embedded system is some combination of hardware and software, either fixed in capability or programmable, that is specifically designed for a particular function. Industrial machines, automobiles, medical equipment, cameras, household appliances, vending machines are some of the examples of embedded system.

This proposal greatly reduces the manpower, saves time and operates efficiently without human interference. This project puts forth the first step in achieving the desired target. With the advent in technology, the existing systems are developed to have in built intelligence.

Radio frequency identification technology (RFID) is a non-contact automatic identification technology. It can identify target and get the relevant data information through radio frequency signal automatically. In general, a radio frequency identification unit can be divided into three parts which includes controller, base stations, and electronic tags. The controller is responsible for the management of the whole unit control, base stations achieve the communication with the electronic tags, and electronic tags store the information of markers. The second generation ID card is a kind of electronic label which is developed based on ISO14443B protocol and the reading of internal information needs specific encryption module solution. However, if we only get the second generation ID card number, we don't need the special encryption module, and the ID number is also unique in the world, which is a reliable ID card as identification marks.

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II. HARDWARE DESCRIPTION

A. BLOCK DIAGRAM OF PCB DESIGN

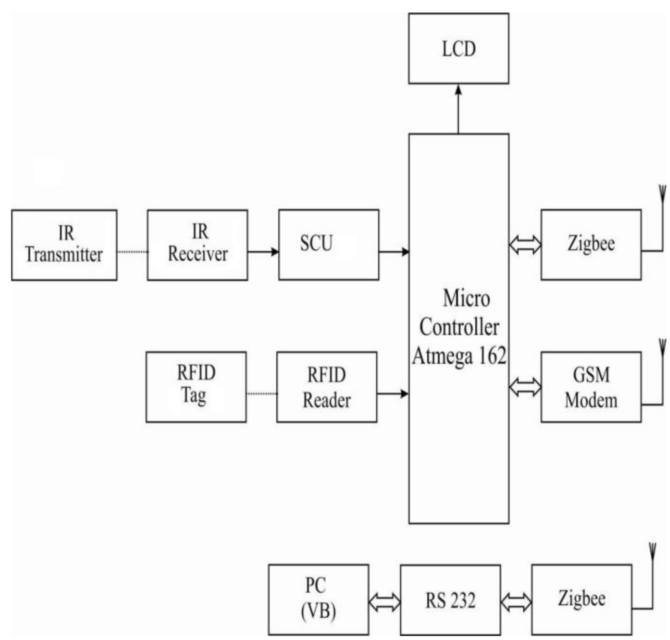

Figure 2.1 Block diagram of PCB design

1) BLOCK DIGRAM DESCRIPTION

ATMEGA

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 16 MIPS Throughput at 16 MHz

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– On-chip 2-cycle Multiplier
• Non-volatile Program and Data Memories
– 16K Bytes of In-System Self-programmable Flash
Endurance: 10,000 Write/Erase Cycles
– Optional Boot Code Section with Independent Lock Bits In-System Programming by On-chip Boot Program
True Read-While-Write Operation
– 512 Bytes EEPROM
Endurance: 100,000 Write/Erase Cycles
– 1K Bytes Internal SRAM
– Up to 64K Bytes Optional External Memory Space
– Programming Lock for Software Security
• JTAG (IEEE std. 1149.1 Compliant) Interface
– Boundary-scan Capabilities According to the JTAG Standard

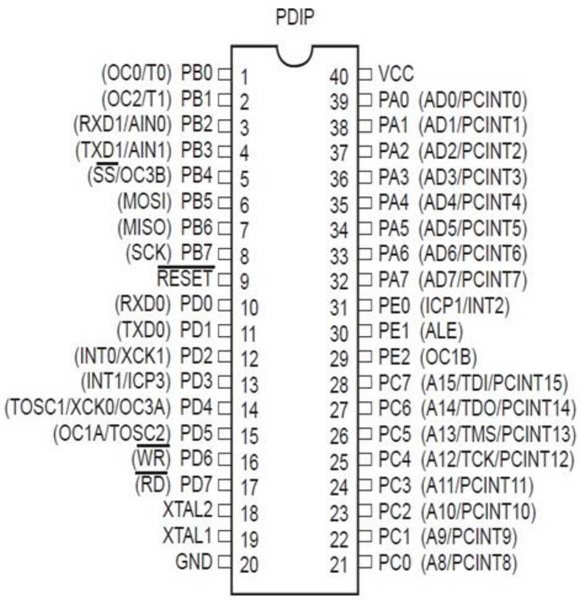

Figure 2.2.1 Pin diagram ATMEGA 162

– Extensive On-chip Debug Support
– Programming of Flash, EEPROM, Fuses, and Lock Bits through the JTAG Interface
• Peripheral Features
– Two 8-bit Timer/Counters with Separate Presales and Compare Modes
– Two 16-bit Timer/Counters with Separate Presales, Compare Modes, and Capture Modes
– Real Time Counter with Separate Oscillator
– Six PWM Channels
– Dual Programmable Serial USARTs
– Master/Slave SPI Serial Interface
– Programmable Watchdog Timer with Separate On-chip Oscillator
– On-chip Ana log Comparator
• Special Microcontroller Features
– Power-on Reset and Programmable Brown-out Detection
– Internal Calibrated RC Oscillator
– External and Internal Interrupt Sources
– Five Sleep Modes: Idle, Power-save, Power-down, Standby, and Extended Standby
• I/O and Packages
– 35 Programmable I/O Lines
– 40-pin PDIP, 44-lead TQFP, and 44-pad MLF
• Operating Voltages
– 1.8 - 5.5V for ATmega162V
– 2.7 - 5.5V for ATmega162
• Speed Grades
– 0 - 8 MHz for ATmega162V (see Figure 113 on page 265)
– 0 - 16 MHz for ATmega162 (see Figure 114 on page 265)

B. PIN DIAGRAM OF ATMEGA 162

1) Pin Configurations

Architecture of ATMEGA 162 MC

Architecture of ATMEGA 162 MC

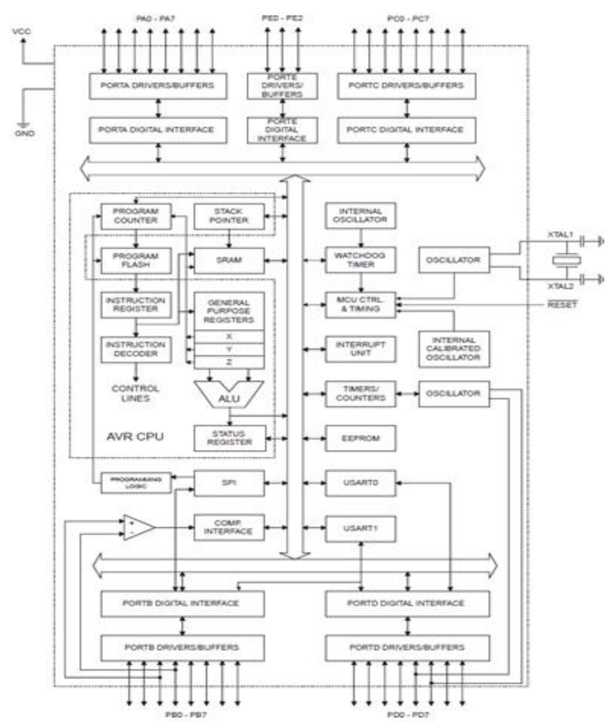

Figure 2.2.2 Architecture of ATMEGA 162 MC

PIN DESCRIPTIONS

VCC Digital supply voltage

GND Ground

Ports

Port A (PA7-PA0):

Port A is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port A output buffers have symmetrical drive characteristics with both high sink and source capability. When pins PA0 to PA7 are used as inputs and are externally pulled low, they will source current if the internal pull-up resistors are activated. The Port A pins are tri-stated when a reset condition becomes active, even if the clock is not running.

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Port Pin	Alternate Function
PA7	AD7 (External memory interface address and data bit 7) PCINT7 (Pin Change INTerrupt 7)
PA6	AD6 (External memory interface address and data bit 6) PCINT6 (Pin Change INTerrupt 6)
PA5	AD5 (External memory interface address and data bit 5) PCINT5 (Pin Change INTerrupt 5)
PA4	AD4 (External memory interface address and data bit 4) PCINT4 (Pin Change INTerrupt 4)
PA3	AD3 (External memory interface address and data bit 3) PCINT3 (Pin Change INTerrupt 3)
PA2	AD2 (External memory interface address and data bit 2) PCINT2 (Pin Change INTerrupt 2)
PA1	AD1 (External memory interface address and data bit 1) PCINT1 (Pin Change INTerrupt 1)
PA0	AD0 (External memory interface address and data bit 0) PCINT0 (Pin Change INTerrupt 0)

Table 2.2.3.1 Port A Pins Alternate Functions

- Port B (PB7-PB0):

Port B is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port B output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port B pins that are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Port Pin	Alternate Functions
PB7	SCK (SPI Bus Serial Clock)
PB6	MISO (SPI Bus Master Input/Slave Output)
PB5	MOSI (SPI Bus Master Output/Slave Input)
PB4	$\overline{SS}$ (SPI Slave Select Input) OC3B (Timer/Counter3 Output Compare Match Output)
PB3	AIN1 (Analog Comparator Negative Input) TXD1 (USART1 Output Pin)
PB2	AIN0 (Analog Comparator Positive Input) RXD1 (USART1 Input Pin)
PB1	T1 (Timer/Counter1 External Counter Input) OC2 (Timer/Counter2 Output Compare Match Output)
PB0	T0 (Timer/Counter0 External Counter Input) OC0 (Timer/Counter0 Output Compare Match Output) $clk_{I/O}$ (Divided System Clock)

Table 2.2.3.2 Port B Pins Alternate Functions

- Port C (PC7-PC0):

Port C is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port C output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port C pins that are externally pulled low will source current if the pull-up resistors are activated. The Port C pins are tri-stated when a reset condition becomes active, even if the clock is not running. If the JTAG interface is enabled, the pull-up resistors on pins PC7(TDI), PC5(TMS) and PC4(TCK) will be activated even if a Reset occurs.

Port Pin	Alternate Function
PC7	A15 (External memory interface address bit 15) TDI (JTAG Test Data Input) PCINT15 (Pin Change INTerrupt 15)
PC6	A14 (External memory interface address bit 14) TDO (JTAG Test Data Output) PCINT14 (Pin Change INTerrupt 14)
PC5	A13 (External memory interface address bit 13) TMS (JTAG Test Mode Select) PCINT13 (Pin Change INTerrupt 13)
PC4	A12 (External memory interface address bit 12) TCK (JTAG Test Clock) PCINT12 (Pin Change INTerrupt 12)
PC3	A11 (External memory interface address bit 11) PCINT11 (Pin Change INTerrupt 11)
PC2	A10 (External memory interface address bit 10) PCINT10 (Pin Change INTerrupt 10)
PC1	A9 (External memory interface address bit 9) PCINT9 (Pin Change INTerrupt 9)
PC0	A8 (External memory interface address bit 8) PCINT8 (Pin Change INTerrupt 8)

Table 2.2.3.3 Port C Pins Alternate Functions

Port Pin	Alternate Function
PD7	$\overline{RD}$ (Read strobe to external memory)
PD6	$\overline{WR}$ (Write strobe to external memory)
PD5	TOSC2 (Timer Oscillator Pin 2) OC1A (Timer/Counter1 Output Compare A Match Output)
PD4	TOSC1 (Timer Oscillator Pin 1) XCK0 (USART0 External Clock Input/Output) OC3A (Timer/Counter3 Output Compare A Match Output)
PD3	INT1 (External Interrupt 1 Input) ICP3 (Timer/Counter3 Input Capture Pin)
PD2	INT0 (External Interrupt 0 Input) XCK1 (USART1 External Clock Input/Output)
PD1	TXD0 (USART0 Output Pin)
PD0	RXD0 (USART0 Input Pin)

Table 2.2.3.4 Port D Pins Alternate Functions

- Port D (PD7-PD0):

Port D is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port D output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. The Port D pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Port Pin	Alternate Function
PE2	OC1B (Timer/Counter1 Output CompareB Match Output)
PE1	ALE (Address Latch Enable to external memory)
PE0	ICP1 (Timer/Counter1 Input Capture Pin) INT2 (External Interrupt 2 Input)

Table 2.2.3.5 Port E Pins Alternate Functions

- Port E(PE2-PE0):

Port E is a 3-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port E output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port E pins that are externally pulled low will source current if the pull-up resistors are activated. The Port E pins are tri-stated when a reset condition becomes active, even if the clock is not running.

- RESET

Reset input. A low level on this pin for longer than the minimum pulse length will generate a Reset, even if the clock is not running. Shorter pulses are not guaranteed to generate a reset.

- CLOCK SIGNALS

XTAL1 Input to the Inverting Oscillator amplifier and input to the internal clock operating circuit.

XTAL2 Output from the Inverting Oscillator amplifier.

RFID

- TRANSPONDER

The Transponder or tag is fixed on to the baggage to be tracked in the airport. When this tag comes within the range of the reader or integrator, the tag is energized. Now, this tag transmits the data to the reader. This data is automatically sent to the micro-controller for further processing. The time at which the tag is sensed is sent to the micro-controller from the RTC (Real Time Clock).These details are displayed on LCD (Liquid Crystal Display) .The same is sent to the EEPROM (Electrically Erasable and Programmable Read Only Memory), which is used as a backup. It can be stored, and retrieved.

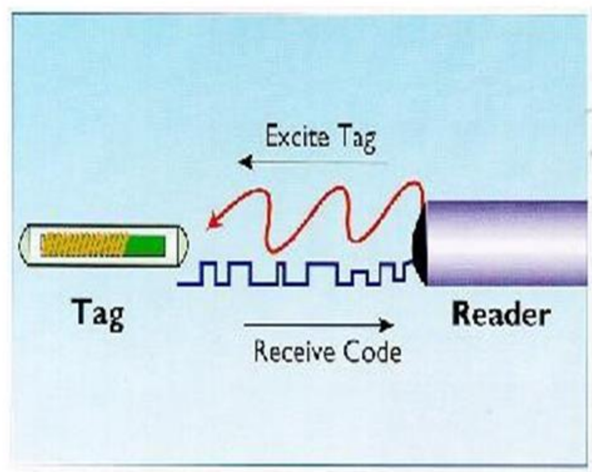
- PASSIVE TAG AND READER

Passive tags are those energized by the reader itself, they contain no power source, typically have very long lifetimes (near indefinite) a drawback over active tags is the read range, typically 2cm (1in) to 1.5m (4.5 ft), a strong positive is individual tag cost. RFID Passive tag is composed of a integrated electronic chip and a antenna coil that includes basic modulation circuitry and non-volatile memory.

For most general applications passive tags are usually the most cost effective. These are made in a wide variety of sizes and materials: there are durable plastic tags for discouraging retail theft, wafer thin tags for use within "smart" paper labels, tiny tracking tags which are inserted beneath an animal's skin and credit card sized tags for access control. In most cases the amount of data storage on a passive tag is fairly limited - capacity often being measured in bits as opposed to bytes.

However for most applications only a relatively small amount of data usually needs to be codified and stored on the tag, so the limited capacity does not normally pose a major limitation. Most tags also carry an unalterable unique electronic serial number, which makes RFID tags potentially very useful in applications where item tracking is needed or where security aspects are important.

Figure 2.3.2 Interaction between tag and reader



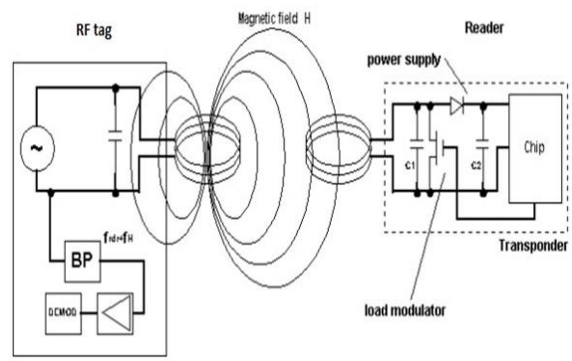


Figure 2.3.3 Inductive Coupling

The reader powers the tag (transponder), by emitting a radio frequency wave. The tag then responds by modulating the energizing field. This modulation can be decoded to yield the tags unique code, inherent in the tag. The resultant data can be the passed to a computer from processing. Tags have various salient features apart from their physical size: Other available features are: Read Only, Read Write, Anti-Collision

- OPERATING PRINCIPLES OF RFID SYSTEMS:

There are a huge variety of different operating principles for RFID systems. The most important principle is inductive coupling, which is described in detail below.

Inductive Coupling:

An inductively coupled transponder comprises of an electronic data- carrying device, usually a single microchip and a large area coil that functions as an antenna

Inductively coupled transponders are almost always operated passively. All the energy needed for the operation of the microchip has to be provided by the reader. For this purpose, the reader's antenna coil generates a strong, high frequency electro-magnetic field, which penetrates the cross-section of the coil area and the area around the coil

A small part of the emitted field penetrates the antenna coil of the transponder, which is some distance away from the coil of the reader. By induction, a voltage Vi is generated in the transponder's antenna coil. This voltage is rectified and serves as the power supply for the data-carrying device (microchip). A capacitor C1 is connected in parallel with the reader's antenna coil, the capacitance of which is selected such that it combines with the coil inductance of the antenna coil to form a parallel resonant circuit, with a resonant frequency that corresponds with the transmission frequency of the reader. Very high currents are generated in the antenna coil of the reader by resonance step- up in the parallel resonant circuit, which can be used to generate the required field strengths for the operation of the remote transponder.

The antenna coil of the transponder and the capacitor C1 to form a resonant circuit tuned to the transmission frequency of the reader. The voltage V at the transponder coil reaches a maximum due to resonance step-up in the parallel resonant circuit.

As described above, inductively coupled systems are based upon a transformer-type coupling between the primary coil in the reader and the secondary coil in the transponder. This is true when the distance between the coils does not exceed 0.16 times the wavelength, so that the transponder is located in the near field of the transmitter antenna

If a resonant transponder (i.e. the self-resonant frequency of the transponder corresponds with the transmission frequency of the reader) is placed within the magnetic alternating field of the reader's antenna, then this draws energy from the magnetic field. This additional power consumption can be measured as voltage drop at the internal resistance in the reader antennae through the supply current to the reader's antenna. The switching on and off of a load resistance at the transponder's antenna therefore effects voltage changes at the reader's antenna and thus has the effect of an amplitude modulation of the antenna voltage by the remote transponder. If the switching on and off of the load resistor is controlled by data, then this data can be transferred from the transponder to the reader. This type of data transfer is called load modulation.

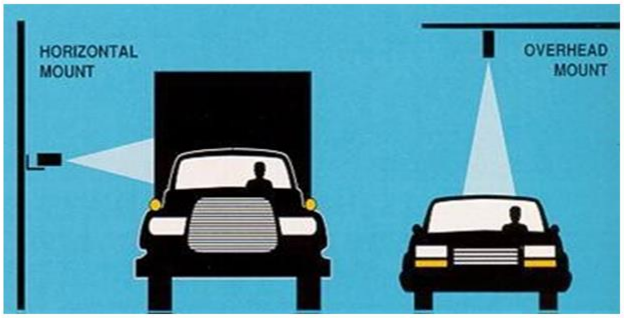


Figure 2.3.4 Reading process by the RFID reader

Technical Specifications

Frequency:	125 KHz / 13.56 MHz / 915 MHz / 2.45 GHz Read/Write
Distance:	Up to 6m (with mounted antenna)
Dimensions	Varies, as small as 0.8mm diameter
Weight:	6-54g
Memory:	Up to 16 Kbits
Data durability:	10 Years

- IR SENSOR

A Infrared sensor (IR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall.

All objects emit what is known as black body radiation. It is usually infrared radiation that is invisible to the human eye but can be detected by electronic devices designed for such a purpose.

―Infra‖ meaning below our ability to detect it visually, and ―Red‖ because this colour represents the lowest energy level that our eyes can sense before it becomes invisible. Thus, infrared means below the energy level of the colour red, and applies to many sources of invisible energy.

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other.

The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver.

When receiver receives the signal from the transmitter it resistance value is low.it resistance value become high when the signal was cut. By this sensor sense the value.

C. ZIGBEE:

The explosion in wireless technology has seen the emergence of many standards, especially in the industrial, scientific and medical (ISM) radio band. There have been a multitude of proprietary protocols for control applications, which bottlenecked interfacing. As an answer to this dilemma, many companies forged an alliance to create a standard which would be accepted worldwide. It was this Zigbee Alliance that created Zigbee.

Bluetooth and Wi-Fi should not be confused with Zibgee. Both Bluetooth and Wi-Fi have been developed for communication of large amount of data with complex structure like the media files, software etc. Zigbee on the other hand has been developed looking into the needs of communication of data with simple structure like the data from the sensors.

The mission of the ZigBee Working Group is to bring about the existence of a broad range of interoperable consumer devices by establishing open industry specifications for unlicensed, untethered peripheral, control and entertainment devices requiring the lowest cost and lowest power consumption communications between compliant devices anywhere in and around the home.

The ZigBee specification is a combination of Home RF Lite and the

802.15.4 specification. The spec operates in the 2.4GHz (ISM) radio band - the same band as 802.11b standard, Bluetooth, microwaves and some other devices. It is capable of connecting 255 devices per network. The specification supports data transmission rates of up to 250 Kbps at a range of up to 30 meters. ZigBee's technology is slower than 802.11b (11 Mbps) and Bluetooth (1 Mbps) but it consumes significantly less power.

ZigBee/ General Characteristics:

1 Dual PHY (2.4GHz and 868/915 MHz)

2 Data rates of 250 kbps (@2.4 GHz), 40 kbps (@ 915 MHz), and 20 kbps (@868 MHz)

3 Optimized for low duty-cycle applications (<0.1%)

4 CSMA-CA channel access Yields high throughput and low latency for low duty cycle devices like sensors and controls

5 Low power (battery life multi-month to years)

6 Multiple topologies: star, peer-to-peer, mesh

7 Range: 50m typical (5-500m based on environment)

ZigBee - Typical Traffic Types Addressed

1 Periodic data

2 Application defined rate (e.g., sensors)

3 Intermittent data

4 Application/external stimulus defined rate (e.g., light switch)

5 Repetitive low latency data

ZigBee is an established set of specifications for wireless personal area networking (WPAN), i.e. digital radio connections between computers and related devices.

WPAN Low Rate or ZigBee provides specifications for devices that have low data rates, consume very low power and are thus characterized by long battery life. ZigBee makes possible completely networked homes where all devices are able to communicate and be controlled by a single unit.

There are three different ZigBee device types that operate on these layers in any self-organizing application network. These devices have 64-bit IEEE addresses, with option to enable shorter addresses to reduce packet size, and work in either of two addressing modes – star and peer-to-peer.

D. GSM MODEM

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone.

For the purpose of this document, the term GSM modem is used as a generic term to refer to any modem that supports one or more of the protocols in the GSM evolutionary family, including the 2.5G technologies GPRS and EDGE, as well as the 3G technologies WCDMA, UMTS, HSDPA and HSUPA.

GSM modems can be a quick and efficient way to get started with SMS, because a special subscription to an SMS service provider is not required. In most parts of the world, GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery.

A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, such as the Falcom Samba 75 used in this document. (Other manufacturers of dedicated GSM modem devices include Wavecom, Multitech and iTegno.) To begin, insert a GSM SIM card into the modem and connect it to an available USB port on your computer.

A GSM modem could also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port or USB port on your computer. Any phone that supports the ―extended AT command set‖ for sending/receiving SMS messages, as defined in ETSI GSM 07.05 and/or 3GPP TS 271.005, can be supported by the Now SMS & MMS Gateway. Note that not all mobile phones support this modem interface.

Due to some compatibility issues that can exist with mobile phones, using a dedicated GSM modem is usually preferable to a GSM mobile phone. This is more of an issue with MMS messaging, where if you wish to be able to receive inbound MMS messages with the gateway, the modem interface on most GSM phones will only allow you to send MMS messages. This is because the mobile phone automatically processes received MMS message notifications without forwarding them via the modem interface.

It should also be noted that not all phones support the modem interface for sending and receiving SMS messages. In particular, most smart phones, including Blackberries, iPhone, and Windows Mobile devices, do not support this GSM modem interface for sending and receiving SMS messages at all at all. Additionally, Nokia phones that use the S60 (Series 60) interface, which is Symbian based, only support sending SMS messages via the modem interface, and do not support receiving SMS via the modem interface.

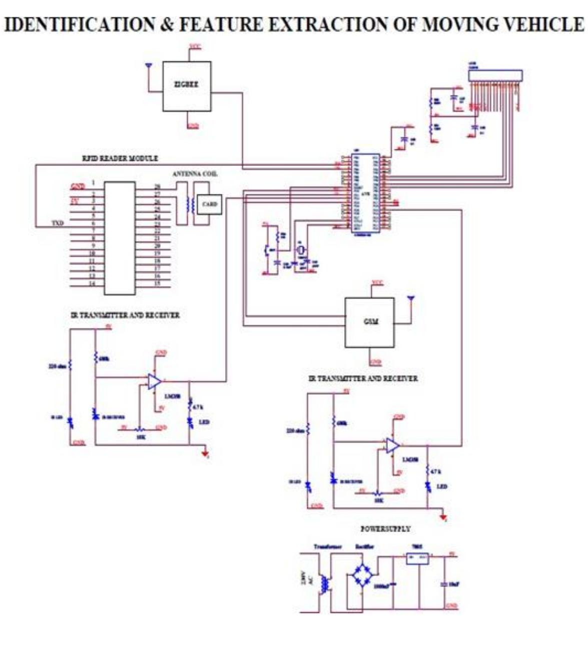


Figure 3.1 Circuit Connections

When you install your GSM modem, or connect your GSM mobile phone to the computer, be sure to install the appropriate Windows modem driver from the device manufacturer. To simplify configuration, the Now SMS & MMS Gateway will communicate with the device via this driver. If a Windows driver is not available for your modem, you can use either the ―Standard‖ or ―Generic‖ 33600 bps modem driver that is built into windows. A benefit of utilizing a Windows modem driver is that you can use Windows diagnostics to ensure that the modem is communicating properly with the computer.

Now SMS & MMS gateway can simultaneously support multiple modems, provided that your computer hardware has the available communications port resources.

III. WORKING PRINCIPLE

3.1.1 CIRCUIT COMPONENTS

- Transformer

The potential transformer will step down the power supply voltage (0- 230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op– amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.

Bridge rectifier

When four diodes are connected as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposite corners of the network, and the output is taken from the remaining two corners.

Let us assume that the transformer is working properly and there is a positive potential, at point A and a negative potential at point B. the positive potential at point A will forward bias D3 and reverse bias D4.

The negative potential at point B will forward bias D1 and reverse D2. At this time D3 and D1 are forward biased and will allow current flow to pass through them; D4 and D2 are reverse biased and will block current flow.

The path for current flow is from point B through D1, up through RL, through D3, through the secondary of the transformer back to point B. this path is indicated by the solid arrows. Waveforms (1) and (2) can be observed across D1 and D3.

One-half cycle later the polarity across the secondary of the transformer reverse, forward biasing D2 and D4 and reverse biasing D1 and D3. Current flow will now be from point A through D4, up through RL, through D2, through the secondary of T1, and back to point A. This path is indicated by the broken arrows. Waveforms

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(3) and (4) can be observed across D2 and D4. The current flow through RL is always in the same direction. In flowing through RL this current develops a voltage corresponding to that shown waveform (5). Since current flows through the load (RL) during both half cycles of the applied voltage, this bridge rectifier is a full-wave rectifier.

One advantage of a bridge rectifier over a conventional full-wave rectifier is that with a given transformer the bridge rectifier produces a voltage output that is nearly twice that of the conventional full-wave circuit.

This may be shown by assigning values to some of the components shown in views A and B. assume that the same transformer is used in both circuits. The peak voltage developed between points X and y is 1000 volts in both circuits. In the conventional full-wave circuit shown—in view A, the peak voltage from the center tap to either X or Y is 500 volts. Since only one diode can conduct at any instant, the maximum voltage that can be rectified at any instant is 500 volts.

The maximum voltage that appears across the load resistor is nearly-but never exceeds-500 v0lts, as result of the small voltage drop across the diode. In the bridge rectifier shown in view B, the maximum voltage that can be rectified is the full secondary voltage, which is 1000 volts. Therefore, the peak output voltage across the load resistor is nearly 1000 volts. With both circuits using the same transformer, the bridge rectifier circuit produces a higher output voltage than the conventional full-wave rectifier circuit.

- IR SENSING CIRCUIT:

IR SENSING CIRCUIT:

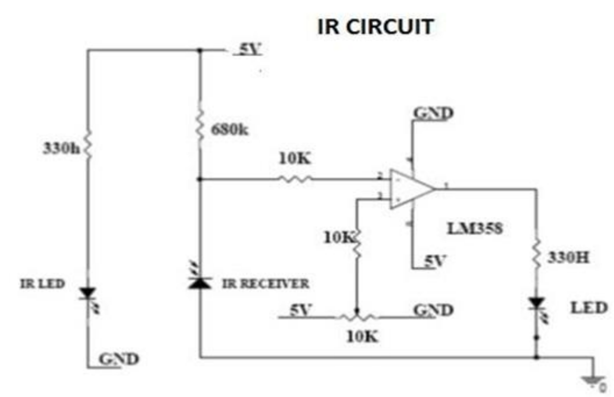

Figure 3.1.1 IR circuit

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other.

The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected with comparator. The comparator is constructed with LM 358 operational amplifier. In the comparator circuit the reference voltage is given to inverting input terminal. The non inverting input terminal is connected IR receiver.

When interrupt the IR rays between the IR transmitter and receiver, the IR receiver is not conducting. So the comparator non inverting input terminal voltage is higher than inverting input. Now the comparator output is in the range of +5V. This voltage is given to microcontroller or PC and led so led will glow.

When IR transmitter passes the rays to receiver, the IR receiver is conducting due to that non inverting input voltage is lower than inverting input. Now the comparator output is GND sothe output is given to microcontroller or PC. This circuit is mainly used to for counting application, intruder detector etc.

RS232 CABLE:

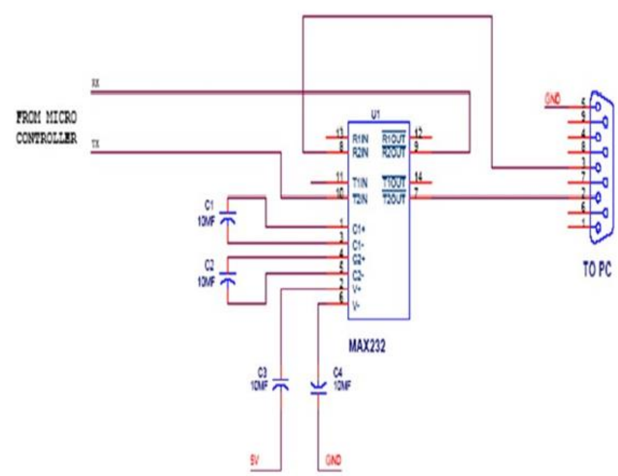

Figure 3.3 RS232 cable connection

In telecommunications, RS-232 is a standard for serial binary data interconnection between a DTE (Data terminal equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports.

Scope of the Standard:

The Electronic Industries Alliance (EIA) standard RS-232-C [3] as of 1969 defines:

 Electrical signal characteristics such as voltage levels, signaling rate, timing and slew-rate of signals, voltage withstand level, short-circuit behavior, maximum stray capacitance and cable length

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 Interface mechanical characteristics, pluggable connectors and pin identification

 Functions of each circuit in the interface connector

 Standard subsets of interface circuits for selected telecom applications The standard does not define such elements as character encoding (for example, ASCII, Baudot or EBCDIC), or the framing of characters in the data stream (bits per character, start/stop bits, parity). The standard does not define protocols for error detection or algorithms for data compression.

The standard does not define bit rates for transmission, although the standard says it is intended for bit rates lower than 20,000 bits per second. Many modern devices can exceed this speed (38,400 and 57,600 bit/s being common, and 115,200 and 230,400 bit/s making occasional appearances) while still using RS- 232 compatible signal levels.

Details of character format and transmission bit rate are controlled by the serial port hardware, often a single integrated circuit called a UART that converts data from parallel to serial form. A typical serial port includes specialized driver and receiver integrated circuits to convert between internal logic levels and RS-232 compatible signal levels.

Circuit working Description:

In this circuit the MAX 232 IC used as level logic converter. The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply EIA 232 voltage levels from a single 5v supply. Each receiver converts EIA-232 to 5v TTL/CMOS levels. Each driver converts TLL/CMOS input levels into EIA-232 levels.

Function Tables

EACH DRIVER

INPUT TIN	OUTPUT TOUT
L	H
H	L

H = high level, L = low level

EACH RECEIVER

INPUT RIN	OUTPUT ROUT
L	H
H	L

H = high level, L = low level

logic diagram (positive logic)

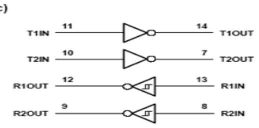

Figure 3.3.1 Logic diagram

In this circuit the microcontroller transmitter pin is connected in the MAX232 T2IN pin which converts input 5v TTL/CMOS level to RS232 level. Then T2OUT pin is connected to reviver pin of 9 pin D type serial connector which is directly connected to PC.

- SOFTWARE DESCRIPTION
- PCB DESIGNING

A Printed Circuit Board (PCB) mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from copper sheets laminated onto a non-conductive substrate. Printed circuit boards are used in all but the simplest electronic products. Alternatives to PCBs include wire wrap and point-to-point construction.

PCBs require the additional design effort to lay out the circuit but manufacturing and assembly can be automated. Manufacturing circuits with PCBs is cheaper and faster than with other wiring methods as components are mounted and wired with one single part. Furthermore, operator wiring errors are eliminated.

- INTRODUCTION:

Printed circuit boards, or PCBs, form the core of electronic equipment domestic and industrial. Some of the areas where PCBs are intensively used are computers, process control, telecommunications and instrumentation.

- MANUFATCURING:

The manufacturing process consists of two methods; print and etch, and print, plate and etch. The single sided PCBs are usually made using the print and etch method. The double sided plate through – hole (PTH) boards are made by the print plate and etch method. The production of multi layer boards uses both the methods. The inner layers are printed and etch while the outer layers are produced by print, plate and etch after pressing the inner layers.

- TOOLS:

The software used in our project to obtain the schematic layout is MICROSIM.

- PANELISATION:

Here the schematic transformed in to the working positive/negative films.

The circuit is repeated conveniently to accommodate economically as many circuits as possible in a panel, which can be operated in every sequence of subsequent steps in the PCB process. This is called penalization.

- DRILLING:

PCB drilling is a state of the art operation. Very small holes are drilled with high speed CNC drilling machines, giving a wall finish with less or no smear or epoxy, required for void free through hole plating.

- PLATING:

The heart of the PCB manufacturing process. The holes drilled in the board are treated both mechanically and chemically before depositing the copper by the electro less copper platting process.

- ETCHING:

Once a multiplayer board is drilled and electro less copper deposited, the image available in the form of a film is transferred on to the outside by photo printing using a dry film printing process. The boards are then electrolytic plated on to the circuit pattern with copper and tin. The tin-plated deposit serves an etch resist when copper in the unwanted area is removed by the conveyor's spray etching machines with chemical etch ants.

- SOLDERMASK:

Since a PCB design may call for very close spacing between conductors, a solder mask has to be applied on the both sides of the circuitry to avoid the bridging of conductors. The solder mask ink is applied by screening. The ink is dried, exposed to UV, developed in a mild alkaline solution and finally cured by both UV and thermal energy.

- HOT AIR LEVELLING:

After applying the solder mask, the circuit pads are soldered using the hot air levelling process. The bare bodies fluxed and dipped in to a molten solder bath. While removing the board from the solder bath, hot air is blown on both sides of the board through air knives in the machines, leaving the board soldered and levelled. This is one of the common finishes given to the boards. Thus the double sided plated through whole printed circuit board is manufactured and is now ready for the components to be soldered.

- AVRDUDE:

Avrdude is a program for downloading and uploading the on-chip memories of Atmel's AVR microcontrollers. It can program the Flash and EEPROM, and where supported by the serial programming protocol, it can program fuse and lock bits. AVRDUDE also supplies a direct instruction mode allowing one to issue any programming instruction to the AVR chip regardless of whether AVRDUDE implements that specific feature of a particular chip.

Argued is a command line program, so you'll have to type in all the commands

- AVRDUDE option

• -B <bitrate>: This is for changing the bitrate, which is how fast the programmer talks to the chip. If your chip is being clocked very slowly you'll need to talk slowly to it to let it keep up. It'll be discussed later, for now don't use it.

• -b <baudrate>: This is for overriding the serial baud rate for programmers like the STK500. Don't use this switch, the default is correct.

• -p <partno>: This is just to tell it what microcontroller its programming. For example, if you are programming an ATtiny2313, use attiny2313 as the partnumber

• -C <config-file>: The config file tells avrdude about all the different ways it can talk to the programmer. Theres a default configuration file, so lets just use that: don't use this command switch

• -c <programmer>: Here is where we specify the programmer type, if you're using an STK500 use stk500, if you're using a DT006 programmer use dt006, etc.

• -D: This disables erasing the chip before programming. We don't want that so don't use this command switch.

• -P <port>: This is the communication port to use to talk to the programmer. It might be COM1 for serial or LPT1 for parallel or USB for, well, USB.

• -F: This overrides the signature check to make sure the chip you think you're programming is. The test is strongly recommended as it tests the connection, so don't use this switch.

• -e: This erases the chip, in general we don't use this because we auto- erase the flash before programming.

• -U <memtype>:r|w|v:<filename>[:format]: OK this one is the important command. The <memtype> is either flash or eeprom (or hfuse, lfuse or efuse for the chip configuration fuses, but we aren't going to mess with those). ther|w|v means you can use r (read) w (write) or v (verify) as the command. The <filename> is, well, the file that you want to write to or read from. and [:format] means theres an optional format flag. We will always be using "Intel Hex" format. For example, if you wanted to write the file test.hex to the flash memory, you would use -U flash:w:test.hex:i. If you wanted to read the eeprom memory into the file "eedump.hex" you would use -U eeprom:r:eedump.hex:i.

• -n: This means you don't actually write anything, its good if you want to make sure you don't send any other commands that could damage the chip, sort of a 'safety lock'.

• -V: This turns off the auto-verify when writing. We want to verify when we write to flash so don't use this.

• -u: If you want to modify the fuse bits, use this switch to tell it you really mean it.

• -t: This is a 'terminal' mode where you can type out commands in a row. Don't use this, it is confusing to beginners.

• -E: This lists some programmer specifications, don't use it.

• -v: This gives you 'verbose' output...in case you want to debug something. If you want you can use it, but in general we won't.

• -q: This is the opposite of the above, makes less output. In general we won't use it but maybe after a while you would like to.

- VISUAL BASIC (VB):

Visual Basic (VB) is a third-generationevent-driven programming language and integrated development environment (IDE) from Microsoft for its COM programming model first released in 1991. Visual Basic is designed to be relatively easy to learn and use.[1][2] Visual Basic was derived from BASIC and enables the rapid application development (RAD) of graphical user interface (GUI) applications, access to databases using Data Access Objects, Remote Data Objects, or ActiveX Data Objects, and creation of ActiveX controls and objects. Scripting languages such as VBA and VBScript are syntactically similar to Visual Basic, but perform differently.

A programmer can put together an application using the components provided with Visual Basic itself. Programs written in Visual Basic can also use the Windows API, but doing so requires external function declarations. Though the program has received criticism for its perceived faults,[3] from version 3 Visual Basic was a runaway commercial success,[4] and many companies offered third party controls greatly extending its functionality.

The final release was version 6 in 1998. Microsoft's extended support ended in March 2008 and the designated successor was Visual Basic .NET (now known simply as Visual Basic).

Forms are created using drag-and-drop techniques. A tool is used to place controls (e.g., text boxes, buttons, etc.) on the form (window). Controls have attributes and event handlers associated with them. Default values are provided when the control is created, but may be changed by the programmer. Many attribute values can be modified during run time based on user actions or changes in the environment, providing a dynamic application.

For example, code can be inserted into the form resize event handler to reposition a control so that it remains centred on the form, expands to fill up the form, etc. By inserting code into the event handler for a key press in a text box, the program can automatically translate the case of the text being entered, or even prevent certain characters from being inserted.

Visual Basic can create executables (EXE files), ActiveX controls, or DLL files, but is primarily used to develop Windows applications and to interface database systems. Dialog boxes with less functionality can be used to provide pop-up capabilities. Controls provide the basic functionality of the application, while programmers can insert additional logic within the appropriate event handlers. For example, a drop-down combination box will automatically display its list and allow the user to select any element. An event handler is called when an item is selected, which can then execute additional code created by the programmer to perform some action based on which element was selected, such as populating a related list.

Alternatively, a Visual Basic component can have no user interface, and instead provide ActiveX objects to other programs via Component Object Model (COM). This allows for server-side processing or an add-in module.

The runtime recovers unused memory using reference counting which depends on variables passing out of scope or being set to "Nothing", resulting in the very common problem of memory leaks. There is a large library of utility objects, and the language provides basic object oriented support. Unlike many other programming languages, Visual Basic is generally not case sensitive, although it will transform keywords into a standard case configuration and force the case of variable names to conform to the case of the entry within the symbol table. String comparisons are case sensitive by default.

The Visual Basic compiler is shared with other Visual Studio languages (C, C++), but restrictions in the IDE do not allow the creation of some targets (Windows model DLLs) and threading models.The code windows in Visual Basic, showing a Function using the If, Then, Else and Dim statements.

Visual Basic has the following traits which differ from C-derived languages:

• Statements tend to be terminated with keywords such as "End If", instead of using "{}"s to group statements.

• Multiple variable assignment is not possible. A = B = C does not imply that the values of A, B and C are equal. The boolean result of "Is B = C?" is stored in A. The result stored in A would therefore be either false or true.

• Boolean constant True has numeric value −1.[5] This is because the Boolean data type is stored as a 16-bit signed integer. In this construct −1 evaluates to 16 binary 1s (the Boolean value True), and 0 as 16 0s (the Boolean value False). This is apparent when performing a Not operation on a 16 bit signed integer value 0 which will return the integer value −1, in other words True = Not False. This inherent functionality becomes especially useful when performing logical operations on the individual bits of an integer such as AND, OR, XOR and NOT. This definition of True is also consistent with BASIC since the early 1970s Microsoft BASIC implementation and is also related to the characteristics of CPU instructions at the time.

• Logical and bitwise operators are unified. This is unlike some C-derived languages (such as Perl), which have separate logical and bitwise operators. This again is a traditional feature of BASIC.

• Variable array base. Arrays are declared by specifying the upper and lower bounds in a way similar to PASCAL and FORTRAN. It is also possible to use the Option Base statement to set the default lower bound.

• This lower bound is not limited to 0 or 1, because it can also be set by declaration. In this way, both the lower and upper bounds are programmable. In more subscript-limited languages, the lower bound of the array is not variable. This uncommon trait does exist in Visual Basic

.NET but not in VBScript.

OPTION BASE was introduced by ANSI, with the standard for ANSI Minimal BASIC in the late 1970s.

• Relatively strong integration with the Windows operating system and the Component Object Model. The native types for strings and arrays are the dedicated COM types, BSTR and SAFEARRAY.

• Banker's rounding as the default behavior when converting real numbers to integers with the Round function. ? Round(2.5, 0) gives 2, ? Round(3.5, 0) gives 4.

• Integers are automatically promoted to reals in expressions involving the normal division operator (/) so that division of one integer by another produces the intuitively correct result. There is a specific integer divide operator (\) which does truncate.

• By default, if a variable has not been declared or if no type declaration character is specified, the variable is of type Variant. However this can be changed with Deftype statements such as DefInt, DefBool, DefVar, DefObj, DefStr. There are 12 Deftype statements in total offered by Visual Basic 6.0. The default type may be overridden for a specific declaration by using a special suffix character on the variable name (# for Double, ! for Single, & for Long, % for Integer, $ for String, and @ for Currency) or using the key phrase As (type). VB can also be set in a mode that only explicitly declared variables can be used with the command Option Explicit.

ADVANDAGES:

- LOW COST-

Due to using IR sensors, RFID tags the cost of this project will be reduced.

- RELIABILITY-

The sensing range can be increased by increasing the frequency of RFID and it is very accurate.

- EASY TO IMPLEMENTATION-

The processes of RFID and IR sensor are very easy to understand.

So the implementation is trouble-free.

RESULTS

Vehicle Speed Measurement

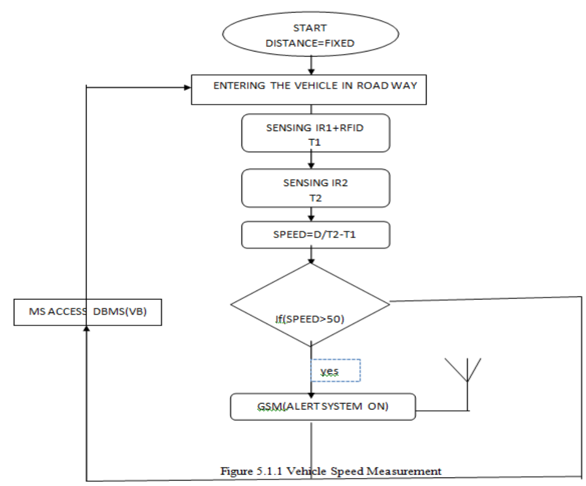

Figure 5.1.1 Vehicle Speed Measurement

Vehicle Counting

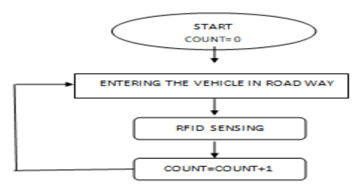

Figure 5.1.2 Vehicle Counting

Vehicle Classification

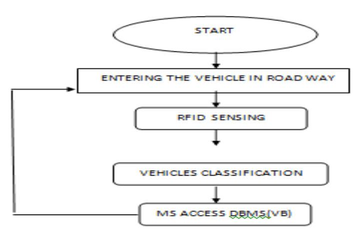

Figure 5.1.2 Vehicle Classification

Transmitter kit:

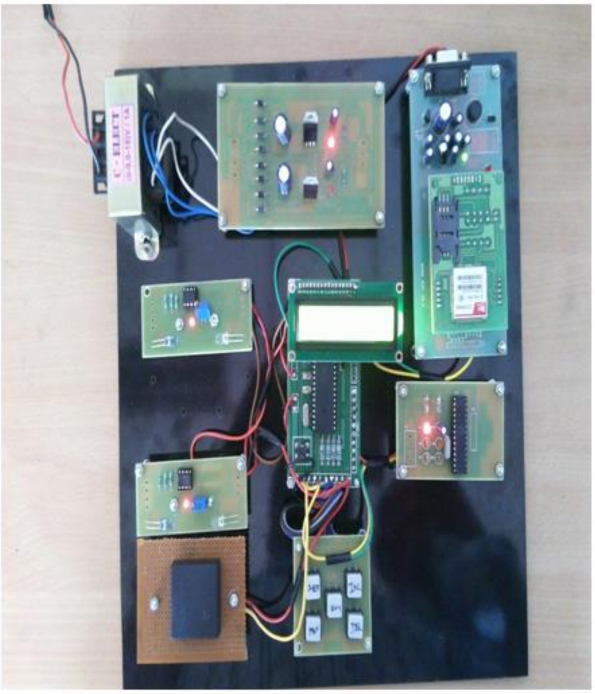

Figure 5.2 Transmitter kit

Receiver kit:

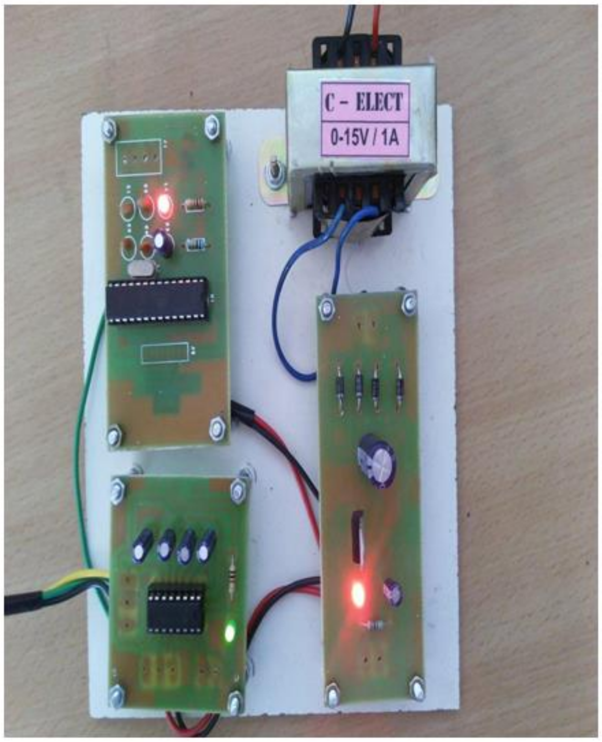

Figure 5.3 Receiver kit

Output Results in PC:

Figure 5.4 Output in PC

Simulation Results using Protus E software

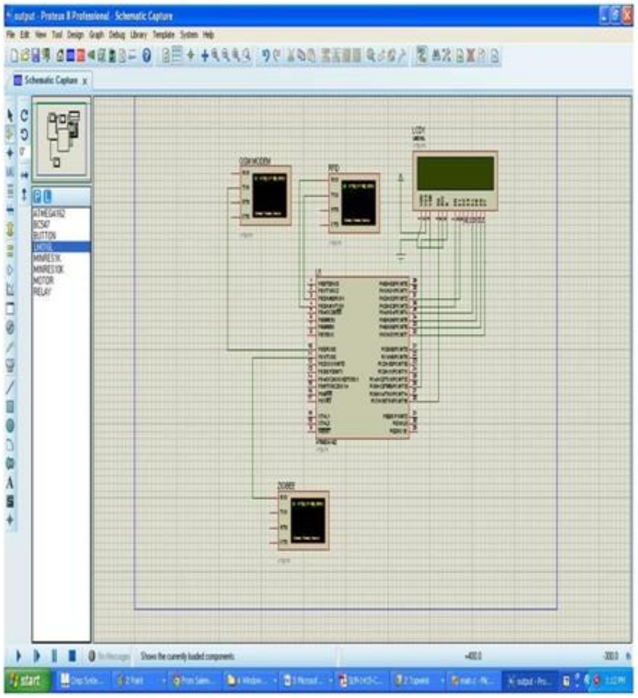

Figure 5.5 Simulation result

IV. CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place.

The proposed system based on ATMEGA microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. Due to the probability of high technology (ATMEGA microcontroller) used this system is fully software controlled with less hardware circuit. The feature makes this system is the base for future systems.

The principle of the development of science is that nothing is impossible. So we shall look forward to a bright & sophisticated world.

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