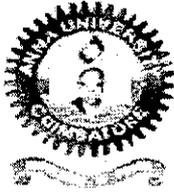
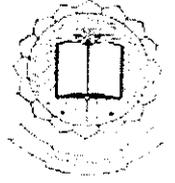


P- 3417



MULTISPY ROBOT USING ZIGBEE



A PROJECT REPORT

Submitted by

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In partial fulfillment for the award of the degree

of

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KUMARAGURU COLLEGE OF TECHNOLOGY

COIMBATORE – 641049

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APRIL - 2011

ANNA UNIVERSITY OF TECHNOLOGY-COIMBATORE

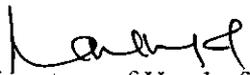
APRIL- 2011

BONAFIDE CERTIFICATE

Certified that this project report “**MULTISPY ROBOT USING ZIGBEE**” is the bonafide work of

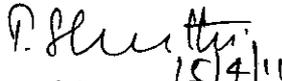
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who carried out the project work under my supervision.


Signature of Head of the Department

Dr. Rani Thottungal

EEE


Signature of the supervisor

Mrs.T.Shanthi

Asst.Professor

The candidates with University Register Nos.0710105019, 0710105043, 0710105023, 0710105304 were examined by us in the project viva-voce examination held on 18.04.2011


INTERNAL EXAMINER


EXTERNAL EXAMINER

ABSTRACT

The objective of project is to design the Robot for the rescuing purpose in the natural disaster or in bomb blast. We are using the computer in this project to control the robot and also to visualize the control. For controlling the robot, the signal is generated by Zigbee using the computer. When using Zigbee no need for modulator and signal is transmitted through the transceiver. This signal is received by the transceiver. This signal is given to the Microcontroller, which is a programmable IC, where we can program it to control the motors according to the signal from the computer. The motor driven circuit improves the current capacity of the Microcontroller.

The Microcontroller is also programmed to control the camera position according to the signal from the computer. We are using the wireless transmitter in the camera to transmit the video signal. This signal is received by the video receiver and monitored in the computer through the tuner card. Temperature sensor, moisture sensor and metal detector is used to senses the temperature, moisture and land mine. Thus we can monitor the situation and can control the robot for rescuing the people from the disaster to save the rescuing people life.

ACKNOWLEDGEMENT

It is our bounden duty to thank contribution made in one form or the other by the individuals we hereby acknowledge.

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CHAPTER -1

CHAPTER-1

INTRODUCTION

1.1 OBJECTIVE

The objective of project is to design the Robot for the rescuing purpose in the natural disaster or in bomb blast. We are using the computer in this project to control the robot and also to visualize the control. For controlling the robot, the signal is generated by Zigbee using the computer. When using Zigbee no need for modulator and signal is transmitted through the transceiver. This signal is received by the transceiver. This signal is given to the Microcontroller, which is a programmable IC, where we can program it to control the motors according to the signal from the computer. The motor driven circuit improves the current capacity of the Microcontroller.

The Microcontroller is also programmed to control the camera position according to the signal from the computer. We are using the wireless transmitter in the camera to transmit the video signal. This signal is received by the video receiver and monitored in the computer through the tuner card. Temperature sensor, moisture sensor and metal detector is used to senses the temperature, moisture and land mine. Thus we can monitor the situation and can control the robot for rescuing the people from the disaster to save the rescuing people life.

Project focuses on developing an embedded system to create a robot which is used as spy during natural disasters or in bomb detection and also by further developing it can be in army. Here temperature, moisture monitoring and metal detection is done and the signals are transferred through zigbee protocol from robot section to the control section. we can also monitor the situation via wireless camera and can control the robot for rescuing the people from the disaster.

1.2 BACKGROUND OF THE PROECT

At present many nations have equipped their control boundaries with artificial humanoid robots and their controlling is done by humans, keeping this in mind we have implemented a robot which could give an awareness of what is going on in the opponent's field without actually sending a human to do the same.

We believe that by developing our prototype, it can be used in both surveillance and for the purpose of rescue. Since it being a robot it can be in 24*7 operations, ie it can operate regardless of the climatic conditions and all other physical constraints.

1.3 ORGANISATION OF THE REPORT

This gives an overall outline of the project report

CHAPTER 1

Objective of the project.

CHAPTER 2

About the components of the project.

CHAPTER 3

About zigbee protocol.

CHAPTER 4

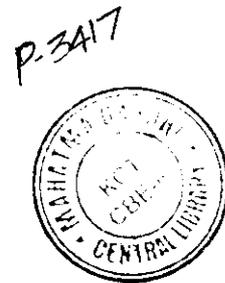
About labVIEW tool.

CHAPTER 5

Microcontroller coding.

CHAPTER 6

Result analysis.



CHAPTER -2

CHAPTER-2

COMPONENTS OF THE PROJECT

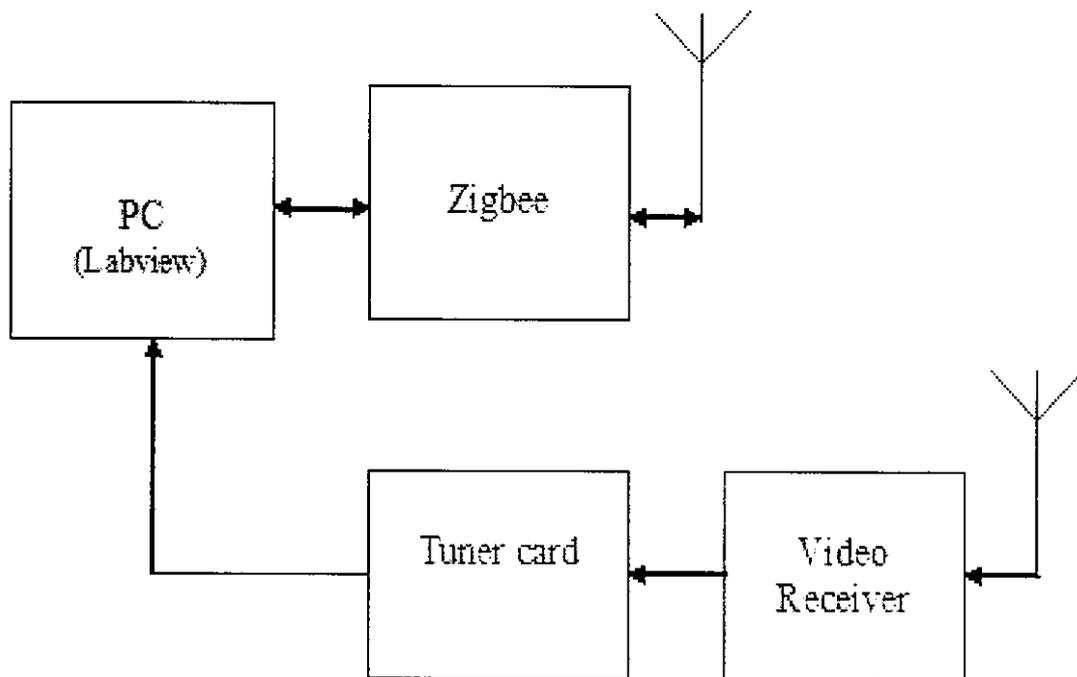
INTRODUCTION:

The hardware consists of two sections controller section and robot section. Controller section consists of pc with labview software, zigbee transceiver, video receiver and tuner card. Robot section consists of robot mechanism, zigbee transceiver, wireless camera, temperature, humidity and proximity sensor, pic microcontroller.

2.1 BLOCK DIAGRAM

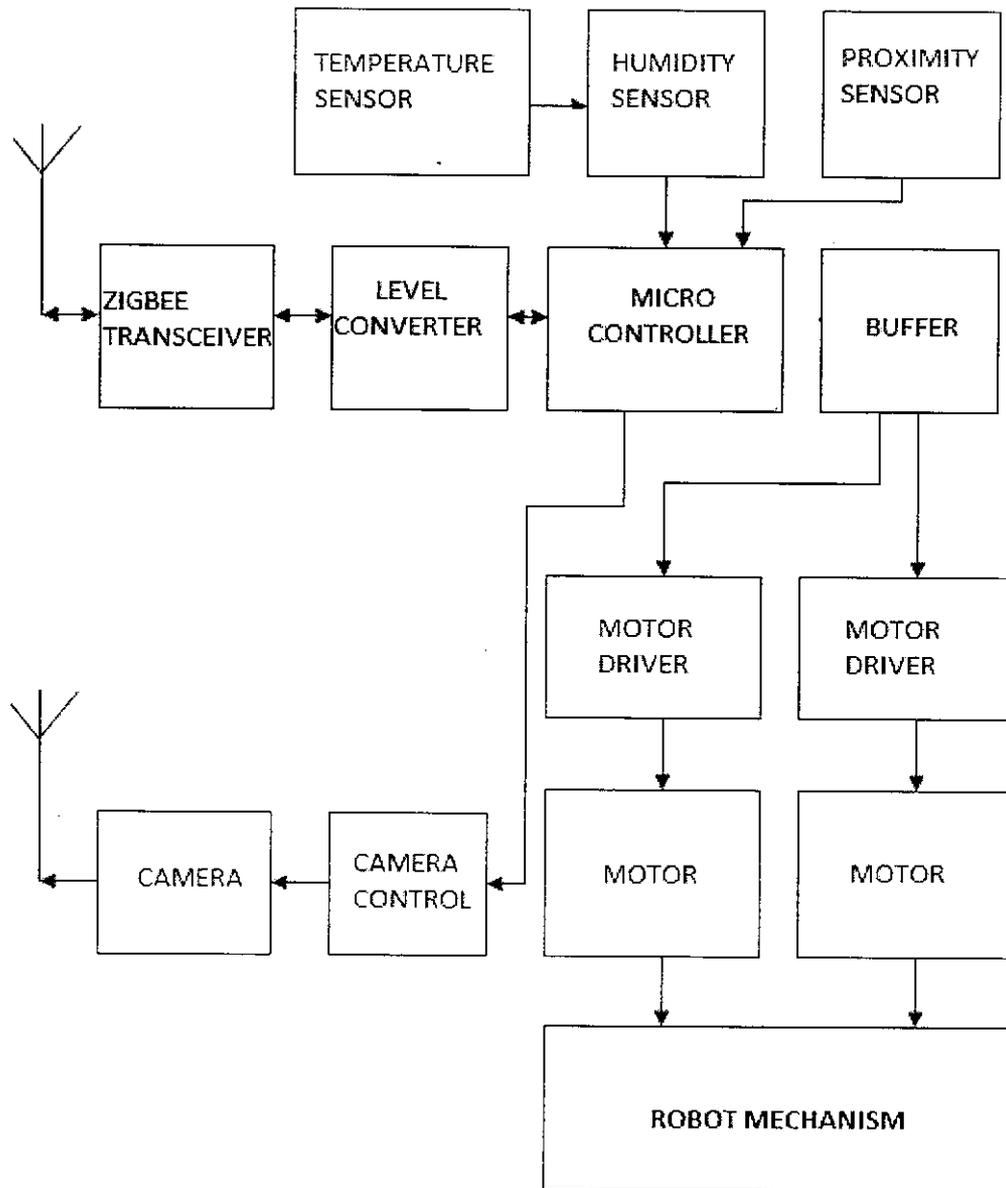
Controller section:

Fig 2.1-controller section:



Robot section:

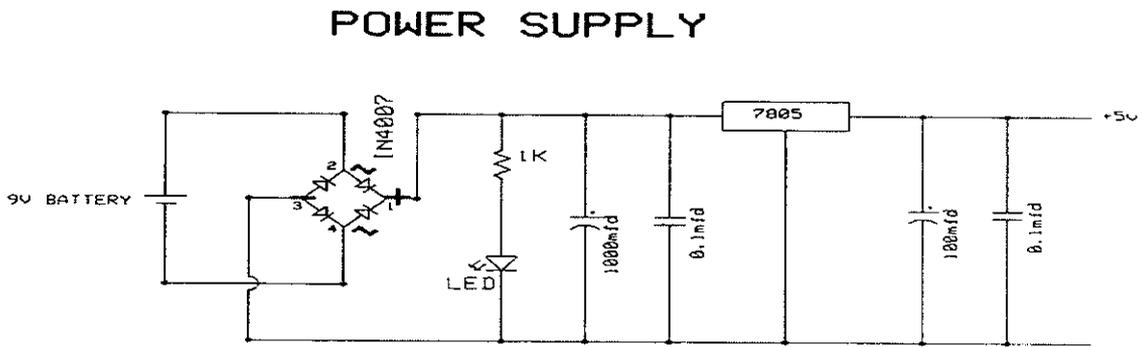
Fig 2.2-controller section:



2.2 POWER SUPPLY

Since all electronic circuits work only with low D.C. voltage we need a power supply unit to provide the appropriate voltage supply. This unit consists of transformer, rectifier, filter and regulator. A.C. voltage typically 230V rms is connected to a transformer which steps that AC voltage down to the level to the desired AC voltage. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a DC voltage. This resulting DC voltage usually has some ripple or AC voltage variations. regulator circuit can use this DC input to provide DC voltage that not only has much less ripple voltage but also remains the same DC value even the DC voltage varies somewhat, or the load connected to the output DC voltage changes. The power supply unit is a source of constant DC supply voltage. The required DC supply is obtained from the available AC supply after rectification, filtration and regulation.

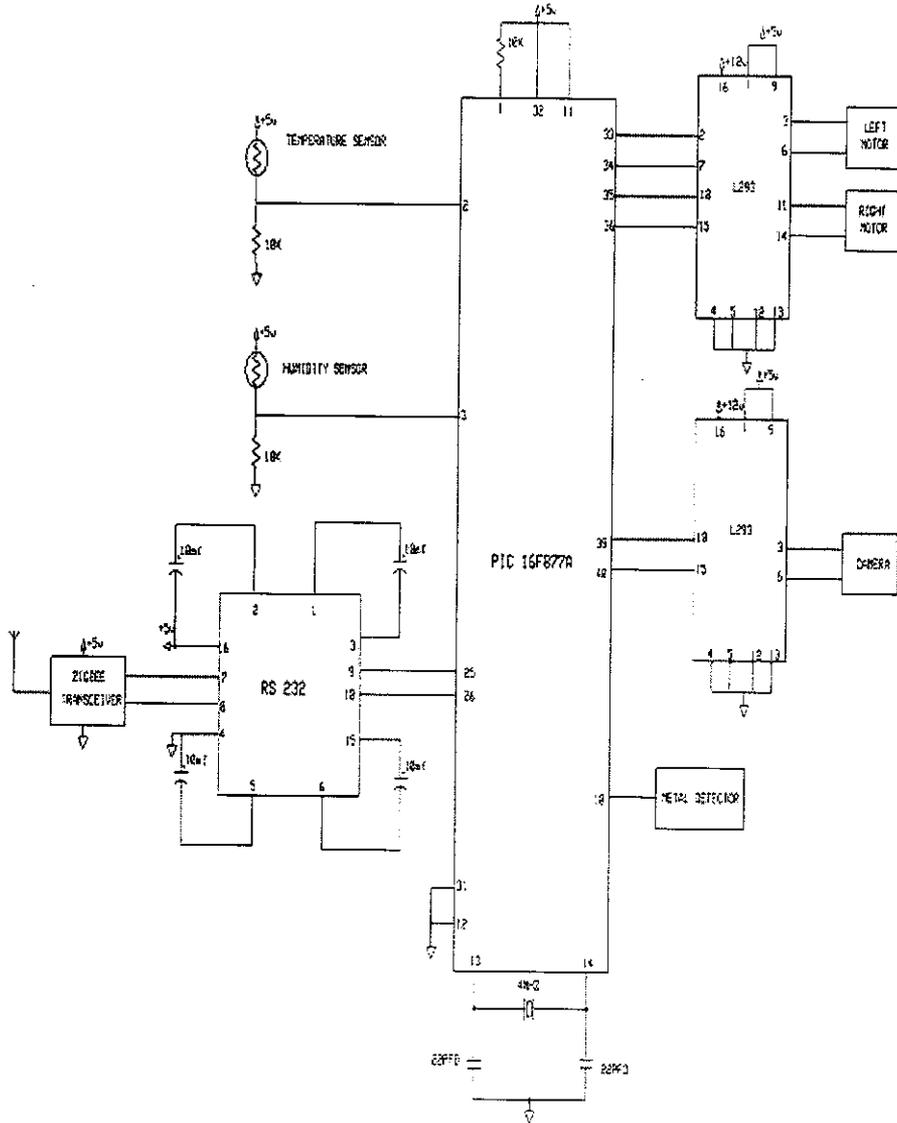
Fig .2.3 Power Supply Circuit:



The main components used in the power supply unit shown in fig 5.5 are Transformer, Rectifier, Filter, and Regulator. The 230V ac supply is converted into 12V ac supply through the transformer. The output of the transformer has the same frequency as in the input ac power. This ac power is converted into dc power through the diodes. Here the bridge diode is used to convert the ac supply to the dc power supply. This converted dc power supply has the ripple content and for the normal operation of the circuit, the ripple content of the dc power supply should be as low as possible. Because the ripple content of the power supply will reduce the life of circuit. So to reduce the ripple content of the dc power supply, the filter is used. The filter is nothing but the large value capacitance. The output waveform of the filter capacitance will almost be the straight line.

This filtered output will not be the regulated voltage. For the normal operation of the circuit it should have the regulated output. Specifically for the microcontroller IC regulated constant 5V output voltage should be given. For this purpose 78xx regulator should be used in the circuit. In that number of IC, the 8 represents the positive voltage and if it is 9, it will represent the negative voltage. The xx represents the voltage. If it is 7805, it represent 5V regulator, and if it is 7812, it represent 12V regulator. Thus the regulated constant output can be obtained.

Fig 2.4: Microcontroller:



2.3 DESCRIPTION OF COMPONENTS USED

2.3.1 SENSORS

2.3.1.1 HUMIDITY

A humidity sensor also called a hygrometer, measures and regularly reports the relative humidity in the air. A humidity sensor senses relative humidity. This means that it measures both air temperature and moisture. Relative humidity, expressed as a percent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. The warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations in temperature.

The most common type of humidity sensor uses what is called “capacitive measurement.” this system relies on electrical capacitance, or the ability of two nearby electrical conductors to create an electrical field between them. The sensor itself is composed of two metal plates with a non-conductive polymer film between them. The film collects moisture from the air, and the moisture causes minute changes in the voltage between the two plates. The changes in voltage are converted into digital readings showing the amount of moisture in the air.

Specifications

Tab2.1-humidity sensor specifications.

1.Range	20-90%RH at 77°F
2.Accuracy	±2% RH
3.Interchangeability	within 2% RH
4.Hysteresis	+/- 1% RH
5. Long Term Drift	<2%RH/5 Years
6. Response	5 Seconds/63% Step Change

7. Temp. Coefficient	-0.4%RH/°F
8. Temperature Limits	-4 to +140°F
9. Excitation Voltage	1 VAC., symmetrical
10. Excitation Frequency	33-10 KHz

2.3.1.2 THERMISTOR

Thermistors, or thermal resistors, are semiconductor devices that behave as resistors with a high, usually negative, temperature coefficient of resistance. In some cases, the resistance of Thermistors at room temperature may decrease as much as 6 percent for each 1°C rise in temperature. This high sensitivity to temperature change makes the Thermistors extremely well suited to precision temperature measurement, control, and compensation. Thermistors are therefore widely used in such applications, especially in the lower temperature range of -100°C to 300°C.

Relationship between resistance and temperature is linear, then:

$$\Delta R = k \Delta T$$

Where

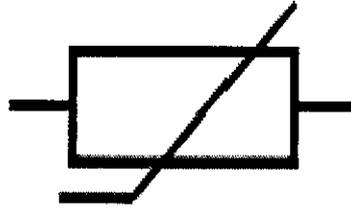
ΔR = change in resistance

ΔT = change in temperature

k = first-order temperature coefficient of resistance

Thermistors can be classified into two types, depending on the sign of k . If k is positive, the resistance increases with increasing temperature, and the device is called a positive temperature coefficient (**PTC**) thermistor, or **posistor**. If k is negative, the resistance decreases with increasing temperature, and the device is called a negative temperature coefficient (**NTC**) thermistor

Thermistor symbol:



Specifications:

Tab 2.2-Thermister Specification

1. Temperature coefficient @25°C	-4.4 %/°C
2. Dissipation factor.	Approx. 0.5 mW/°C (in air)
3. Thermal time constant	Approx. 0.4 s (in air)
4. Tolerance range (tolerance)	0°C to 70°C (±0.1°C)
5. Maximum operating temperature	150 °C

2.3.1.3 PROXIMITY SENSOR

Proximity sensors are sensors able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic or electrostatic field, or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a

Specifications: Tab 2.3-metal detector specifications.

1.voltage	10-30 v dc
2.Ripple on Supply	10% max.
3.No load Current	Less than 10 mA
4.Maximum load Current	300 mA
5.Hysteresis	15% max.
6.Operating Temperature	-25°C to + 70°C
7.Temperature Drift	5% typical
8.Status Indication	Provided thro' LED

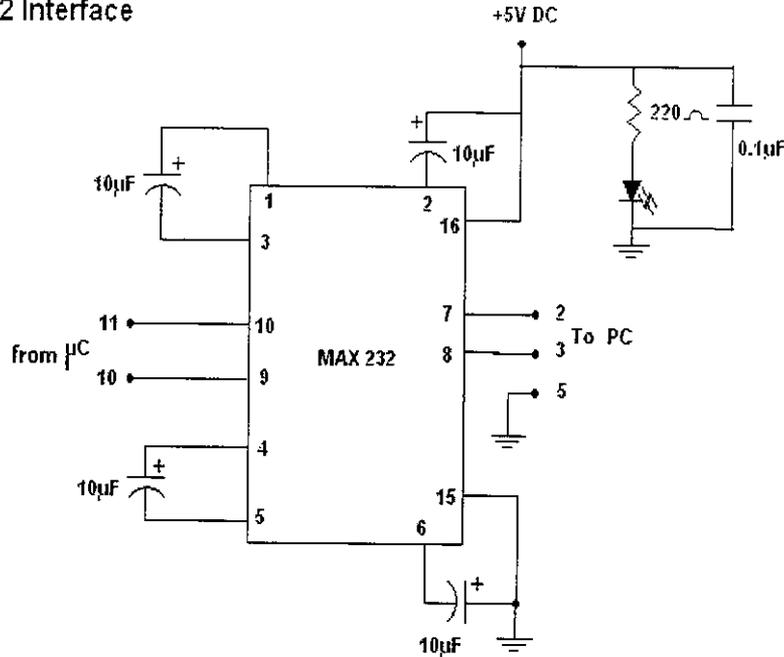
2.3.2 RS232

2.3.2.1 FEATURES

1. operate from single +5v power supply (+5v and +12v max231/max239)
2. low-power receive mode in shutdown (max223/max242)
3. meet all eia/tia-232e and v.28 specifications
4. multiple drivers and receivers
5. 3-state driver and receiver outputs
6. open-line detection (max243)

Fig 2.6 RS232

RS 232 Interface



2.3.2.2 SERIAL INTERFACE CIRCUIT

RS-232 is simple, universal, well understood and supportive. The serial port transmits a '1' as -3 to -25 volts and a '0' as +3 to +25 volts. Devices which use serial cables for their communication are split into two categories. These are DCE (Data Communications Equipment) and DTE (Data Terminal Equipment.) Data Communications Equipment is devices such as the modem, TA adapter, plotter etc. while Data Terminal Equipment is your Computer or Terminal.

Properties

The electrical specifications of the serial port are contained in the EIA (Electronics Industry Association) RS232C standard. It states many parameters such as –

1. A "Space" (logic 0) will be between +3 and +25 Volts
2. A "Mark" (Logic 1) will be between -3 and -25 Volts.
3. The region between +3 and -3 volts is undefined.
4. An open circuit voltage should never exceed 25 volts. (In Reference to GND)
5. A short circuit current should not exceed 500mA. The driver should be able to handle this without damage.

2.3.2.3 DATA TRANSFER RATE

The rate of data transfer in serial data communication is stated in bps(bits per second). Another widely used terminology for bps is baud rate.

data rate (bps)	maximum distance	
	(meters)	(feet)
19200	15	45
9600	25	76
4800	50	152
2400	100	304
1200	200	608
600	400	1216

Tab 2.4-data transfer rate ranges.

Baud rate is defined as the number of signal changes per second. In modems, there are occasions when a single change of signal transfers several bits of data. As far as the conductor wire is concerned, the baud rate and bps are the same. It must be noted that in asynchronous serial data communication, the baud rate is generally limited to 100,000 bps.

RS232 STANDARDS:

To allow compatibility among data communication equipment made by various manufactures, an interfacing standard called RS232 was set by the Electronics Industries Association (EIA) in 1960. RS232 is the most widely used serial I/O interfacing standard.

Since the RS232 standard was set long before the advent of the TTL logic family, its input and output voltage levels are not TTL compatible. In RS232, a 1 is represented by -3 to -25 V, while a 0 bit are +3 to +25 V, making -3 to +3 undefined. For this reason, to connect any Rs232 to a microcontroller system we must use voltage converters such as MAX232 to convert any RS232 the TTL logic levels to the RS232 voltage level, and vice versa. MAX232 IC chips are commonly referred to as line drivers.

2.2.2.4 ADVANTAGES

- ✓ Serial Cables can be longer than Parallel cables. The serial port transmits a '1' as -3 to -25 volts and a '0' as +3 to +25 volts where as a parallel port transmits a '0' as 0v and a '1' as 5v. Therefore the serial port can have a maximum swing of 50V compared to the parallel port which has a maximum swing of 5 Volts. Therefore cable loss is not going to be as much of a problem for serial cables as they are for parallel.
- ✓ Wires are less than parallel transmission.
- ✓ Serial transmission is used where one bit is sent at a time.

Microcontrollers have also proven to be quite popular recently. Many of these have in built SCI (Serial Communications Interfaces) which can be used to talk to the outside world. Serial Communication reduces the pin count of these MPU's.

2.3.3 PIC MICROCONTROLLER

PIC is a family of Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1640 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "**Peripheral Interface Controller**".

PICs are popular with developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.

Core architecture

2.3.3.1 FEATURES:

1. High-performance RISC CPU
2. Only 35 single word instructions to learn
3. All single cycle instructions except for program branches which are two cycle
4. Operating speed: DC - 20 MHz clock input DC - 200 ns instruction cycle
Up to 8K x 14 words of FLASH Program Memory, Up to 368 x 8 bytes of Data Memory (RAM) Up to 256 x 8 bytes of EEPROM data memory
5. Pin out compatible to the PIC16C73B/74B/76/77
6. Interrupt capability (up to 14 sources)
7. Eight level deep hardware stack
8. Direct, indirect and relative addressing modes
9. Power-on Reset (POR)
10. Power-up Tim Low-power, high-speed CMOS FLASH/EEPROM technology
11. Fully static design
12. In-Circuit Serial Programming a (ICSP) via two pins
13. Single 5V In-Circuit Serial Programming capability

2.3.3.2 PIN CONFIGURATION

Fig 2.7-pin configuration of mc.

U1

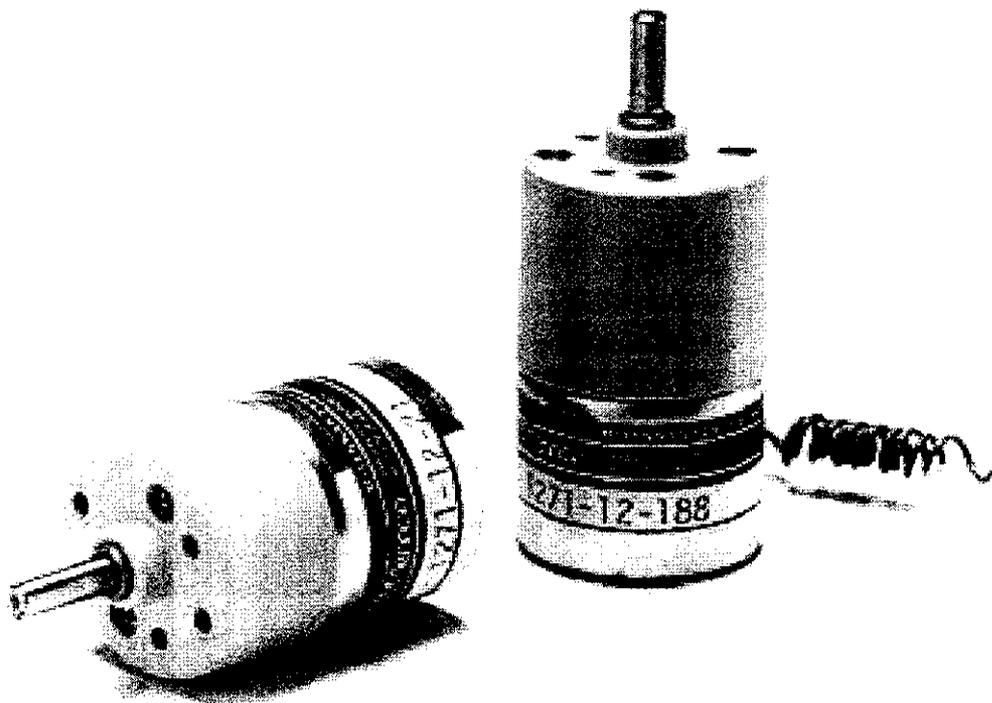
1	MCLRn/Vpp	RB7/PGD	40
2	RA0/AN0	RB6/PGC	39
3	RA1/AN1	RB5	38
4	RA2/AN2/VREF-	RB4	37
5	RA3/AN3/VREF+	RB3/PGM	36
6	RA4/T0CKI	RB2	35
7	RA5/AN4/SSn	RB1	34
8	RE0/AN5/RDn	RB0/INT	33
9	RE1/AN6/WRn	Vdd2	32
10	RE2/AN7/CSn	Vss2	31
11	Vdd1	RD7/PSP7	30
12	Vss1	RD6/PSP6	29
13	OSC1/CLKIN	RD5/PSP5	28
14	OSC2/CLKOUT	RD4/PSP4	27
15	RC0/T1OSO/T1CKI	RC7/RX/DT	26
16	RC1/T1OSI/CCP2	RC6/TX/CK	25
17	RC2/CCP1	RC5/SDO	24
18	RC3/SCK/SCL	RC4/SDI/SDA	23
19	RD0/PSP0	RD3/PSP3	22
20	RD1/PSP1	RD2/PSP2	21

PIC16F877

2.3.4 GEAR MOTOR:

The 1271 geared instrument dc motor is ideally suited to a wide range of applications requiring a combination of low speed operation and small unit size. The integral iron core dc motor provides smooth operation and a bidirectional variable speed capability while the gearhead utilizes a multistage metal spur gear train rated for a working torque up to 0.2 nm. The unit, which is suitable for mounting in any attitude, provides reliable operation over a wide ambient temperature range and is equipped with an integral vdr (voltage dependent resistor) electrical suppression system to minimise electrical interference. the 1271 unit offers a range of gear ratio options for operating speeds from 5- 200 rpm and is ideally suited to applications where small size and low unit price are important design criteria.

Fig 2.8-geared motor:



2.3.4.1 GEAR MOTOR SPECIFICATIONS:

Tab 2.5-motor specifications:

Order code	1271-06- 21
Length	36mm
Gear ratio	21:1
Speed	105rpm(@no load) 60rpm(rated)
Rated torque	2.5Ncm
Rated current	80mA
Mass	55grams

2.3.4.2 FEATURES OF GEAR MOTOR:

- Smaller overall size
- Higher efficiency than wound field
- Wide voltage operating range (12–230)
- Typical 20:1 constant torque speed range
- Provide high starting torques
- Linear speed regulation
- Instant reversing capability
- Locked rotor torque 7 to 10 times full load torque

- Speed adjustable via potentiometer, full wave rectifiers, electronic controls
- Low voltage applications may require current limiting
- Low temperature may demagnetize magnets
- High altitude operation may reduce brush life

2.3.5 DRIVERS:

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included. This device is suitable for use in switching applications at frequencies up to 5 kHz. The L293D is assembled in a 16 lead plastic package which has 4 centre pins connected together and used for heat sinking. The L293DD is assembled in a 20 lead surface mount which has 8 centre pins connected together and used for heat sinking

2.3.5.1. FEATURES:

- 600ma output current capability per channel
- 1.2a peak output current (non repetitive) per channel
- enable facility
- over temperature protection
- logical "0" input voltage up to 1.5 v high noise immunity
- internal clamp diodes

Pin diagram:

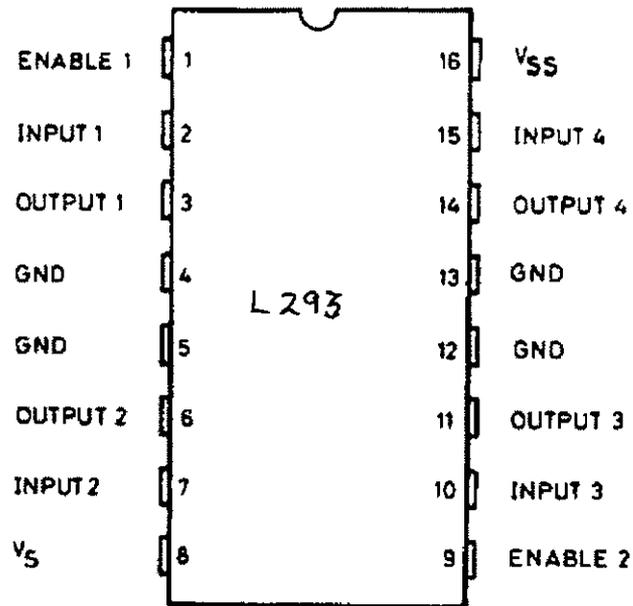
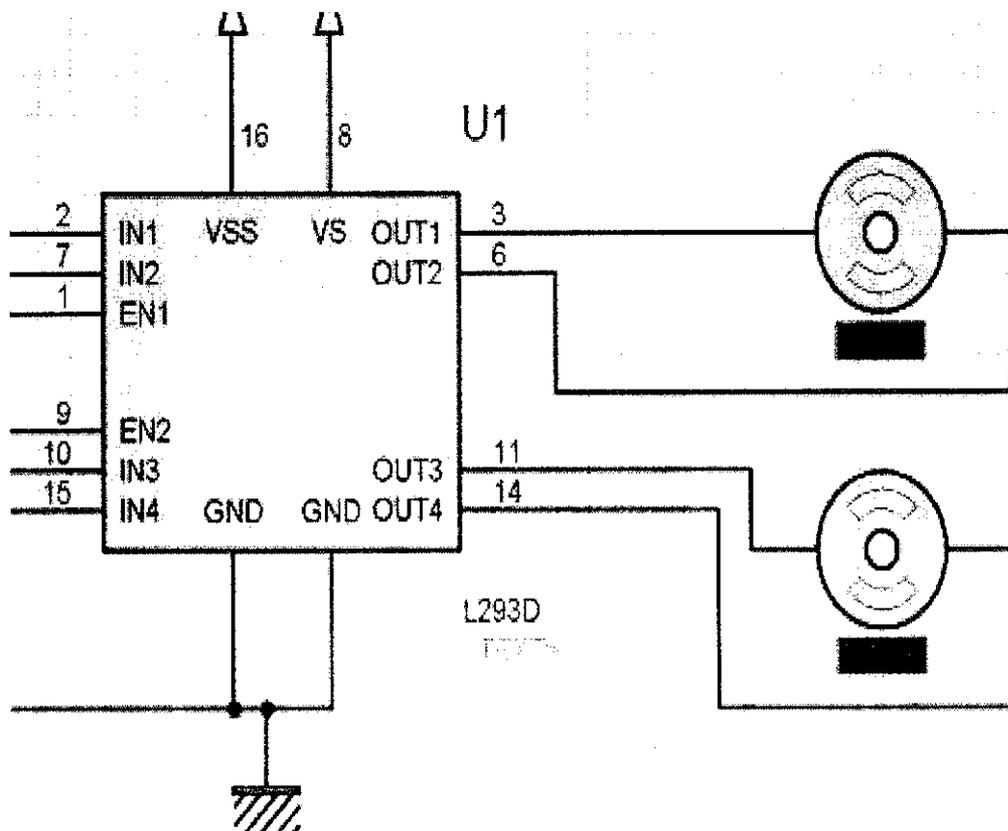


Fig2.9LDRIVER:



CHAPTER -3

CHAPTER 3

ZIGBEE PROTOCOL

3.1 FEATURES:

The focus of network applications under the IEEE.802.15.4 / ZigBee standard include the features of low power consumption, needed for only two major modes (Tx/Rx or Sleep), High density of nodes per network, low costs and simple implementation.

These **features** are enabled by the following characteristics:

1. 2.4GHz and 868/915 MHz dual PHY modes.

This represents three license-free bands: 2.4-2.4835 GHz, 868-870 MHz and 902-928 MHz The number of channels allotted to each frequency band is fixed at 16 channels in the 2.45 GHz band, 10 channels in the 915 MHz band, and 1 channel in the 868 MHz band

2. Maximum data rates allowed for each of these frequency bands are fixed as 250 kbps @2.4 GHz, 40 kbps @ 915 MHz, and 20 kbps @868 MHz

3. Allocated 16 bit short or 64 bit extended addresses.

4. Allocation of guaranteed time slots (GTSs)

5. Carrier sense multiple access with collision avoidance (CSMA-CA) channel access Yields high throughput and low latency for low duty cycle devices like sensors and controls.

6. Fully “hand-shake” acknowledged protocol for transfer reliability.

7. Low power consumption with battery life ranging from months to years

8. Energy detection (ED).

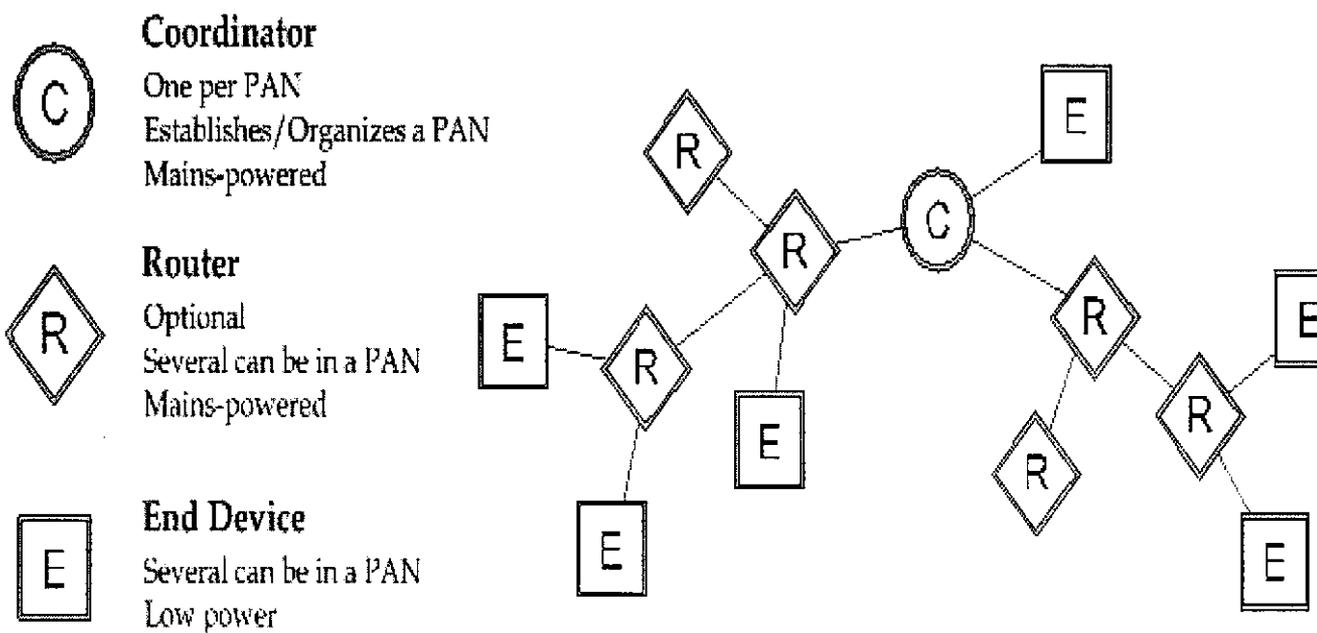
9. Link quality indication (LQI).

10. Multiple topologies: star, peer-to-peer, mesh topologies

3.2 NETWORK FORMATION

Zigbee networks are called personal area networks (PAN). Each network contains a 16-bit identifier called a PAN ID. ZigBee defines three different device types – coordinator, router, and end device. An example of such a network is shown below.

Fig 3.1-Personal Area Network:



Coordinator:

Responsible for selecting the channel and PAN ID. The coordinator starts a new PAN. Once it has started a PAN, the coordinator can allow routers and end devices to join the PAN. The coordinator can transmit and receive RF data transmissions, and it can assist in routing data through the mesh network. Coordinators are not intended to be battery-powered devices. Since the coordinator must be able to allow joins and/or route data, it should be mains powered.

Router:

A router must join a ZigBee PAN before it can operate. After joining a PAN, the router can allow other routers and end devices to join the PAN. The router can also transmit and receive RF data transmissions, and it can route data packets through the network. Since routers can allow joins and participate in routing data, routers cannot sleep and should be mains powered.

End device:

An end device must join a ZigBee PAN, similar to a router. The end device, however, cannot allow other devices to join the PAN, nor can it assist in routing data through the network. An end device can transmit or receive RF data transmissions. End devices are intended to be battery powered devices. Since the end device may sleep, the router or coordinator that allows the end device to join must collect all data packets intended for the end device, and buffer them until the end device wakes and is able to receive them. The router or coordinator that allowed the end device to join and that manages RF data on behalf of the end device is known as the end device's parent. The end device is considered a child of its parent

3.3 SPECIFICATIONS:**Tab 3.1-specifications for ZIGBEE:**

Transmission Range (meters)	1 – 100*
Battery Life (days)	100 – 1,000
Network Size (# of nodes)	> 64,000
Application	Monitoring and control
Stack Size (KB)	4 – 32
Throughput kb/s)	20 – 250

3.4 ZIGBEE APPLICATIONS:

ZigBee enables broad-based deployment of wireless networks with low-cost, low-power solutions. It provides the ability to run for years on inexpensive batteries for a host of monitoring applications:

- Lighting controls
- AMR (Automatic Meter Reading)
- smoke and CO detectors
- wireless telemetry
- HVAC control
- heating control
- home security
- Environmental controls
- drapery and shade controls, etc

CHAPTER -4

CHAPTER-4

LABVIEW DETAILS

4.1 INTRODUCTION:

LabVIEW (short for Laboratory Virtual Instrumentation Engineering Workbench) is a platform and development environment for a visual programming language from National Instruments. The graphical language is named "G". Originally released for the Apple Macintosh in 1986, LabVIEW is commonly used for data acquisition, instrument control, and industrial automation on a variety of platforms including Microsoft Windows, various flavors of UNIX, Linux, and Mac OS. The latest version of LabVIEW is version 8.6.1, released in February of 2009.

4.2 DATAFLOW PROGRAMMING:

The programming language used in LabVIEW, also referred to as G, is a dataflow programming language. Execution is determined by the structure of a graphical block diagram (the LV-source code) on which the programmer connects different function-nodes by drawing wires. These wires propagate variables and any node can execute as soon as all its input data become available. Since this might be the case for multiple nodes simultaneously, G is inherently capable of parallel execution. Multi-processing and multi-threading hardware is automatically exploited by the built-in scheduler, which multiplexes multiple OS threads over the nodes ready for execution.

4.3 GRAPHICAL PROGRAMMING:

LabVIEW ties the creation of user interfaces (called front panels) into the development cycle. LabVIEW programs/subroutines are called virtual instruments (VIs). Each VI has three components: a block

diagram, a front panel, and a connector panel. The last is used to represent the VI in the block diagrams of other, calling VIs. Controls and indicators on the front panel allow an operator to input data into or extract data from a running virtual instrument. However, the front panel can also serve as a programmatic interface. Thus a virtual instrument can either be run as a program, with the front panel serving as a user interface, or, when dropped as a node onto the block diagram, the front panel defines the inputs and outputs for the given node through the connector pane. This implies each VI can be easily tested before being embedded as a subroutine into a larger program.

The graphical approach also allows non-programmers to build programs simply by dragging and dropping virtual representations of lab equipment with which they are already familiar. The LabVIEW programming environment, with the included examples and the documentation, makes it simple to create small applications. This is a benefit on one side, but there is also a certain danger of underestimating the expertise needed for good quality "G" programming. For complex algorithms or large-scale code, it is important that the programmer possesses an extensive knowledge of the special LabVIEW syntax and the topology of its memory management. The most advanced LabVIEW development systems offer the possibility of building stand-alone applications. Furthermore, it is possible to create distributed applications, which communicate by a client/server scheme, and are therefore easier to implement due to the inherently parallel nature of *G*-code.

4.4 BENEFITS:

One benefit of LabVIEW over other development environments is the extensive support for accessing instrumentation hardware. Drivers and abstraction layers for many different types of instruments and buses are included or are available for inclusion. These present themselves as graphical nodes. The abstraction layers offer standard software interfaces to communicate

with hardware devices. The provided driver interfaces save program development time. The sales pitch of National Instruments is, therefore, that even people with limited coding experience can write programs and deploy test solutions in a reduced time frame when compared to more conventional or competing systems. A new hardware driver topology (DAQmxBase), which consists mainly of G-coded components with only a few register calls through NI Measurement Hardware DDK (Driver Development Kit) functions, provides platform independent hardware access to numerous data acquisition and instrumentation devices. The DAQmxBase driver is available for LabVIEW on Windows, Mac OS X and Linux platforms.

Fig 4.1- Labview program for spy robot:

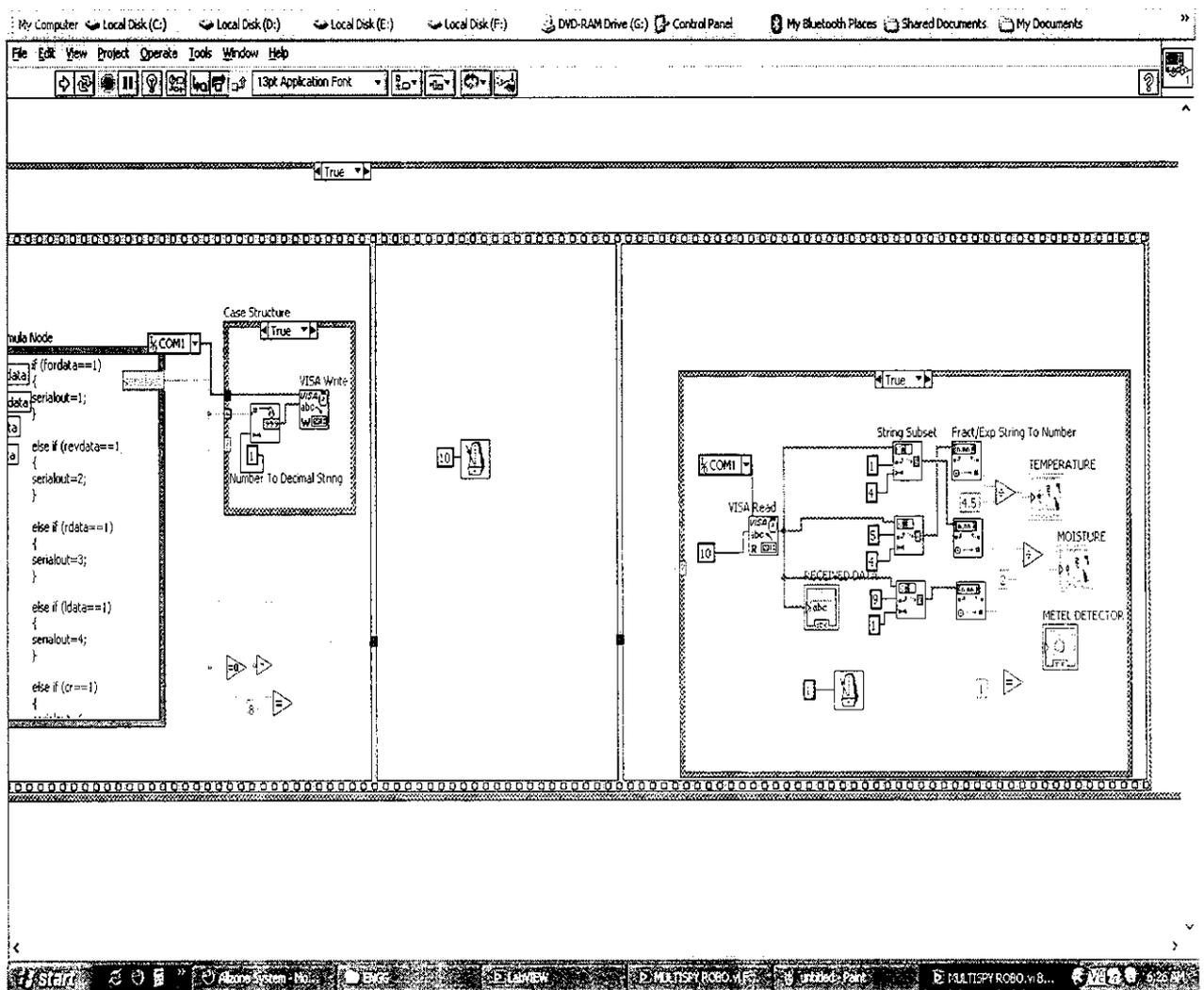
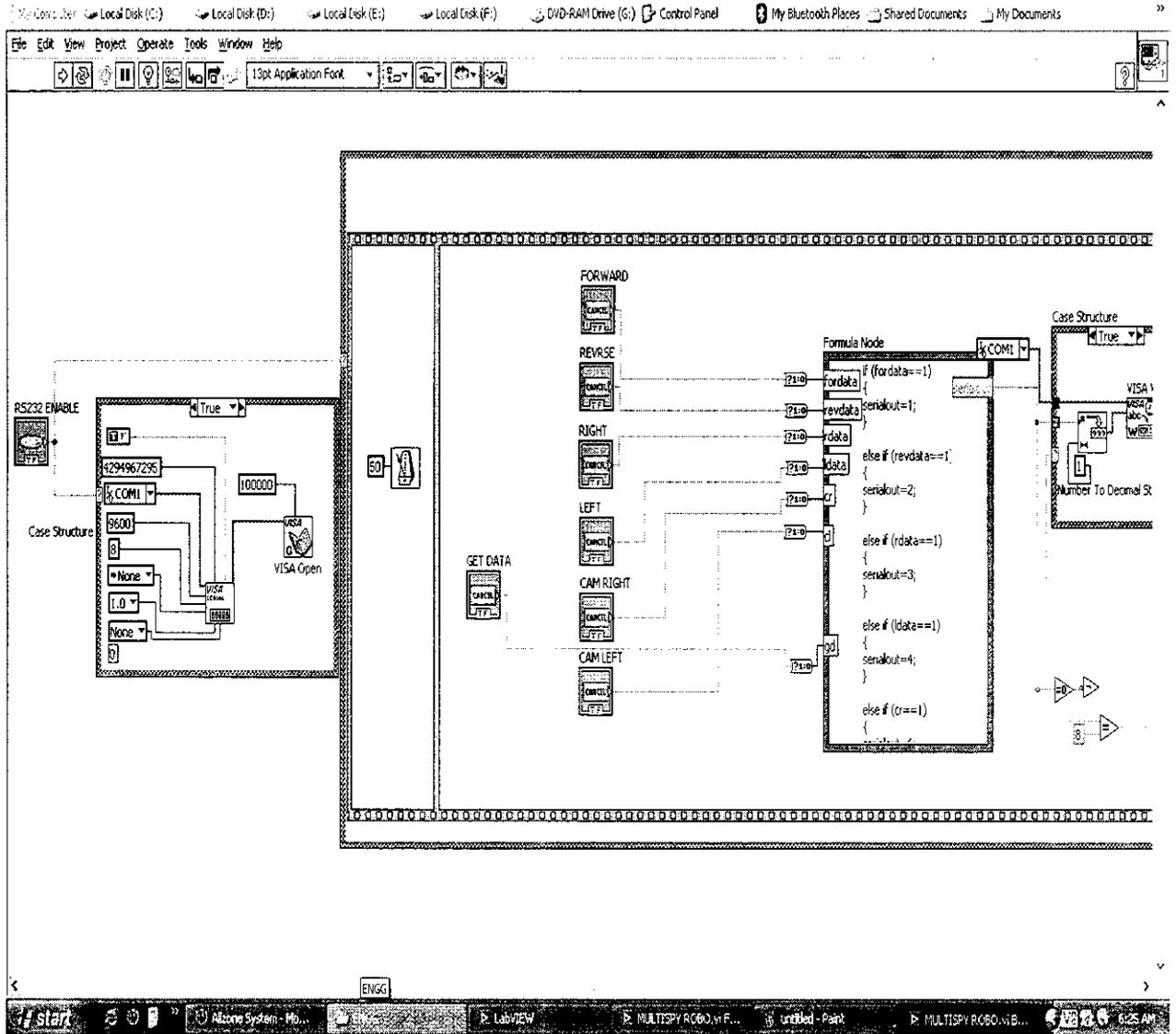


Fig 4.2- Labview program for spy robot:



CHAPTER-5

CHAPTER-5

CODING

```
#include<pic.h>

#define m1_1 RB0

#define m1_2 RB1

#define m2_1 RB2

#define m2_2 RB3

#define m3_1 RB4

#define m3_2 RB5

#define m4_1 RB6

#define m4_2 RB7

#define metal RD0

int convert[16]='0','1','2','3','4','5','6','7','8','9','A','B','C','D','E','F';

unsigned int temp,adc_value,countdata,digit1,digit2,digit3,digit4,digit5;

unsigned long temperature,humidity;

void hextobcd();

void acd_config();

void adc_data_accure();

void acd_read(int);
```

```

void forward();

void reverse();

void right();

void left();

void camright();

void camleft();

void send_data();

void delay(int);

void main()
{
    TRISA=0xFF; // PORTA is input
    TRISD=0xFF; // PORTD is input
    TRISB=0x00;

    delay(2)

    PORTB=0x00;

    PORTD=0xFF;

    metal=1;

    TXSTA=0b00100100; //configure serial port
    RCSTA=0b10010000; //configure serial port

    SPBRG=25;

```

```
acd_config();  
  
delay(50);  
  
loop:  
  
if (RCIF==1)  
  
    {  
  
temp=RCREG;  
  
if(temp=='4')  
  
    {  
  
forward();  
  
    }  
  
if(temp=='3')  
  
    {  
  
reverse();  
  
    }  
  
if(temp=='2')  
  
    {  
  
right();  
  
    }  
  
if(temp=='1')  
  
    {
```

```
left();  
}  
  
if(temp=='5')  
{  
camright();  
}  
  
if(temp=='6')  
{  
camleft();  
}  
  
if(temp=='7')  
{  
send_data();  
}  
}  
  
goto loop;  
}  
  
void send_data()  
{  
delay(200);
```

```
acd_read(0);  
temperature=adc_value;  
acd_read(1);  
humidity=adc_value;  
TXREG='F';  
delay(200);  
temp=temperature;  
hextobcd();  
TXREG=(convert[digit2]);  
delay(200);  
TXREG=(convert[digit3]);  
delay(200);  
TXREG=(convert[digit4]);  
delay(200);  
TXREG=(convert[digit5]);  
delay(200);  
temp=humidity;  
hextobcd();  
TXREG=(convert[digit2]);  
delay(200);
```

```
TXREG=(convert[digit3]);  
  
delay(200);  
  
TXREG=(convert[digit4]);  
  
delay(200);  
  
TXREG=(convert[digit5]);  
  
delay(200);  
  
if(metal==1)  
{  
  
TXREG='0';  
  
delay(200);  
  
}  
  
else  
  
{  
  
TXREG='1';  
  
delay(200);  
  
}  
  
}  
  
void forward()  
  
{  
  
m1_1=1;
```

```
m1_2=0;

m2_1=0;

m2_2=1;

delay(1000);

m1_1=0;

m1_2=0;

m2_1=0;

m2_2=0;

}

void reverse()

{

m1_1=0;

m1_2=1;

m2_1=1;

m2_2=0;

delay(1000);

m1_1=0;

m1_2=0;

m2_1=0;

m2_2=0;
```

```
}  
  
void right()  
  
{  
  
m1_1=0;  
  
m1_2=1;  
  
m2_1=0;  
  
m2_2=1;  
  
delay(1000);  
  
m1_1=0;  
  
m1_2=0;  
  
m2_1=0;  
  
m2_2=0;  
  
}  
  
void left()  
  
{  
  
m1_1=1;  
  
m1_2=0;  
  
m2_1=1;  
  
m2_2=0;  
  
delay(1000);
```

```
m1_1=0;
m1_2=0;
m2_1=0;
m2_2=0;
}
```

```
void camright()
```

```
{
m3_1=1;
m3_2=0;
delay(30);
m3_1=0;
m3_2=0;
}
```

```
void camleft()
```

```
{
m3_1=0;
m3_2=1;
delay(30);
m3_1=0;
```



```

m3_2=0;
}

void hextobcd()
{
countdata=temp;

countdata=(countdata/10000);

digit1=countdata;

countdata=(countdata*10000);

temp=(temp-countdata);

countdata=temp;

countdata=(countdata/1000);

digit2=countdata;

countdata=(countdata*1000);

temp=(temp-countdata);

countdata=temp;

countdata=(countdata/100);

digit3=countdata;

countdata=(countdata*100);

temp=(temp-countdata);

countdata=temp;

```

```

countdata=(countdata/10);

digit4=countdata;

countdata=(countdata*10);

temp=(temp-countdata);

digit5=temp;

}

void acd_config()

{

    ADCON1=0b10000011;

    ADCON0=0b01000001;

    delay(1);

}

void acd_read(int channel)

{

    if (channel==0)

    {

        ADCON0=0b01000001;

        adc_data_accure();

    }

    else if (channel==1)

```

```

{
ADCON0=0b01001001;

adc_data_accure();
}

else if (channel==2)

{
ADCON0=0b01010001;

adc_data_accure();
}

else

{
}

}

void adc_data_accure()

{

delay(1);

ADCON0=ADCON0|0b00000100;

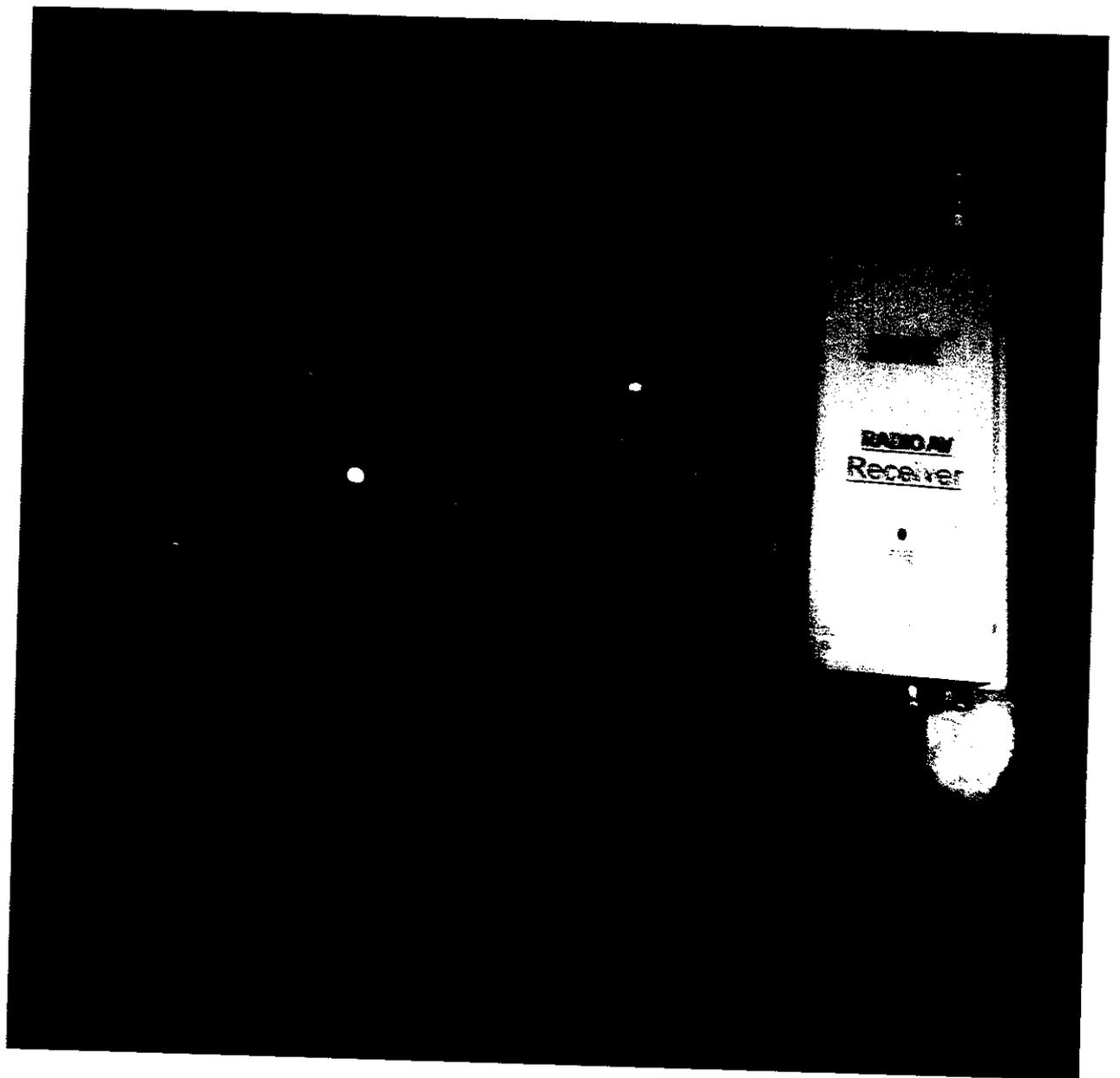
delay(1);

adc_value=ADRESL;           //collect ADRESL value

adc_value+=(ADRESH<<8); //collect ADRESH value and add with ADRESL
value

```

Fig 6.3-controller setup image:



CONCLUSION:

We developed this prototype using ZIGBEE protocol for wireless communication because of its low cost and high efficiency ,and To view the temperature ,humidity and for metal detected results we use LabVIEW 8.6 tool and wireless camera is used to capture videos. If this prototype model is developed by reducing size to nanoscale and also by providing additional features for weapons and artificial intelligence and implemented in real time, it can make revolution in Indian army.

FUTURE DEVELOPMENT

- Robot with weapons
- Robot with Bomb diffusion
- Medication to wounded
- Fixing of hexapod for precise movement or tank like wheel base
- Humanoid robot with artificial intelligence