BORDER SECURITY SYSTEM

A Project report Submitted in fulfillment for diploma in

ELECTRONICS ENGINEERING

By

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Under the guidance of

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Maharashtra State Board of Technical Education

(2018-2019)

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CERTIFICATE

This is to certify that the project entitled **"BORDER SECURITY SYSTEM''** is a record of work carried out by group **EX/F/19/01** has following members.

1. **ARHUM ANSARI** **(ROLL NO 16)**
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Of

"**DIPLOMA IN ELECTRONICS ENGINEERING"**

submitted in partial fulfillment of the requirement for the diploma in Electronics Engineering. The project report has been approved.

Prof. Asif Ali Shaikh	**( )**
(Internal Guide)	**(External Examiner)**
Prof: Arif Shaikh	**Prof: Ramjan A. Khatik**
(Head of Department)	**(Principal, AIARKP)**

APPROVAL OF PROJECT

The project report entitled **“BORDER SECURITY SYSTEM’’** is

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Of

“DIPLOMA IN ELECTRONICS ENGINEERING”

has been accepted in partial fulfillment of the requirement for the Diploma in Electronics Engineering. This project has been approved.

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(Internal Examiner) **(External Examiner)**

( )

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Prof. Ramjan A. Khatik

(Principal, AIARKP)

Date of Approval:___________

DECLARATION

I declare that this project report entitled **“BORDER SECURITY SYSTEM’’** represents my ideas in my own words and where others'ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principlesof academic honesty and integrity and have not misrepresented or fabricated or falsified any data/fact in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evokepenal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

1. **ARHUM ANSARI (ROLL NO 16) Sign _____**
2. **SARANG ABBAS (ROLL NO 14) Sign _____**
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Date:

Place: New Panvel

ACKNOWLEDGEMENT

We consider our self lucky to work under guidance of such talented and experienced people who guided me all through the completion of my dissertation.

We express our deep sense of gratitude to our guide **Mr. Asif Ali Shaikh**, Lecturer of Electronics Engineering Department, and **Mr. Patel Anwar & Mr. Ansar Tamboli** for his generous lab assistance, vast knowledge, experience, views & suggestions and for giving us his gracious support. We owe a lot to them for this invaluable guidance in spite of their busy schedule.

We are grateful **to Mr. Ramjan Khatik**, Principal for his support and co-operation and for allowing me to pursue my Diploma Program besides permitting me to use the laboratory infrastructure of the Institute.

We are thankful to our H.O.D **Mr. ARIF SHAIKH** and **Mr. KHAN SHUJAUDDIN** for his support at various stages.

We also take this opportunity to thank my Friends for their support and encouragement at every stage of our life.

Date:

TABLE OF CONTENTS

LIST OF FIGURES

ABSTRACT

In this project we are designed Arduino based "**BORDER SECURITY SYSTEM"** using Ultrasonic Sensor for Detection & Ranging. Ultrasonic an object detection system that uses radio waves to identify the range, altitude, direction and speed of the objects. The ultrasonic antenna transmits radio wave pulses that bounce off any object in their path. The object returns a portion of the wave received by the receiver which is in line of sight with the transmitter. We are implement a DIY vehicle to move system from one place to another. Different sensor like proximity sensor, metal detector and ultrasonic sensor with LCD is placed on vehicle to detect the object and show the distance and angel of a object. Mechanical buzzer and different LED's connected to give the response of a system.

This project aims to find enemy or object present in the surrounding based on Arduino board, capable of detecting stationary and moving objects.

Working Of Project

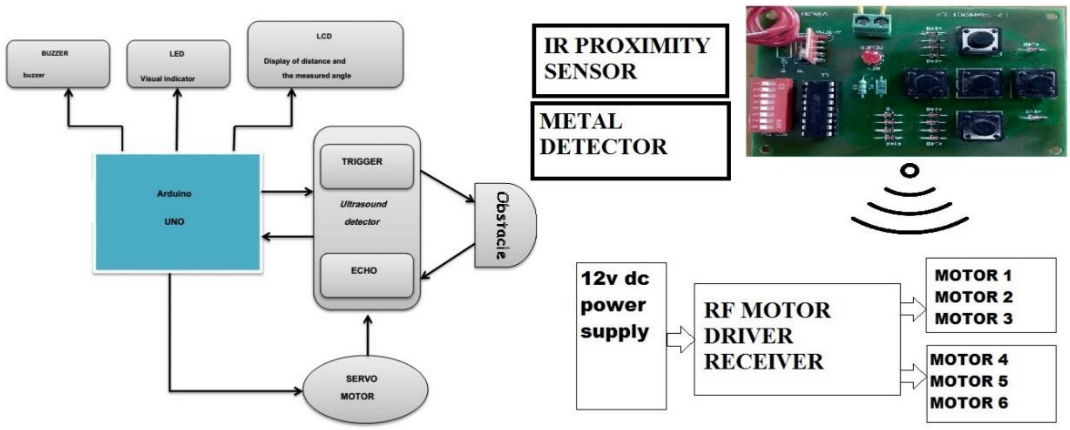


Figure 1: Block Diagram Of Border Security System

Ultrasonic sensor is placed on servo motor and it's rotate with the help of servo motor by 180 degree and it is connected to Arduino. Servo motor is rotating continuously by 180 degree. If object detected the wave transmitted by ultrasonic sensor touch the object and reflects back on the receiver of ultrasonic sensor. Arduino board sends a signal of +5V to trig pin of Ultrasonic Sensor HC-SR04 which triggers the sensor. Then it provides rotational action at the servo motor mechanically fitted along with ultrasonic Sensor HC-SR04 so that it can detect the moving objects and locate within 180 degrees.

The Arduino sends a HIGH pulse width of (10 S) on the TRIGGER pin of the sensor to regenerate a series of ultrasonic waves which propagate through the air, until it touches an obstacle and returns in the opposite direction towards the sensor pin ECHO. The sensor detects the width of the pulse to calculate the distance.

The signal on pin ECHO the sensor remains at the HIGH position during transmission, thereby measuring the duration of the round trip of ultrasound and thus determine the distance. The LCD display displays the calculated distance and the angle of rotation. The buzzer is an additional component, it rings when there is a detection (Tone1 and Tone2) along with LEDs. These both LEDs along with buzzer determine the field where the object is located (near or distant).

Figure 2: RF based robotic vehicle

Ultrasonic sensor is placed on servo motor and LCD display is connected to the sensor via Arduino. It is placed on wireless robotic vehicle controlled with RF module. IR proximity sensor and metal detector are also placed on vehicle. Proximity sensor detect the movement and metal detector detect the metal.

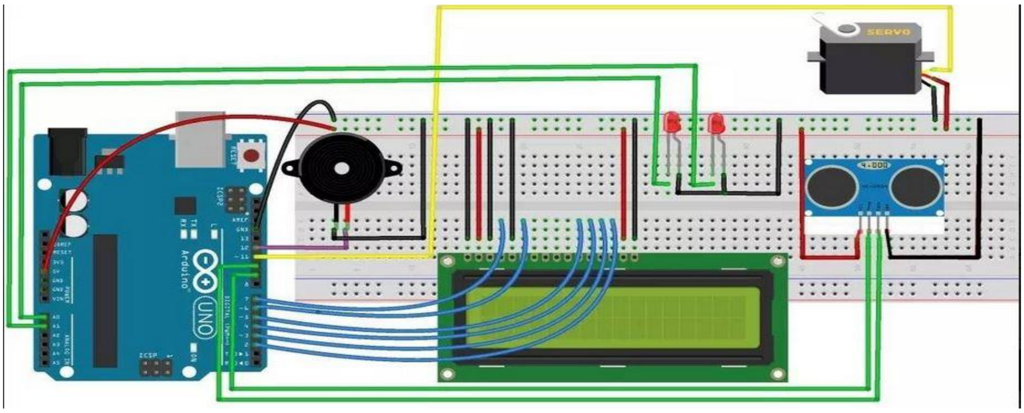
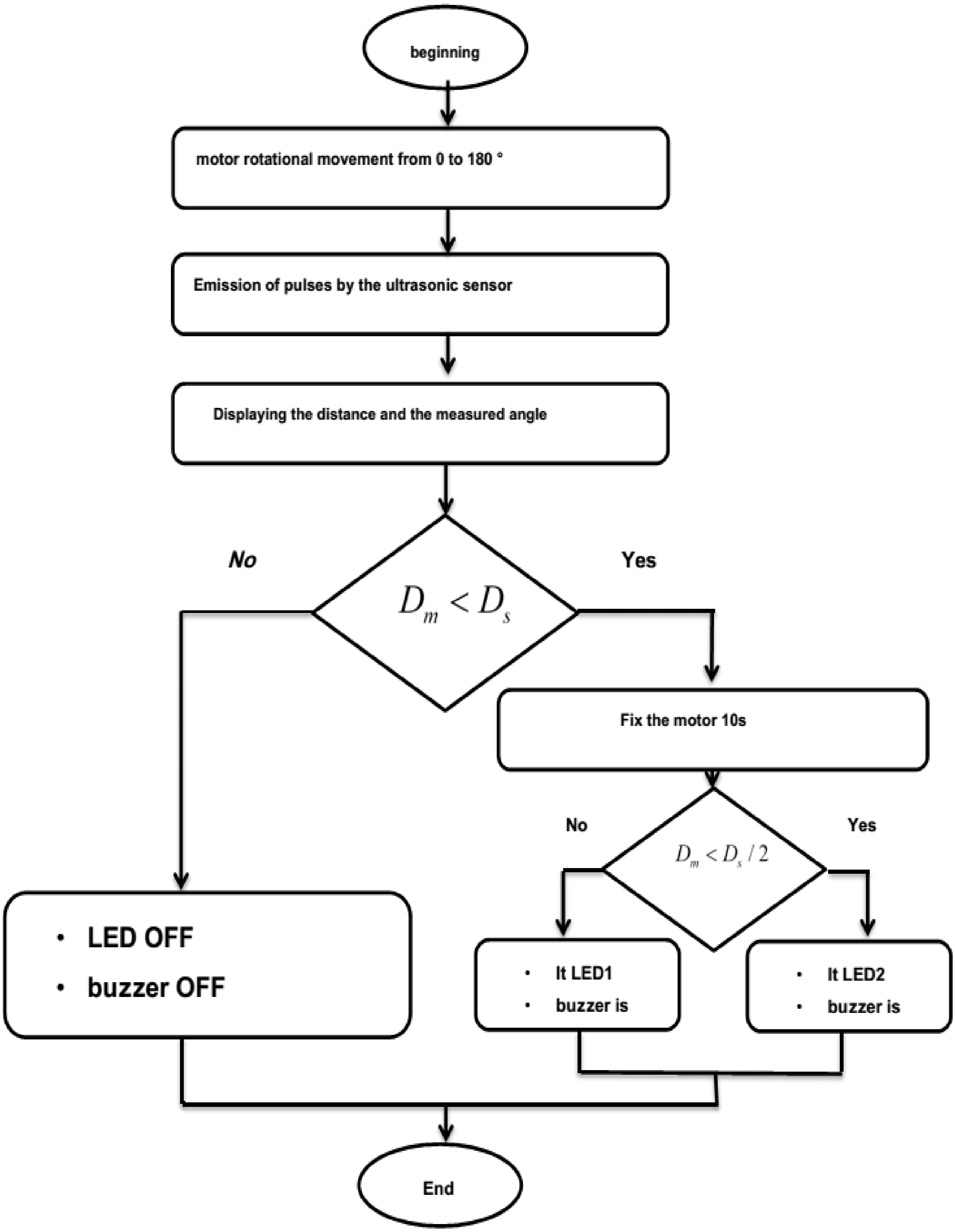


Figure 3: Circuit Diagram Of Object Detection System


beginning
motor rotational movement from 0 to 180 °
Emission of pulses by the ultrasonic sensor
Displaying the distance and the measured angle
No
Yes
$D_m < D_s$
Fix the motor 10s
No
Yes
$D_m < D_s / 2$
LED OFF
buzzer OFF
It LED1
buzzer is
It LED2
buzzer is
End

CHAPTER 1: ARDUINO UNO R3

1.1 Introduction

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats and motion detectors.

The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduin of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.

1.2 History

The Arduino project was started at the Interaction Design Institute Ivrea (IDII) in Ivrea, Italy. At that time, the students used a BASIC Stamp microcontroller at a cost of $50, a considerable expense for many students. In 2003 Hernando Barragán created the development platform Wiring as a Master's thesis project at IDII, under the supervision of Massimo Banzi and Casey Reas. Casey Reas is known for co-creating, with Ben Fry, the Processing development platform. The project goal was to create simple, low cost tools for creating digital projects by non-engineers. The Wiring platform consisted of a printed circuit board (PCB) with an ATmega168 microcontroller, an IDE based on Processing and library functions to easily program the microcontroller In 2003, Massimo Banzi, with David Mellis, another IDII student, and David Cuartielles, added support for the cheaper ATmega8 microcontroller to Wiring. But instead of continuing the work on Wiring, they forked the project and renamed it Arduino.

The initial Arduino core team consisted of Massimo Banzi, David Cuartielles, Tom Igoe, Gianluca Martino, and David Mellis, but Barragán was not invited to participate. Following the completion of the Wiring platform, lighter and less expensive versions were distributed in the open-source community. It was estimated in mid-2011 that over 300,000 official Arduinos had been commercially produced, and in 2013 that 700,000 official boards were in users' hands.

In October 2016, Federico Musto, Arduino's former CEO, secured a 50% ownership of the company. In April 2017, Wired reported that Musto had "fabricated his academic record.... On his company's website, personal LinkedIn accounts, and even on Italian business documents, Musto was until recently listed as holding a PhD from the Massachusetts Institute of Technology. In some cases, his biography also claimed an MBA from New York University." Wired reported that neither University had any record of Musto's attendance, and Musto later admitted in an interview with Wired that he had never earned those degrees. Around that same time, Massimo Banzi announced that the Arduino Foundation would be "a new beginning for Arduino. But a year later, the Foundation still hasn't been established, and the state of the project remains unclear.

1.3 Block Diagram Of Arduino

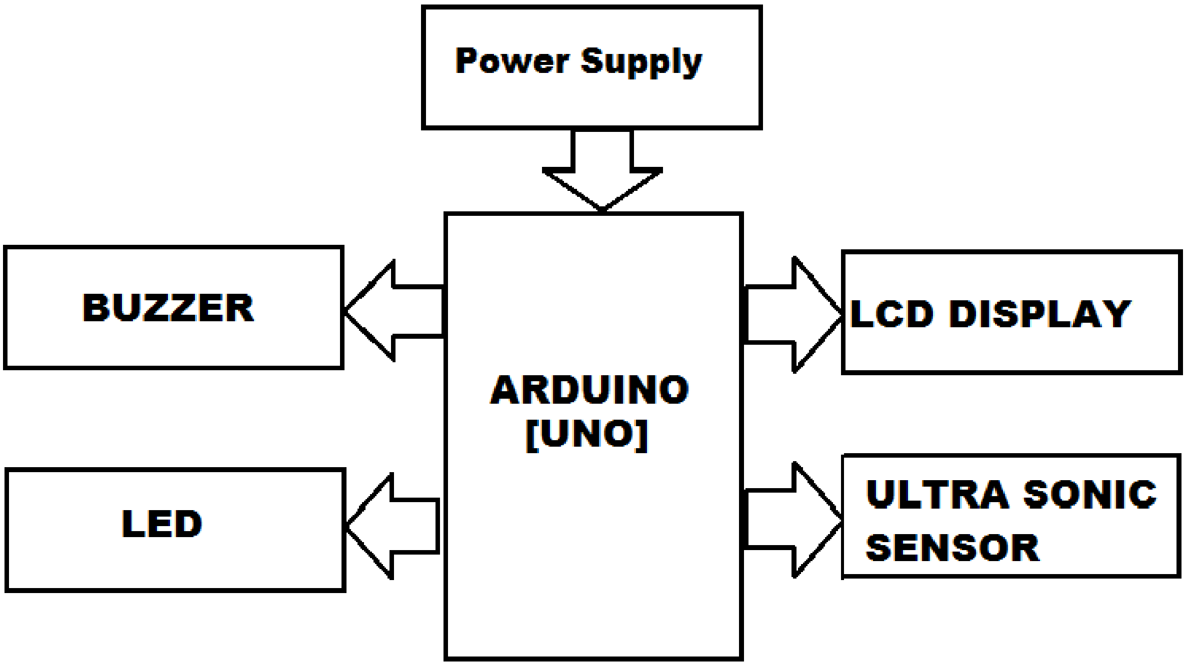


Figure 1.3.1: Basic Block Diagram Of Arduino

The ATmega328 microcontroller is the MCU used in Arduino UNO R3 as a main controller. ATmega328 is an MCU from the AVR family; it is an 8-bit device, which means that its data-bus architecture and internal registers are designed to handle 8 parallel data signals.

ATmega328 has three types of memory:

- Flash memory: 32KB nonvolatile memory. This is used for storing application, which explains why you don't need to upload your application every time you unplug Arduino from its power source.
- SRAM memory: 2KB volatile memory. This is used for storing variables used by the application while it's running.
- EEPROM memory: 1KB nonvolatile memory. This can be used to store data that must be available even after the board is powered down and then powered up again.

- Power: The MCU accepts supply voltages from 1.8 to 5.5 V. However, there are restrictions on the operating frequency; for example, if you want to use the maximum clock frequency (20 MHz), you need a supply voltage of at least 4.5 V.
- Digital I/O: This MCU has three ports: PORTC, PORTB, and PORTD. All pins of these ports can be used for general-purpose digital I/O or for the alternate functions indicated in the pinout below. For example, PORTC pin0 to pin5 can be ADC inputs instead of digital I/O. There are also some pins that can be configured as PWM output. These pins are marked with "~" on the Arduino board.

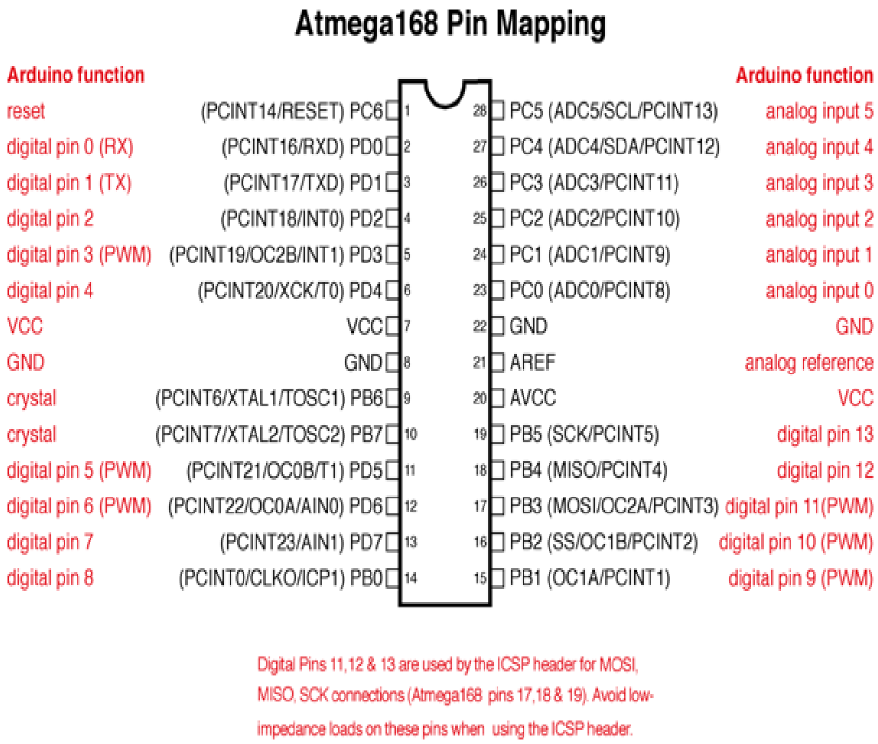


Figure 1.3.2: Pin Diagram Of Arduino

Types of Arduino

- Arduino UNO R3
- Redboard Arduino Board
- Arduino Mega(R3) Board
- Arduino Leonardo Board
- Arduino Shields
- Arduino Nano

1.4 Architecture

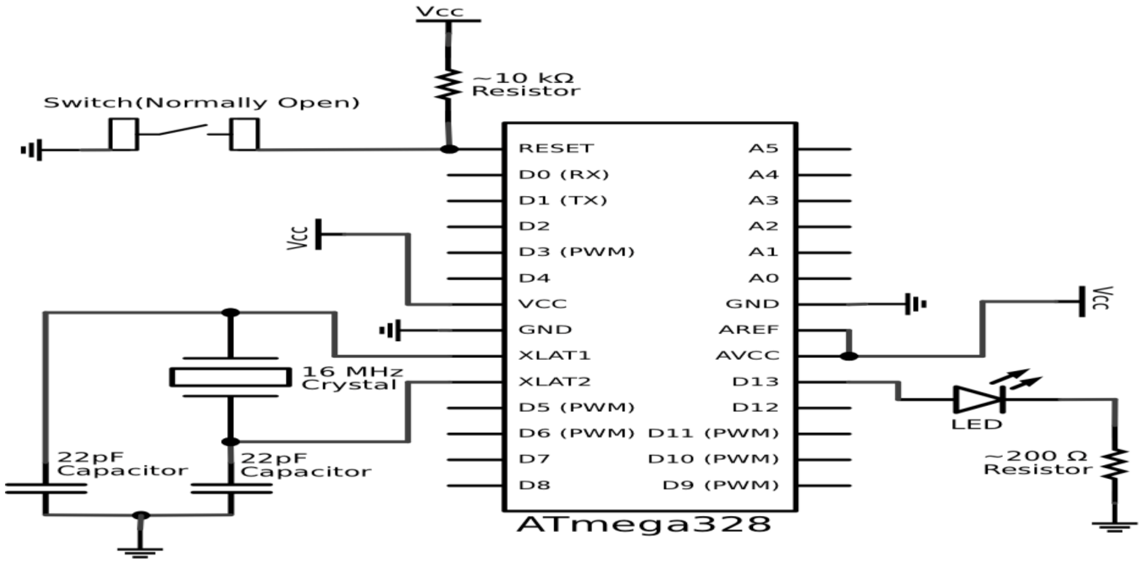


Figure 1.4: Architecture Of Arduino

The ATmega328 microcontroller is the MCU used in Arduino UNO R3 as a main controller. ATmega328 is an MCU from the AVR family; it is an 8-bit device, which means that its data-bus architecture and internal registers are designed to handle 8 parallel data signals.

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- The ATmega168 is almost identical to the ATmega328 and they are pin compatible. The difference is that the ATmega328 has more memory—32KB flash, 1KB EEPROM, and 2KB RAM compared to the ATmega168's 16KB flash, 512 bytes EEPROM, and 1KB RAM.

1.5 Arduino Program:

```
#include <Servo.h>
#include <LiquidCrystal.h>
Servo myservo;
LiquidCrystal lcd(7, 6, 5, 4, 3, 2);
int pos = 0;
const int trigPin = 9;
const int echoPin = 10;
const int moteur = 11;
const int buzzer = 12;
const int ledPin1 = 14;
const int ledPin2 = 15;
float distanceCm, DistanceSec,duration;
void setup()
{
myservo.attach(moteur);
lcd.begin(16,2);
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
pinMode(buzzer, OUTPUT);
pinMode(ledPin1, OUTPUT);
pinMode(ledPin2, OUTPUT);
```

```
DistanceSec=20;
}
void loop()
{
for (pos = 0;pos <= 180; pos += 1)
{
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distanceCm= duration*0.034/2;
if(distanceCm <= DistanceSec)
{
if(distanceCm <= DistanceSec/2)
{
tone(buzzer, 10);
digitalWrite(ledPin1, LOW);
digitalWrite(ledPin2, HIGH);
delay(700);
noTone(buzzer);
lcd.setCursor(0,0);
lcd.print("Distance: ");
lcd.print(distanceCm);
lcd.print(" cm ");
lcd.setCursor(0,1);
lcd.print("Angle : ");
lcd.print(pos);
lcd.print(" deg ");
delay(2000);
}
else
{
```

```
digitalWrite(buzzer, HIGH);
digitalWrite(ledPin2, LOW);
digitalWrite(ledPin1, HIGH);
delay(100);
digitalWrite(buzzer, LOW);
lcd.setCursor(0,0);
lcd.print("Distance: ");
lcd.print(distanceCm);
lcd.print(" cm ");
delay(10);
lcd.setCursor(0,1);
lcd.print("Angle : ");
lcd.print(pos);
lcd.print(" deg ");
delay(2000);
}
else{
digitalWrite(buzzer, LOW);
digitalWrite(ledPin1, LOW);
digitalWrite(ledPin2, LOW);
}
lcd.setCursor(0,0);
lcd.print("Distance: ");
lcd.print(distanceCm);
lcd.print(" cm ");
delay(10);
lcd.setCursor(0,1);
lcd.print("Angle : ");
lcd.print(pos);
lcd.print(" deg ");
delay(80);
}
for (pos = 180; pos >= 0; pos -= 1)
```

```
{
myservo.write(pos);
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distanceCm= duration*0.034/2;
if
(distanceCm <= DistanceSec)
{
if(distanceCm <= DistanceSec/2)
{
tone(buzzer, 10);
digitalWrite(ledPin1, LOW);
digitalWrite(ledPin2, HIGH);
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```

```
digitalWrite(ledPin1, HIGH);
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digitalWrite(ledPin2, LOW);
}
lcd.setCursor(0,0);
lcd.print("Distance: ");
lcd.print(distanceCm);
lcd.print(" cm ");
delay(10);
lcd.setCursor(0,1);
lcd.print("Angle : ");
lcd.print(pos);
lcd.print(" deg ");
delay(80);
}
}
```

CHAPTER 2: ARDUINO IDE (Integrated Development Environment)

2.1 What is Arduino IDE?

An integrated development environment (IDE) is an application that facilitates application development. IDEs are designed to encompass all programming tasks in one application. Therefore, IDEs offer a central interface featuring all the tools a developer needs, including the following:

- Code editor: This feature is a text editor designed for writing and editing source code. Source code editors are distinguished from text editors because they enhance or simplify the writing and editing of code.
- Compiler: This tool transforms source code written in a human readable/writable language into a form executable by a computer.
- Debugger: This tool is used during testing to help debug application programs.
- Build automation tools: These tools automate common developer tasks.

In addition, some IDEs might also include the following:

- Class browser: This tool is used to examine and reference the properties of an object-oriented class hierarchy.
- Object browser: This feature is used to examine the objects instantiated in a running application program.
- Class hierarchy diagram: This tool allows the programmer to visualize the structure of object-oriented programming code.

2.2 History of IDEs

Before IDEs, developers wrote their programs in text editors. They would write and save an application in a text editor; then run the compiler, taking note of the error messages; then go back to the text editor to revise the code.

In 1983, Borland Ltd. acquired a Pascal compiler and released it as Turbo Pascal, which featured, for the first time, an integrated editor and compiler.

While Turbo Pascal launched the idea of an integrated development environment, many believe Microsoft's Visual Basic (VB), launched in 1991, was the first real IDE. Visual Basic was built on the older BASIC language, which was a popular programming language throughout the 1980s. With the emergence of Visual Basic, programming could be thought of in graphical terms, and significant productivity benefits emerged.

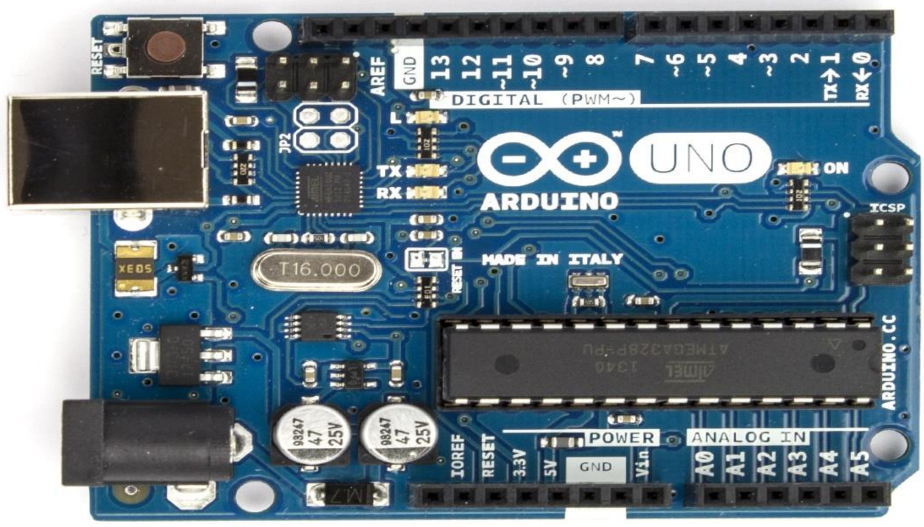

Figure 2.2: ARDUINO UNO R3

2.3 Benefits of IDEs

- The overall goal and main benefit of an integrated development environment is improved developer productivity. IDEs boost productivity by reducing setup time, increasing the speed of development tasks, keeping developers up to date and standardizing the development process.
- Faster setup: Without an IDE interface, developers would need to spend time configuring multiple development tools. With the application integration of an IDE, developers have the same set of capabilities in one place, without the need for constantly switching tools.
- Faster development tasks: Tighter integration of all development tasks improves developer productivity. For example, code can be parsed and syntax checked while being edited, providing instant feedback when syntax errors are introduced. Developers don’t need to switch between applications to complete tasks. In addition, the IDE’s tools and features helps developers organize resources, prevent mistakes and take shortcuts.
- Further, IDEs streamline development by encouraging holistic thinking. They force developers to think of their actions in terms of the entire development lifecycle, rather than as a series of discrete tasks.
- Continual learning: Staying up to date and educated is another benefit. For instance, the IDE’s help topics are constantly being updated, as well as new samples, project templates, etc. Programmers who are continually learning and current with best practices are more likely to contribute value to the team and the enterprise, and to boost productivity.
- Standardization: The IDE interface standardizes the development process, which helps developers work together more smoothly and helps new hires get up to speed more quickly.

CHAPTER 3: LCD(LIQUID CRYSTAL DISPLAY)

3.1 WHAT IS LCD?

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.[1] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a character positive LCD with a backlight will have black lettering on a background that is the color of the backlight, and a character negative LCD will have a black background with the letters being of the same color as the backlight. Optical filters are added to white on blue LCDs to give them their characteristic appearance.

3.2 WHERE LCD IS USED?

LCDs are used in a wide range of applications, including LCD televisions, computer monitors, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smartphones. LCD screens are also used on consumer electronics products such as DVD players, video game devices and clocks. LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays in nearly all applications. LCD screens are available in a wider range of screen sizes than CRT and plasma displays, with LCD screens available in sizes ranging from tiny digital watches to very large television receivers. LCDs are slowly being replaced by OLEDs, which can be easily made into different shapes, and have a lower response time, wider color gamut, virtually infinite color contrast and viewing angles, lower weight for a given display size and a slimmer profile (because OLEDs use a single glass or plastic panel whereas LCDs use two glass panels; the thickness of the panels increases with size but the increase is more noticeable on LCDs) and potentially lower power consumption (as the display is only "on" where needed and there is no backlight). OLEDs, however, are more expensive for a given display size due to the very expensive electroluminescent materials or phosphors that they use. Also due to the use of phosphors, OLEDs suffer from screen burn-in and there is currently no way to recycle OLED displays, whereas LCD panels can be recycled, although the technology required to recycle LCDs is not yet widespread. Attempts to increase the lifespan of LCDs are quantum dot displays, which offer similar performance as an OLED display, but the Quantum dot sheet that gives these displays their characteristics can not yet be recycled.

3.3 PIN CONFIGURATION OF LCD

LCD 16x2 Pin out

All character LCD's have

- Eight(8) data pins D0-D7
- VCC (Apply +5 volt here)
- Gnd (Ground this pin)
- Rc (Register select)
- Rw (read - write)
- En (Enable)
- V0 (Set LCD contrast)

16x2 LCD Pin Out Diagrammatically Is Shown Below:

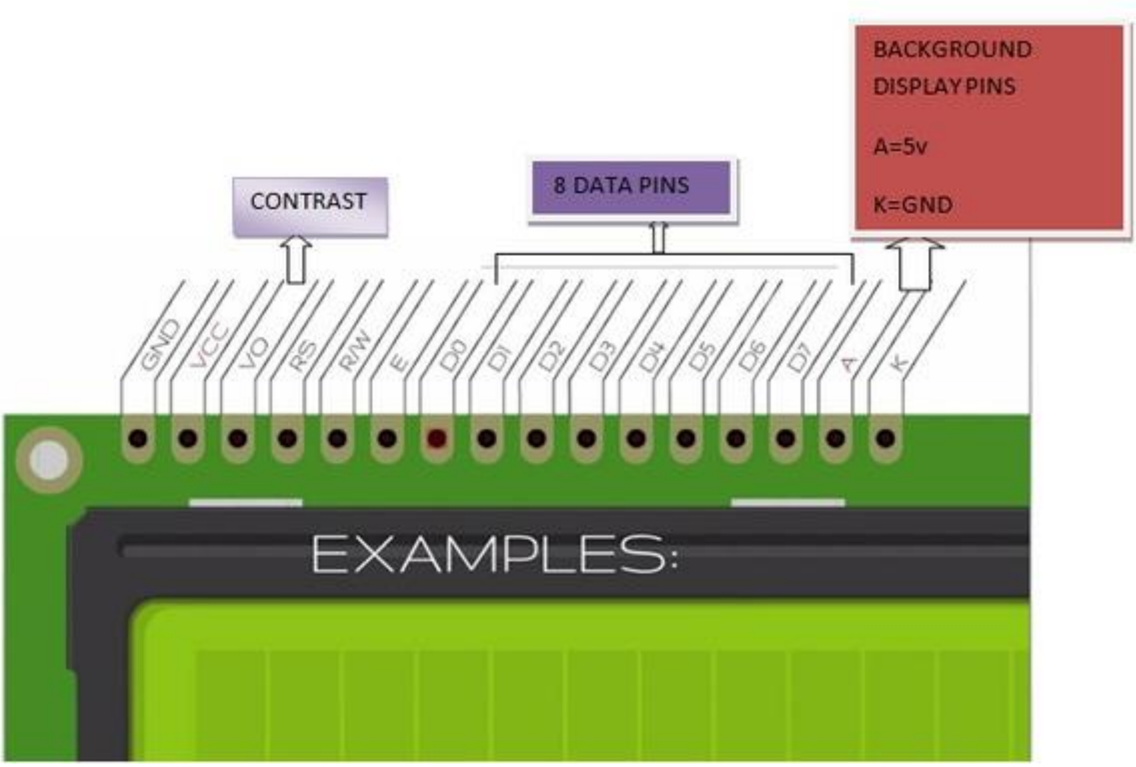

FIGURE 3.3: 16x2 LCD Pin Out

The picture above shows the pin out of the character LCD's. All most all the character LCD's are composed of the same pin out. LCD's with total pin count equal to 14 does not have back light control option. They might have back light always on or does not have a back light. 16 total pin count LCD's have 2 extra A and K pins. A means anode and K cathode, use these pins to control the back light of LCD's.

Character LCD's controller - HD44780

Character LCD's have a controller build in to them named HD44780. We actually talk with this controller in order to display character on the LCD's screen. HD44780 must be properly handled and initialized before sending any data to it. HD44780 has some registers which are initialized and manipulated for character displaying on the LCD's. These registers are selected by the pins of character LCD's.

LCD’s Rs(Register select) Pin:

Register select selects the HD44780 controller registers. It switches between Command and data register.

- Command Register
- Data Register

Command Register

When we send commands to lcd these commands go to Command register and are processed their. Commands with their full description are given in the picture below. When Rs=0 command register is selected.

Data Register

When we send Data to lcd it goes to data register and is processed their. When Rs=1 data register is selected.

LCD’s RW(Read/Write) Pin:

Rw pin is used to read and write data to HD44780 data and command registers. When Rw=1 we can read data from LCD’s. When Rw=0 we can write to LCD’s.

LCD’s En(Enable) Pin:

When we select the register Rs(Command and Data) and set Rw(read - write) and placed the raw value on 8-data lines, now its time to execute the instruction. By instruction i mean the 8-bit data or 8-bit command present on Data lines of lcd. For sending the final data/command present on the data lines we use this enable pin. Usually it remains en=0 and when we want to execute the instruction we make it high en=1 for some mills seconds. After this we again make it ground en=0.

LCD’s V0 of contrast set pin:

To set lcd display sharpness use this pin. Best way is to use variable resistor such as potentiometer a variable current makes the character contrast sharp. Connect the output of the potentiometer to this pin. Rotate the potentiometer knob forward and backward to adjust the LCD’s contrast.

we can not send an integer, float, long, double type data to LCD’s because LCD’s is designed to display a character only. Only the characters that are supported by the HD44780 controller. See the HD44780 data sheet to find out what characters can we display on LCD’s. The 8 data pins on LCD’s carries only Ascii 8-bit code of the character to LCD’s. How ever we can convert our data in character type array and send one by one our data to LCD’s. Data can be sent using LCD’s in 8-bit or 4-bit mode. If 4-bit mode is used, two nibbles of data (First high four bits and then low four bits) are sent to complete a full eight-bit transfer. 8-bit mode is best used when speed is required in an application and at least ten I/O pins are available. 4-bit mode requires a minimum of seven bits. In 4-bit mode, only the top 4 data pins (4-7) are used.

3.4 LCD’s command meanings and functions:

- The command 0x38 means we are setting 8-bit mode lcd having two lines and character shape between 5x7 matrix.
- The command 0x20 means we are setting 4-bit mode lcd having 1 line and character shape between 5x7 matrix.
- The command 0x28 means we are setting 4-bit mode lcd having 2 lines and character shape between 5x7 matrix.
- The command 0x06 is entry mode it tells the lcd that we are going to use.
- The command 0x08 dispalys cursor off and display off but with out clearing DDRAM contents.
- The command 0x0E displays cursor on and dispaly on.
- The command 0x0c dispaly on cursor off(displays cursor off but the text will appear on lcd)
- The command 0x0F dispaly on cursor blink(text will appear on screen and cursor will blink).
- The command 0x18 shift entire dispaly left(shift whole off the text on the particular line to its left).
- The command 0x1C shift entire dispaly right(shift whole off the text on the particular line to its right).
- The command 0x10 Moves cursor one step left or move cursor on step a head to left when ever new character is displayed on the screen.

- The command 0x14 Moves cursor one step right or move cursor on step a head to righ when ever new character is displayed on the screen.
- The command 0x01 clear all the contents of the DDRAM and also clear the lcd removes all the text from the screen.
- The command 0x80 initialize the cursor to the first position means first line first matrix(start point) now if we add 1 in 0x80+1=0x81 the cursor moves to second matrix.

3.5 Difference between 4-bit and 8-bit Lcd Mode

Character Lcd's can be used in 4-bit and 8-bit mode. Before you send commands and data to your lcd. Lcd must first be initialized. This initialization is very important for lcd that are made by Hitachi because they use HD44780 driver chip sets. Hd44780 Chip set first has to be initialized before using it. If you don't initialize it properly you will see nothing on your lcd.

FOR 8-BIT MODE:

This is done as follows:

1. Wait more than 15 mill secs after power is applied.
2. Write command 0x30 to LCD and wait 5 milli seconds for the instruction to complete.
3. Write command 0x30 to LCD and wait 160 micro seconds for instruction to complete.
4. Write command 0x30 AGAIN to LCD and wait 160 micro seconds or Poll the Busy Flag.

FOR 4-BIT MODE:

In 4-bit mode the high nibble is sent first before the low nibble and the En pin is toggled each time four bits is sent to the LCD. To initialize in 4-bit mode:

1. Wait more than 15 mill secs after power is applied.
2. Write command 0x03 to LCD and wait 5 msecs for the instruction to complete.
3. Write command 0x03 to LCD and wait 160 usecs for instruction to complete.
4. Write command 0x03 AGAIN to LCD and wait 160 usecs (or poll the Busy Flag).

Write 0x02 to the LCD to Enable 4-Bit Mode

3.6 Advantages

- Very compact, thin and light, especially in comparison with bulky, heavy CRT displays.
- Low power consumption. Depending on the set display brightness and content being displayed, the older CCFT backlit models typically use less than half of the power a CRT monitor of the same size viewing area would use, and the modern LED backlit models typically use 10–25% of the power a CRT monitor would use.[93]
- Little heat emitted during operation, due to low power consumption.
- No geometric distortion.
- The possible ability to have little or no flicker depending on backlight technology.
- Usually no refresh-rate flicker, because the LCD pixels hold their state between refreshes (which are usually done at 200 Hz or faster, regardless of the input refresh rate).
- Sharp image with no bleeding or smearing when operated at native resolution.
- Emits almost no undesirable electromagnetic radiation (in the extremely low frequency range), unlike a CRT monitor.[94][95]
- Can be made in almost any size or shape.
- Can be made with very narrow frame borders, allowing multiple LCD screens to be arrayed side-by-side to make up what looks like one big screen.

3.7 Disadvantages

- Limited viewing angle in some older or cheaper monitors, causing color, saturation, contrast and brightness to vary with user position, even within the intended viewing angle.
- Uneven backlighting in some monitors (more common in IPS-types and older TNs), causing brightness distortion, especially toward the edges ("backlight bleed").
- Black levels may not be as dark as required because individual liquid crystals cannot completely block all of the backlight from passing through.
- Display motion blur on moving objects caused by slow response times (>8 ms) and eye-tracking on a sample-and-hold display, unless a strobing backlight is used. However, this strobing can cause eye strain.

CHAPTER 4: SERVO MOTOR

4.1 What is a Servo Motor?

A Servo motor (or servo) is a rotary actuator that allows for precise control of angular position, velocity and acceleration. Servos are found in many places: from toys to home electronics to cars and airplanes. If you have a radio-controlled model car, airplane, or helicopter, you are using at least a few servos. Servos also appear behind the scenes in devices we use every day. Electronic devices such as DVD and Blu-ray Disc™ players use servos to extend or retract the disc trays.

4.2 How does a Servo Motor work?

The simplicity of a servo is among the features that make them so reliable. The heart of a servo is a small direct current (DC) motor, similar to what you might find in an inexpensive toy. These motors run on electricity from a battery and spin at high RPM (rotations per minute) but put out very low torque (a twisting force used to do work— you apply torque when you open a jar). An arrangement of gears takes the high speed of the motor and slows it down while at the same time increasing the torque. (Basic law of physics: work = force x distance.) A tiny electric motor does not have much torque, but it can spin really fast (small force, big distance). The gear design inside the servo case converts the output to a much slower rotation speed but with more torque (big force, little distance). The amount of actual work is the same, just more useful. Gears in an inexpensive servo motor are generally made of plastic to keep it lighter and less costly. On a servo designed to provide more torque for heavier work, the gears are made of metal (such as with EZ-Robot Servos) and are harder to damage.

With a small DC motor, you apply power from a battery, and the motor spins. Unlike a simple DC motor, however, a servo's spinning motor shaft is slowed way down with gears. A positional sensor on the final gear is connected to a small circuit board. The sensor tells this circuit board how far the servo output shaft has rotated. The electronic input signal from the computer or the radio in a remote-controlled vehicle also feeds into that circuit board. The electronics on the circuit board decode the signals to determine how far the user wants the servo to rotate. It then compares the desired position to the actual position and decides which direction to rotate the shaft so it gets to the desired position.

FIGURE 4.2: Servo Motor

4.3 Types of Servo Motors

Servos come in many sizes and in three basic types: positional rotation, continuous rotation, and linear.

- Positional rotation servo: This is the most common type of servo motor. The output shaft rotates in about half of a circle, or 180 degrees. It has physical stops placed in the gear mechanism to prevent turning beyond these limits to protect the rotational sensor. These common servos are found in EZ-Robot's arms, legs, limbs, etc.. For example, the JD or Six robots use these servos.
- Continuous rotation servo: This is quite similar to the common positional rotation servo motor, except it can turn in either direction indefinitely. The control signal, rather than setting the static position of the servo, is interpreted as the direction and speed of rotation. The range of possible commands causes the servo to rotate clockwise or counterclockwise as desired, at varying speed, depending on the command signal. You might use a servo of this type on a radar dish if you mounted one on a robot. Or you could use one as a drive motor on a mobile robot. The EZ-Robot AdventureBot uses two continuous rotation servos with wheels. The center (90 degrees) is the center of a continuous rotation's STOP position. The further you move away from 90 degrees in either direction controls the speed of the continuous rotation servo in that direction.

- Linear servo: This is also like the positional rotation servo motor described above, but with additional gears (usually a rack and pinion mechanism) to change the output from circular to back-and-forth. These servos are not easy to find, but you can sometimes find them at hobby stores where they are used as actuators in larger model airplanes.

4.4 Controlling of Servo Motor

A standard servo is what you normally find in R/C Hobby Toys. They are high precision devices that can rotate a shaft up to 180 degrees. With the EZ-B and a Standard Servo, you can easily configure how many degrees to rotate the output shaft.

However, here is some technical information on how servos work. The servo is controlled using pulse controlling. The control pulse is a positive voltage with a length of 1 to 2 ms which determines the angle of the shaft. The control pulse is repeated every 18-25 ms.

4.5 ADVANTAGES:

1. SMOOTH ROTATION.
2. HIGH SPEED ATTAINABLE.
3. HIGH PEAK TORQUE AVAILABLE.

4.6 DISADVANTAGES:

1. THERMALLY INEFFICIENT.
2. REQUIRES MAINTEINANCE.
3. DEMAGNETISED.

4.7 APPLICATIONS:

1. USED IN ROBOTICS & ROBOTICS VEHICLES.
2. USED IN CONVEYORS.
3. USED IN SOLAR TRACKING SYSTEM.

Chapter 5: Ultrasonic Sensor with Buzzer & LED

5.1 Introduction

Ultrasonic sensors (also known as tranceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

5.2 What is an Ultrasonic Sensor?

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High-frequency sound waves reflect from boundaries to produce distinct echo patterns.

5.3 How Ultrasonic Sensors Work?

Ultrasonic sound vibrates at a frequency above the range of human hearing. Transducers are the microphones used to receive and send the ultrasonic sound. Our ultrasonic sensors, like many others, use a single transducer to send a pulse and to receive the echo. The sensor determines the distance to a target by measuring time lapses between the ending and receiving of the ultrasonic pulse.

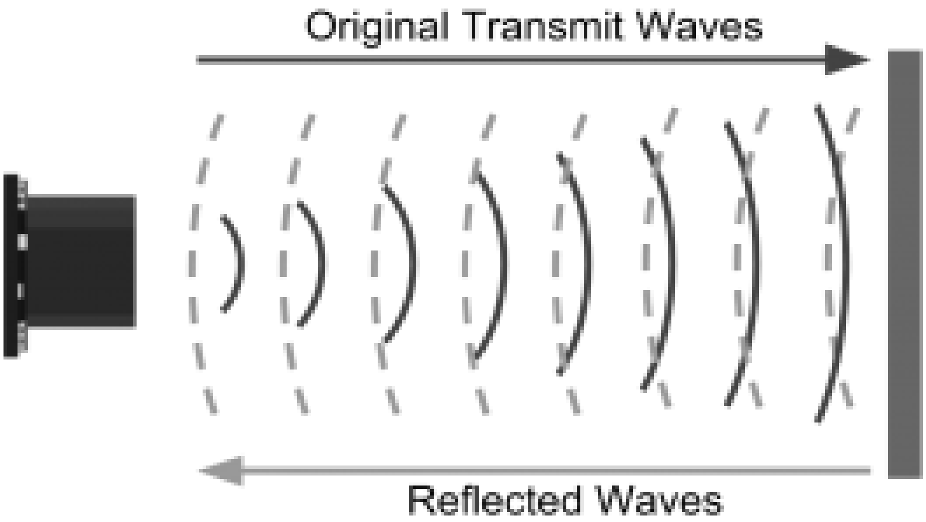

Figure 5.3: Tx & Rx wave of Ultrasonic Sensor

5.4 Why use an Ultrasonic Sensor?

Ultrasound is reliable in any lighting environment and can be used inside or outside. Ultrasonic sensors can handle collision avoidance for a robot, and being moved often, as long as it isn't too fast. Ultrasonics are so widely used, they can be reliably implemented in grain bin sensing applications, water level sensing, drone applications and sensing cars at your local drive-thru restaurant or bank. Ultrasonic rangefinders are commonly used as devices to detect a collision.

Ultrasonic Sensors are best used in the non-contact detection of:

- Presence
- Level
- Position
- Distance

Ultrasonics are Independent of:

- Light
- Smoke
- Dust
- Color

Long range detection of targets with varied surface properties.

Ultrasonic sensors are superior to infrared sensors because they aren't affected by smoke or black materials, however, soft materials which don't reflect the sonar (ultrasonic) waves very well may cause issues. It's not a perfect system, but it's good and reliable.

5.5 Applications Involving Ultrasonic Detection:

- Ultrasonic Distance Measurement
- Ex. Distance measurement would be applied in a garage parking application, sensing when a vehicle is pulled completely into a garage.
- Ultrasonic Sensors for water level detection.
- Tank level measurement, Fuel gauging, irrigation control.
- Ultrasonic Obstacle Detection
- Our UAV Sensors for Drones as well as our proximity sensors that are used for robots are for obstacle detection.

Ultrasonic sensors are a reliable, cost-effective solution for distance sensing, level, and obstacle detection.

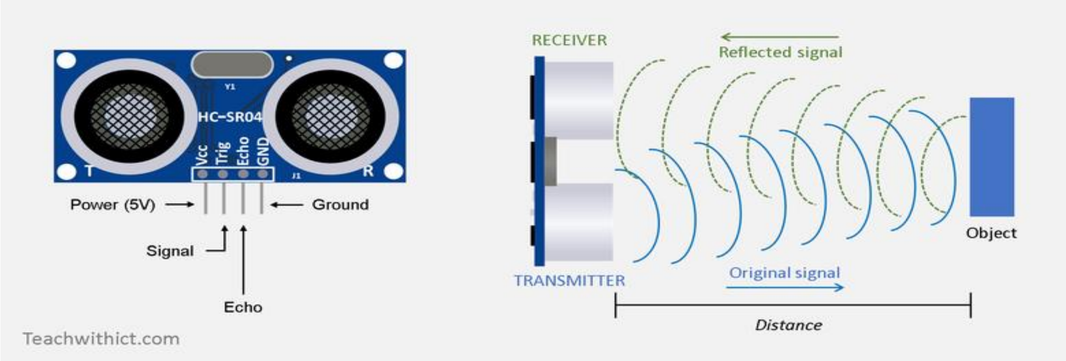

Figure 5.5: Working Of Ultrasonic Sensor

5.6 Buzzer

5.6.1 What is Buzzer?

A buzzer or beeper is an audio signalling device,[1] which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

5.6.2 Types Of Buzzer

Electromechanical

Early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz. Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made.

Mechanical

A joy buzzer is an example of a purely mechanical buzzer and they require drivers. Other examples of them are doorbells.

Piezoelectric
Piezoelectric disk beeper

A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

Interior of a readymade loudspeaker, showing a piezoelectric-disk-beeper (With 3 electrodes ... including 1 feedback-electrode (the central, small electrode joined with red wire in this photo), and an oscillator to self-drive the buzzer.

A piezoelectric buzzer/beeper also depends on acoustic cavity resonance or Helmholtz resonance to produce an audible beep

5.6.3 Application

While technological advancements have caused buzzers to be impractical and undesirable, there are still instances in which buzzers and similar circuits may be used. Present day applications include:

- Novelty uses
- Judging panels
- Educational purposes
- Annunciator panels
- Electronic metronomes
- Game show lock-out device
- Microwave ovens and other household appliances
- Sporting events such as basketball games
- Electrical alarms
- Joy buzzer (mechanical buzzer used for pranks)

5.7 LED

5.7.1 What is LED?

A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. This effect is called electroluminescence. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are used in remote-control circuits, such as those used with a wide variety of consumer electronics. The first visible-light LEDs were of low intensity and limited to red. Modern LEDs are available across the visible, ultraviolet, and infrared wavelengths, with high light output.

Early LEDs were often used as indicator lamps, replacing small incandescent bulbs, and in seven-segment displays. Recent developments have produced white-light LEDs suitable for room lighting. LEDs have led to new displays and sensors, while their high switching rates are useful in advanced communications technology.

LEDs have many advantages over incandescent light sources, including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. Light-emitting diodes are used in applications as diverse as aviation lighting, automotive headlamps, advertising, general lighting, traffic signals, camera flashes, lighted wallpaper and medical devices.

Unlike a laser, the color of light emitted from an LED is neither coherent nor monochromatic, but the spectrum is narrow with respect to human vision, and functionally monochromatic.

5.7.2 Types Of LED

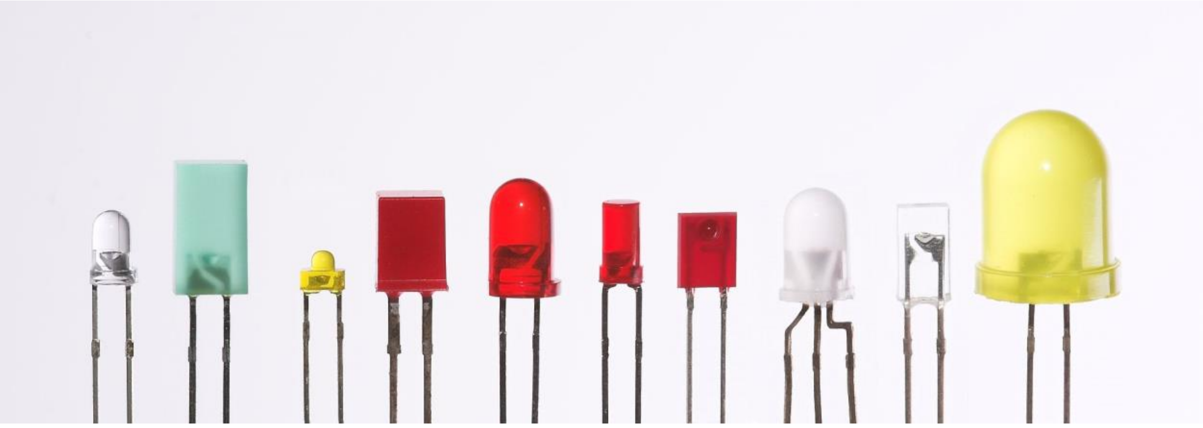

Figure 5.7.2: Types Of LED's

LED's are made in different packages for different applications. A single or a few LED junctions may be packed in one miniature device for use as an indicator or pilot lamp.An LED array may include controlling circuits within the same package, which may range from a simple resistor, blinking or color changing control, or an addressable controller for RGB devices. Higher-powered white-emitting devices will be mounted on heat sinks and will be used for illumination. Alphanumeric displays in dot matrix or bar formats are widely available. Special packages permit connection of LEDs to optical fibers for high-speed data communication links.

5.7.3 Advantages Of LED

- Efficiency: LEDs emit more lumens per watt than incandescent light bulbs. The efficiency of LED lighting fixtures is not affected by shape and size, unlike fluorescent light bulbs or tubes.
- Color: LEDs can emit light of an intended color without using any color filters as traditional lighting methods need. This is more efficient and can lower initial costs.
- Size: LED's can be very small (smaller than 2 mm) and are easily attached to printed circuit boards.
- Warmup time: LEDs light up very quickly. A typical red indicator LED achieves full brightness in under a microsecond. LEDs used in communications devices can have even faster response times.

- Cycling: LEDs are ideal for uses subject to frequent on-off cycling, unlike incandescent and fluorescent lamps that fail faster when cycled often, or high-intensity discharge lamps (HID lamps) that require a long time before restarting.
- Dimming: LEDs can very easily be dimmed either by pulse-width modulation or lowering the forward current. This pulse-width modulation is why LED lights, particularly headlights on cars, when viewed on camera or by some people, seem to flash or flicker. This is a type of stroboscopic effect.

5.7.4 Disadvantages

- Temperature dependence: LED performance largely depends on the ambient temperature of the operating environment – or thermal management properties. Overdriving an LED in high ambient temperatures may result in overheating the LED package, eventually leading to device failure. An adequate heat sink is needed to maintain long life. This is especially important in automotive, medical, and military uses where devices must operate over a wide range of temperatures, which require low failure rates. Toshiba has produced LEDs with an operating temperature range of −40 to 100 °C, which suits the LEDs for both indoor and outdoor use in applications such as lamps, ceiling lighting, street lights, and floodlights.
- Voltage sensitivity: LEDs must be supplied with a voltage above their threshold voltage and a current below their rating. Current and lifetime change greatly with a small change in applied voltage. They thus require a current-regulated supply (usually just a series resistor for indicator LEDs).
- Color rendition: Most cool-white LEDs have spectra that differ significantly from a black body radiator like the sun or an incandescent light. The spike at 460 nm and dip at 500 nm can make the color of objects appear differently under cool-white LED illumination than sunlight or incandescent sources, due to metamerism, red surfaces being rendered particularly poorly by typical phosphor-based cool-white LEDs. The same is true with green surfaces.
- Area light source: Single LEDs do not approximate a point source of light giving a spherical light distribution, but rather a lambertian distribution. So, LEDs are difficult to apply to uses needing a spherical light field; however, different fields of light can

be manipulated by the application of different optics or "lenses". LEDs cannot provide divergence below a few degrees.

- Light pollution: Because white LEDs emit more short wavelength light than sources such as high-pressure sodium vapor lamps, the increased blue and green sensitivity of scotopic vision means that white LEDs used in outdoor lighting cause substantially more sky glow.
- Efficiency droop: The efficiency of LEDs decreases as the electric current increases. Heating also increases with higher currents, which compromises LED lifetime. These effects put practical limits on the current through an LED in high power applications.
- Impact on insects: LEDs are much more attractive to insects than sodium-vapor lights, so much so that there has been speculative concern about the possibility of disruption to food webs.

5.7.5 Application

LED uses fall into four major categories:

- Visual signals where light goes more or less directly from the source to the human eye, to convey a message or meaning
- Illumination where light is reflected from objects to give visual response of these objects
- Measuring and interacting with processes involving no human vision
- Narrow band light sensors where LEDs operate in a reverse-bias mode and respond to incident light, instead of emitting light

CHAPTER 6: HARDWARE IMPLEMENTION

6.1 IR Proximity Sensor

6.1.1 What is IR Proximity Sensor?

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact.

A proximity sensor often emits an electromagnetic 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 capacitive proximity sensor or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target. Proximity sensors can have a high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between the sensor and the sensed object. Proximity sensors are also used in machine vibration monitoring to measure the variation in distance between a shaft and its support bearing. This is common in large steam turbines, compressors, and motors that use sleeve-type bearings.

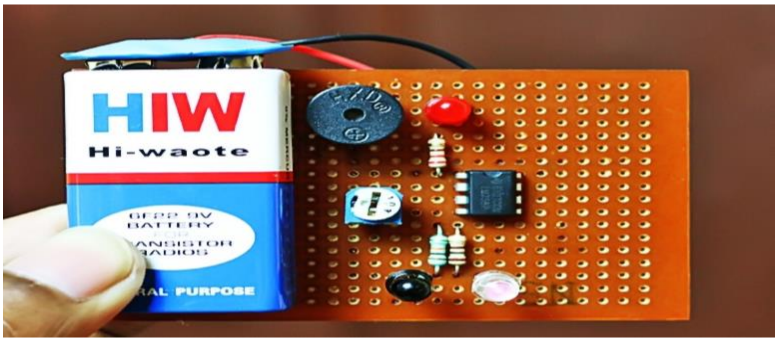

Figure 6.1.1: IR Proximity Sensor

6.1.2 Application

Parking sensors, systems mounted on car bumpers that sense distance to nearby cars for parking:

- Ground proximity warning system for aviation safety

- Vibration measurements of rotating shafts in machinery
- Top dead centre (TDC)/camshaft sensor in reciprocating engines.
- Sheet break sensing in paper machine.
- Anti-aircraft warfare
- Roller coasters
- Conveyor systems
- Beverage and food can making lines
- Mobile devices
- Touch screens that come in close proximity to the face
- Attenuating radio power in close proximity to the body, in order to reduce radiation exposure
- Automatic faucets

6.2 Metal Detector

6.2.1 What is Metal Detector?

A metal detector is an electronic device that comprises of an oscillator which generates an AC current that passes via a coil generating an alternating magnetic field. When a part of the metal is nearby to the coil, eddy current will be induced in the metal object & this generates a magnetic field of its own. If an extra coil is used to measure the magnetic field, the magnetic field can be changed and sensed due to the metal object. The metal detectors are used to sense the weapons and also used in the construction industry to identify the steel reinforcing bars in pipes, concrete, wires, pipes buried in walls & floors.

Metal detector types are classified into three types such as BFO (Beat Frequency Oscillation), TR(Transmitter or Receiver) and VLF(Very Low frequency)

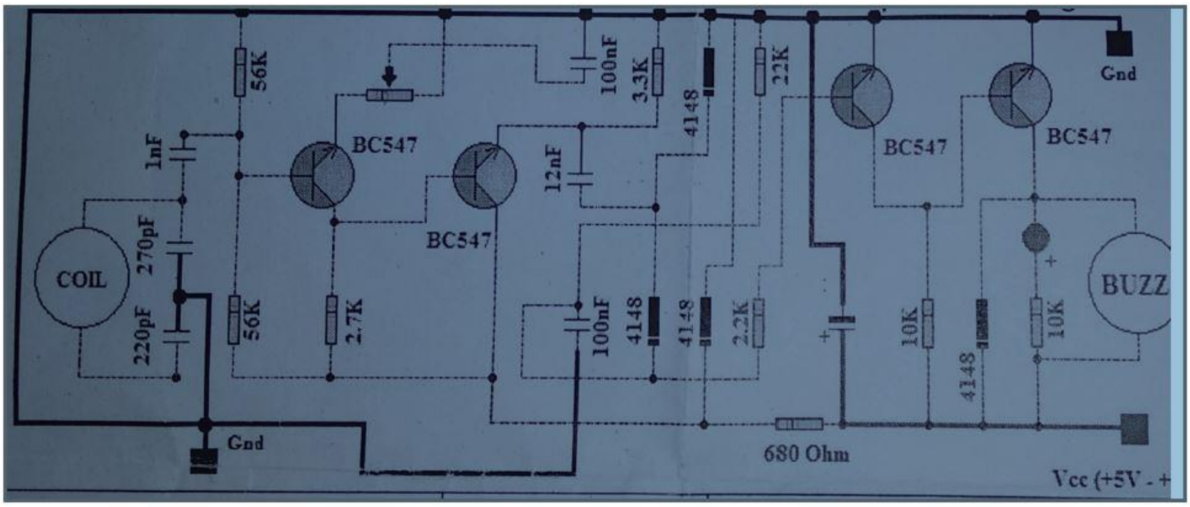

Figure 6.2.1: Circuit Diagram Of Metal Detector

6.2.2 Working Of Metal Detector

The operation of metal detectors is based on the principles of electromagnetic induction. It generates a rapidly changing magnetic field by running the alternating current though coil, which will generate eddy currents inside the metal objects. Thereby, the eddy currents will create a new magnetic field that

Affects the original one, and then the metal detectors will utter a high-pitched tone. The accuracy and reliability of the metal detectors depend on the stability of frequency of electromagnetic launchers. Generally, the frequency is between 80 to 800 KHz.

This metal detector can be used to detect slightly bigger size metallic object. It uses a sensing coil. This coil should be kept near metallic objects for detection.

6.2.3 Application

The metal detectors are able to detect all kinds of metal impurity of different metal materials. The metal detectors can be used widely in food detecting. They are specially used in detecting the metal impurity in meat, beverage, fruits, vegetables, dairy Products, food additives, and health care products and so on.Besides, they can be used to detect the metal impurity in chemical raw materials, rubber, plastics, textile, leather,chemical fiber and toys, etc.

CHAPTER 7: RF MOTOR DRIVER BOARD

7.1 WHAT IS RF BASED MOTOR DRIVER?

It is often required to switch electrical appliances from a distance without being a direct line of sight between the transmitter and receiver. As you may well know, an RF based wireless remote control system (RF Transmitter & RF Receiver) can be used to control an output load from a remote place. RF transmitter, as the name suggests, uses radio frequency to send the signals at a particular frequency and a baud rate.

The RF receiver can receive these signals only if it is configured for the pre-defined signal/data pattern. An ideal solution for this application is provided by compact transmitter and receiver modules, which operate at a frequency of 434 MHz and are available ready-made. Here, the radio frequency (RF) transmission system employs Amplitude Shift Keying (ASK) with transmitter (and receiver) operating at 434 MHz. The use of the ready-made RF module simplifies the construction of a wireless remote control system and also makes it more reliable.

7.2 HOW MOTOR DRIVER TRANSMITER WORKS?

RF Transmitter

434MHz transmitter moduleThis simple RF transmitter, consisting of a 434MHz license-exempt Transmitter module and an encoder IC , was designed to remotely switch simple appliances on and off. The RF part consists of a standard 434MHz transmitter module, which works at a frequency of 433.92 MHz and has a range of about 400m according to the manufacture. The transmitter module has four pins. Apart from “Data” and the “Vcc” pin, there is a common ground (GND) for data and supply. Last is the RF output (ANT) pin.

Figure 7.2: Motor Driver Transmitter

Note that, for the transmission of a unique signal, an encoder is crucial. For this, I have used the renowned encoder IC HT12E from Holtek. HT12E is capable of encoding information which consists of N address bits and 12N data bits. Each address/ data input can be set to one of the two logic states. The programmed addresses/data are transmitted together with the header bits via an RF transmission medium upon receipt of a trigger signal. Solder bridges TJ1 and TJ2 are used to set the address and data bits.

The current consumption with a supply voltage of near 5.4V is about 10 mA. Since the current consumption is very little,the power can also be provided by standard button cells. Recommended antenna length is 17 cm for 433.92 MHz, and a stiff wire can be used as the antenna. Remember to mount the antenna (aerial) as close as possible to pin 4 (ANT) of the transmitter module.

7.3 HOW MOTOR DRIVER RECEIVER WORK?

This circuit complements the RF transmitter built around the small 434 MHz transmitter module. The receiver picks up the transmitted signals using the 434 MHz receiver module. This integrated RF receiver module has been tuned to a frequency of 433.92MHz, exactly same as for the RF transmitter.

The miniature 434MHz RF receiver module receives On-Off Keyed (OOK) modulation signal and demodulates it to digital signal for the next decoder stage. Local oscillator is made of Phase Locked Loop (PLL) structure. Technically, this is an Amplitude Shift Keying (ASK) receiver module based on a single-conversion, super-heterodyne receiver architecture and incorporates an entire Phase-Locked Loop (PLL) for precise local oscillator (LO) generation. It can use in OOK / HCS / PWM modulation signal and demodulate to digital signal.

The receiver module has eight (4+4) pins. Apart from three “ground (GND) ” and two “Vcc” pins, there are two pins (one for Digital Data & other for Linear Data) for data output. Last is the RF input (ANT) pin.

Pin Connections

1. Antenna
2. Ground
3. Ground
4. Vcc
5. Vcc
6. Linear Data (Normally NOT used)
7. Digital Data (Normally Used)
8. Ground

The “coded” signal transmitted by the transmitter is processed at the receiver side by the decoder IC HT12F from Holtek. VR1 and R1 are used to tweak the oscillator frequency of the decoder to that of the transmitter. Any possible variations due to component tolerences and/or a different supply voltage can be compensated by this arrangement. HT12F is capable of decoding informations that consist of N bits of address and 12N bits of data. HT12F decoder IC receives serial addresses and data from the HT12E encoder that are transmitted by the RF transmitter module. HT12D compare the serial input data three times continuously with the local addresses.

If no error or unmatched codes are found, the input data codes are decoded and then transferred to the output pins. The “Valid Transmission” (VT) pin also goes high to indicate a valid transmission.

For proper operation, a pair of HT12E/HT12F ICs with the same number of addresses and data format should be chosen. The data bits are set up using solder bridges RJ1 and RJ2. Output of the decoder is brought out on a pinheader K1 , making the logical signal available to circuits that need it. This output is also fed to the relay driver transitor T1. The RF Receiver circuit can be powered from a standard 5VDC supply.

CHAPTER 8 : CONCLUSION

8.1 FEATURES OF PROJECT

- A significant advantage of border security system is that they are specially useful at sites without electricity. These are solar powered with battery backups.
- System can be move and relocated to collect data feom various location to meet changing mission needs.
- The multimedia sensors provide accurate detection and large detection range.
- As the sensors is highly accurate we can cover a large area.
- The most distinct advantage provided by wireless system is the fact that the technology does not include cable wire.
- Criminals can blind the latest recorded surveillance camera by disrupting power cable & telephone communication line on the other hand, wireless surveillance camera have no wires for criminal to attack.
- Border security system can work 24/7 without additional petrolling team.
- Video recording is store securely on an internal SD card and provides Upto a week of recording video can be viewed via any internet connected device through a standard web browser or integrated into various hosted or local video management system.

8.2 LIMITATIONS OF PROJECT

- Privacy issue : In worst cases hackers can play havoc with your security system by using the hacking tools & use them to spy on you instead .This makes security system vulnerable to damage &/or misuse.
- It's a costly affair: This type of system will cost thousands of dollar depending on the features and monitoring system you buy.
- They can be vulnerable: A clever trespasser will probably know all about them and may have understand the technology and worked out ways to disable/deactivate them from their power source.

- power supply system: Solar battery system also need to be located in a cool environment with adequate ventilation as they don't like heat . There is also need to protect the system from rain and thunderstorm.
- Manpower will be replaced by robots: Due to this unemployment will increase which will hampers the mankind

8.3 FUTURE EXPANSION OF PROJECT

- As the Information Technology (IT) industries and the security industries continue to merge ,IP surveillance system are being changed forever .surveillance system today are smarter and more sophisticated, yet easier to use than ever before. They offer endless possibilities regarding integration, expansion, access and location.
- The future of security and surveillance is internet protocol (IP) surveillance or network video.
- These type of system can be used in future to protect home, office, industry etc.

8.4 Project Cost Estimation

Sr No.	Components	Qty	Amount
1	Arduino UNO R3	1	450/-
2	Servo Motor	1	150/-
3	Ultrasonic Sensor and Metal Detector Sensor	1	350/-
4	LCD display & IR proximity sensor	1	250/-
5	Motor Driver (TX & RX)	1	750/-
6	PVC Pipes for Vehicle (including all sizes and bolds)	25	400/-
7	DC Gear Motor	6	660/-
8	Vehicle Wheels	6	350/-
9	12V Battery	1	700/-
10	Jumpers, Connecting Wires and Others Active Component	Per Unit 1	400/-
Total= Rs. 4500/- Approx			

8.5 REFERENCES

www.google.com

www.wikipedia.org

www.how2mechatronics.com

www.arduino.cc