# GPS/GSM BASED BOUNDARY MONITORING SYSTEM

**A PROJECT REPORT**

***Submitted by***


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**COIMBATORE-641049**

**(An Autonomous Institution Affiliated to Anna University, Chennai)**


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# KUMARAGURU COLLEGE OF TECHNOLOGY

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**(An Autonomous Institution Affiliated to Anna University, Chennai)**

## BONAFIDE CERTIFICATE

Certified that this project report titled **"GPS/GSM BASED BOUNDARY MONITORING SYSTEM**" is the bonafide work of **"SHRIVINOTHKUMAR, SATHEESH,SOUNDARRAJAN.J.S,SOWNDARARAJAN.R''**who carried out project under my supervision.

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**EXTERNAL EXAMINER**

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## ABSTRACT

Fishermen from Tamil Nadu getting shot in the Sri Lankan's maritime boundary is the major issue in our country. From Tamil Nadu about 18,000 boats used for fishing along the India - Sri Lanka maritime border. Ever since violence broke out in Sri Lanka two decades ago, fishing activity has not been peaceful. Tamil Nadu fishermen are arrested, or shot, by the Sri Lankans.

Boundary monitoring system is developed to alter the fisherman when they are accidently crossing the maritime border. This system consists of Global Positioning System(GPS) and a Global System for Mobile communication(GSM) module. The Global Positioning System(GPS) keeps track of the geographical location of the boat. Three boundary limits are set prior to the India - Sri Lanka maritime border.

When the boat crosses the first set boundary limit, the alarm in the boat triggers indicating the fisherman that he is entering into the danger zone. Message will be sent to coast guard via GSM modem when the boat crosses the second boundary limit. If the boat crosses the final set boundary limit which is very close to the maritime border,the boat's motor will be turned off using the darlington relay driver.

The boundary monitoring system is used to help the fishermen to identify their geographical position and to navigate inside their boundary limit,so that they can safeguard their life.

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## LIST OF ABBREVATIONS

| | |
|---|---|
| **GPS** | Global Positioning System |
| **GSM** | Global System for Mobile communication |
| **EEPROM** | Electrically Erasable Programmable Read Only Memory |
| **SRAM** | Static Random Access Memory |
| **LED** | Light Emitting Diode |
| **COM** | Component Object Model |
| **LabVIEW** | Laboratory Virtual Instrumentaion Engineer's Workbench |
| **UART** | Universal Asynchronous Receiver Transmitter |
| **USB** | Universal Serial Bus |
| **ADC** | Analog to Digital Converter |
| **Txr PIN** | Transmitter PIN |
| **Rxr PIN** | Reciever PIN |

## LIST OF FIGURES

# CHAPTER 1

# CHAPTER 1

## INTRODUCTION

Most of the people living in the coastal countries are fisherman. Due to carelessness or without knowing their boundary limit they are crossing the border. In such situation they are being abducted and their boats are being captured by other country. Fisherman of Tamilnadu are being captured by Srilankans and their boats are being destroyed frequently.

To address the fisherman problem, boundary monitoring system is developed. The project consists of Global Positioning System(GPS) receiver,Global System for Mobile communication(GSM)modem,ArduinoUNO.GPS(Global Positioning System) is increasingly being used for a wide range of applications.It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather,day and night.GSM is used to communicate with the coast guard.Arduino uno which is a microcontroller and it can able to control wide range of analog and digital inputs.Arduino uno can be interfaced with GPS receiver and GSM modem.

GPS is made up of three segments: Space, Control and User. GPS has become a widely used aid for navigating worldwide, and a useful tool for map-making, land surveying, commerce, scientific uses, tracking and reliance, and hobbies such as geo caching and way marking. None of the present GPS systems satisfies the requirements for the safety of civilian navigation in the sea as the maritime boundary of a country cannot be marked. It adds on the versatility and the usefulness of a GPS device in the sea.

Boundary monitoring system warns and prevents the fishermen in not crossing the national sea border.Satellites involved in border monitoring system are,

- Communication Satellite
- Global Positioning Satellite

Through these two satellites, the operation of the system is done. Here we are taking an innovative handheld device which perform following actions,

(i) The device allows fishermen to calculate its exact location using the integrated “GPS receiver”.

(ii) Radio the information to the nearest coastguard station via “GSM communication”.

(iii) Community surveillance allows the coastguard to patrol efficiently because they could go only on an alert call and not to patrol at random.

The power supply connects with the GPS to initialize the GPS module. And the GPS interface to the laptop by using UART. GPS produce the NMEA output. So the given output is separated by using the Visual Basics. The resultant output is given to the ARDUINO. ARDUINO compares the current position to stored value. If the resultant value is greater than the stored value then the alarm is generated. And the information sends to the coast guard.

The main objective of the project is to help the fishermen not to navigate beyond other country’s border.The GPS receiver is interfaced with Arduino uno,so that the GPS location will be stored in Arduino uno.GSM modem also interfaced with Arduino uno.GPS value will be displayed in LCD display which is placed in the boat.

The maritime boundary between Sri Lanka and India in the Bay of Bengal shall be arcs of great circles between the following positions, in the sequence given below, defined by latitude and longitude. Figure 1.1 shows the Maritime Border between India and Srilanka.Maritime boundary in Bay of Bengal POSITIONS- LATITUDE LONGITUDE- Position 1 10° 05'.0 N 80° 03'.0 E ,Position 2 10° 05'.8 N 80° 05'.0 E

,Position 3 10° 08'.4 N 80° 09'.5 E, Position 4 10° 33' 0 N 80° 46'.0 E, Position 5 10° 41'.7 N 81° 02'.5 E, Position 6 11° 02'.7 N 81° 56'.0 E, Position 7 11° 16'.0 N 82° 24'.4 E.


Figure 1.1Maritime Border between India and Srilanka

If the fisherman navigates beyond the country's border,three actions takes place.Firstly,an alarm which is present in the boat triggers indicating that the fisherman has nearing the border. With this alarm, the fisherman can be caution and come back inside the country's border.Secondly, a message transmitter is interfaced with the Arduino uno to send a message to naval station located on the shore.so that coast guard take necessary steps to prevent fishermen.Finaly,the boat's motor will be turned off.

The project is used to help the fishermen to identify their geographical position and to navigate inside their boundary limit,so that they can safeguard their life.

# CHAPTER 2

# CHAPTER 2

## HARDWARE DESCRIPTION

The components involved in hardware sections are Arduino uno,Stepper motor,GSM modem and GPS receiver .This chapter gives detailed information about the hardware components, working principles and their applications which are used in the boundary monitoring system.

### 2.1 BLOCK DIAGRAM OF BOUNDARY MONITORING SYSTEM

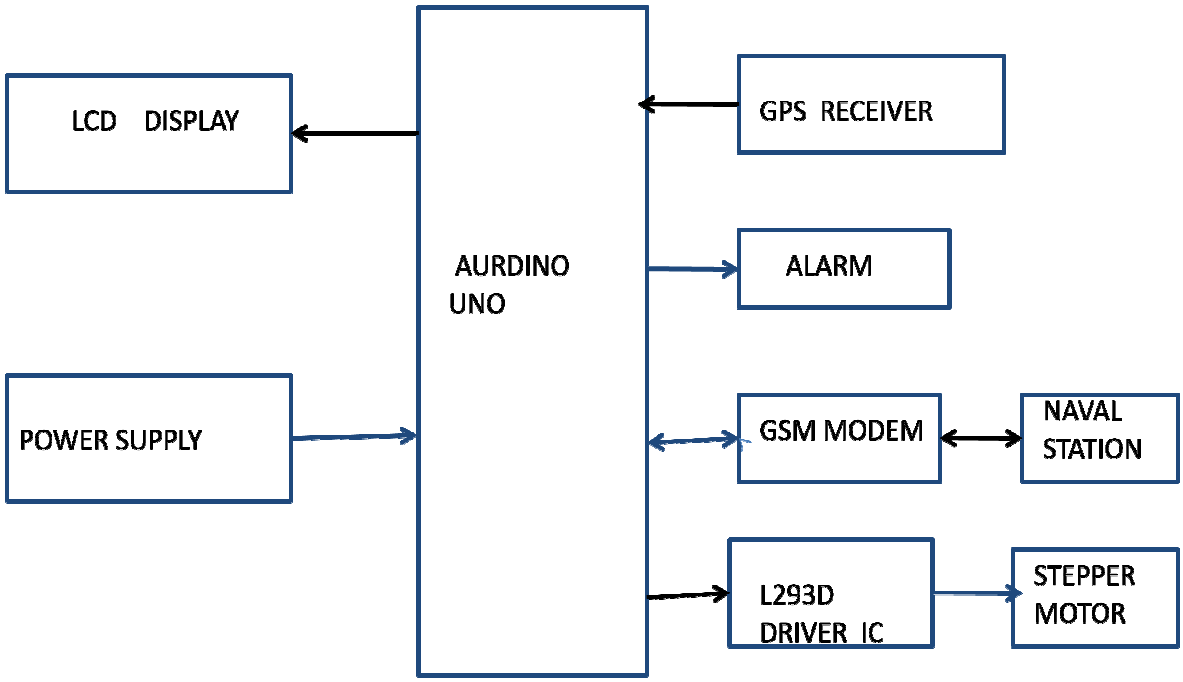



Figure 2.1-Block Diagram of Boundary Monitoring System

The block diagram of boundary monitoring system is shown in Figure 2.1, which consists of Arduino UNO,Power Supply,LCD display,GPS Receiver,GSM Modem and motor.Arduino UNO is a microcontroller,which is operated at 12V. Arduino UNO which is programmed using Arduino software.GPS Receiver provides the geographical location to Arduino UNO. LCD Display shows the GPS value.Whenever the boat reaches the threshold GPS location alarm will trigger,message will be sent to coast gaurd through GSM modem and boats's motor will be turned off.

## 2.2 GLOBAL POSITIONING SYSTEM

The Global Positioning System (GPS) is a space-based global navigation satellite system that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth when and where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible by anyone with a GPS receiver

GPS consists of three parts: the space segment, the control segment, and the user segment. The U.S. Air Force develops, maintains, and operates the space and control segments. GPS satellites broadcast signals from space, which each GPS receiver uses to calculate its three-dimensional location (latitude, longitude, and altitude) plus the current time.

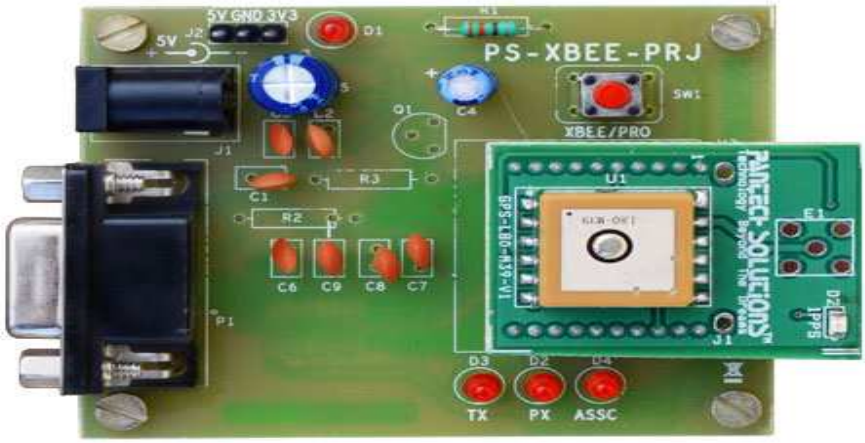



Figure 2.2-GPS Module

GPS is a highly integrated smart GPS module with a ceramic GPS patch antenna. The antenna is connected to the module via an LNA. The module is with 51 channel acquisition engine and 14 channel track engine, which be capable of receiving

signals from up to 65 GPS satellites and transferring them into the precise position and timing information that can be read over either UART port or RS232 serial port. Small size and high-end GPS functionality are at low power consumption, Both of the LVTTL-level and RS232 signal interface are provided on the interface connector, supply voltage of 3.6V~6.0V is supported. The smart GPS antenna module is available as an off-the-shelf component, 100% tested. The smart GPS antenna module can be offered for OEM applications with the versatile adaptation in form and connection. Additionally, the antenna can be tuned to the final systems' circumstances.it has following features as,

- Industry-leading TTFF speed
- Tracking sensitivity reaches -161 dBm
- 0.5 PPM TCXO for quick cold start
- Integral LNA with low power control
- SBAS (WAAS/EGNOS) capable
- Cold start ≈ 29 sec under clear Sky
- Hot start ≈ 1 sec under clear Sky
- Accuracy 5m CEP
- Operable at 3.6V-6V
- Both of RS232 and UART interface at CMOS level
- Small form factor of 32 mm W x 32 mm Lx 8 mm H
- Mountable without solder process

## 2.3 ARDUINO UNO

Arduino uno is used to control the external device which is an advanced microcontroller.It has large flash memory which is used to execute million instruction per second.It can able to sense analog and digital inputs.

### 2.3.1 DESCRIPTION


Figure 2.3-Arduino UNO Module

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage

provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

POWER: The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

- VIN. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- 5V.This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.
- 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

### 2.3.2 FEATURES

| | |
|---|---|
| Microcontroller | ATmega328 |
| Operating Voltage | 5V |
| Input Voltage (recommended) | 7-12V |
| Input Voltage (limits) | 6-20V |
| Digital I/O Pins | 14 (of which 6 provide PWM output) |
| Analog Input Pins | 6 |
| DC Current per I/O Pin | 40 mA |
| DC Current for 3.3V Pin | 50 mA |
| Flash Memory | 32 KB (ATmega328) |
| SRAM | 2 KB (ATmega328) |
| EEPROM | 1 KB (ATmega328) |
| Clock Speed | 16 MHz |

### 2.3.3 CIRCUIT DIAGRAM-ARDUINO

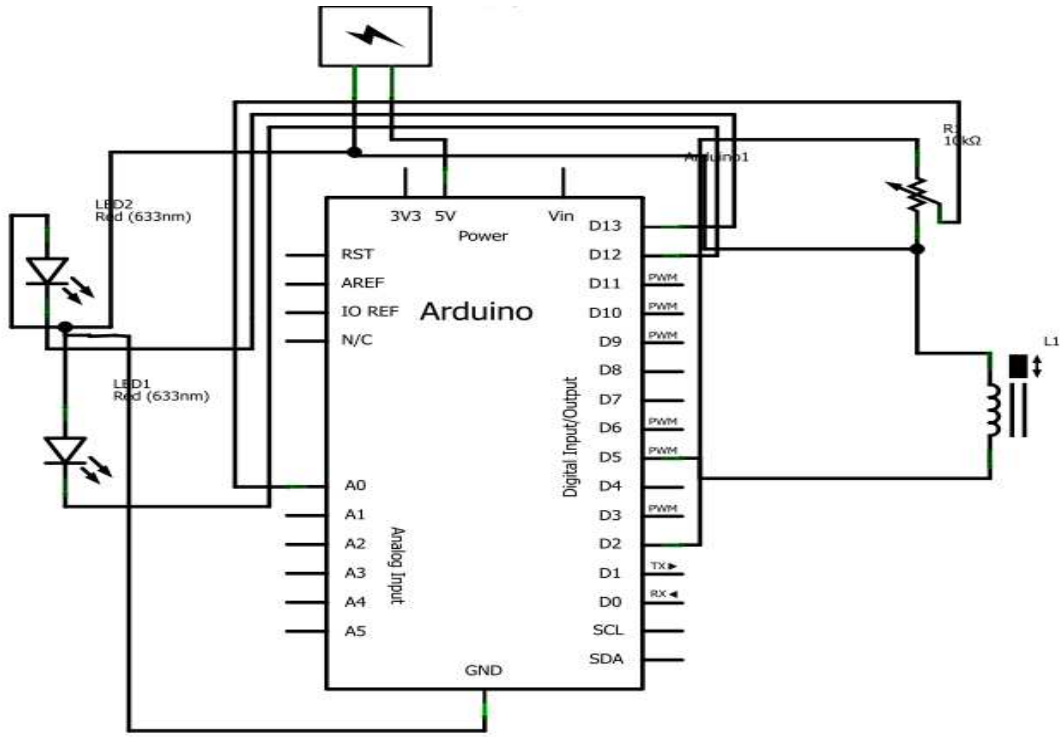



Figure 2.4-Circuit diagram –ARDUINO

ARDUINO consists of six analog pins and it has fourteen digital pins.Digital pin0 is used for serial receiver communication.Digital pin 1 is used for serial transmitter.Digital pins 3,5,6,9,10,11 gives Pulse Width Modulation(PWM) output.ARDUINO consists of two LED's .During uploading of program to arduino the LED blinks,which indicates the program is uploaded successfully.Power supply for ARDUINO is provided by USB connected to computer ,which is normally 5v.

## 2.4BUZZER

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).

Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Sonalert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

## 2.5 GLOBAL SYSTEM FOR MOBILE COMMUNICATION

### 2.5.1 FEATURES OF GSM

**Features of SIM 900 Module**

- Designed for global market, SIM900 is a Dual-band GSM/GPRS engine
- Works on frequencies from  900 MHz to 1800 MHz
- SIM900 features supports the GPRS coding schemes

**Feautures of GSM Kit**

- This GSM modem is a highly flexible plug and play dual band GSM modem
- Supports features like Voice, Data/Fax, SMS,GPRS and integrated TCP/IP stack.
- Control via AT commands(GSM 07.07,07.05 and enhanced AT commands)
- Use DC Power 3.6 - 4.6 Volts Maximum
- Current Consumption in normal operation 250mA, can rise up to 1Amp while transmission.

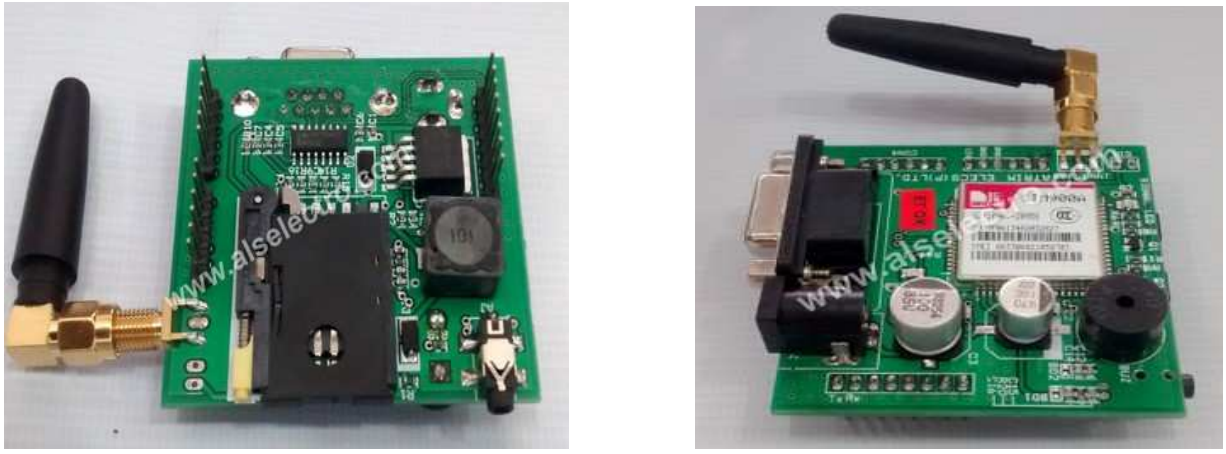


figure 2.5-GSM Module

### 2.5.2 WORKING OF GSM

GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves.

GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone.GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it may be a mobile phone that provides GSM modem capabilities.

In computers use AT commands to control modems. Both GSM modems and dial-up modems support a common set of standard AT commands. You can use a GSM modem just like a dial-up modem.

In addition to the standard AT commands, GSM modems support an extended set of AT commands. These extended AT commands are defined in the GSM standards. With the extended AT commands, you can do things like

- Reading, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.
- Reading, writing and searching phone book entries.The number of SMS messages that can be processed by a GSM modem per minute is very low only about six to ten SMS messages per minute.

## 2.6 DC MOTOR

### 2.6.1 DESCRIPTION

DC motors are part of the electric motors using DC power as energy source. These devices transform electrical energy into mechanical energy. The basic principle of DC motors is same as electric motors in general, the magnetic interaction between the rotor and the stator that will generate spin.

DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances.

**Simple motor has six parts:**

1. Armature or rotor
2. Commutator
3. Brushes
4. Axle
5. Field magnet
6. DC power supply of some sort

**The major classes of DC motors are**

- Shunt wound.
- Series wound.
- Compound wound.
- Separately excited.

### 2.6.2 WORKING OF DC MOTOR

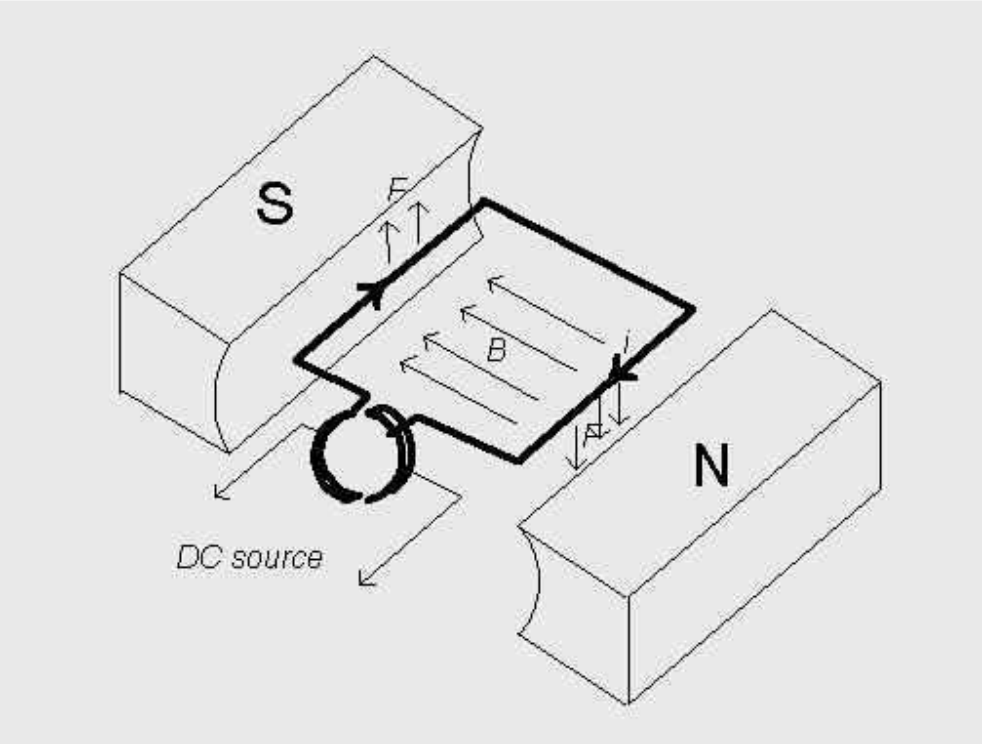



Figure 2.6-Working principle of DC motor

When DC electric current flowing in the coil in accordance with the direction of the arrow, while the direction of the magnetic field B is from north to south pole, the coil will be driven by the force F in the direction. This condition occurs continuously so will result in rotation on the axis of the coil. The direction of the electric current in the coil is fixed, because of the split ring on the end of the coil.

These types of motors differ only in the connection of the field circuits The armatures, commutators, and so forth are nearly identical with each other and with those of the generators. All four major classes of motors are widely used. This is in

contrast to the generators, in which the compound wound type is used for nearly all general power applications.

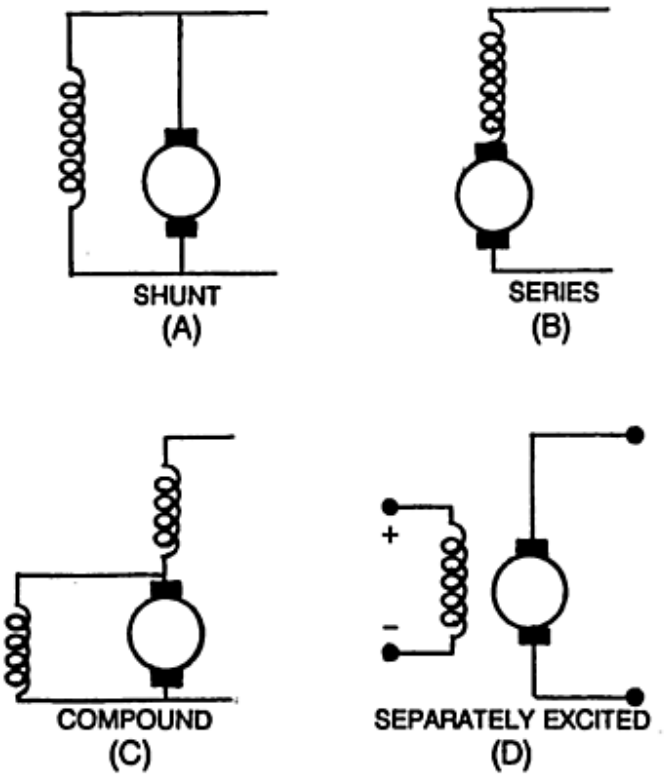



Figure 2.7 Types of DC motor

### 2.6.3 ADVANTAGES

- Electronic commutation based on Hall position sensors
- Less required maintenance due to absence of brushes
- Speed/Torque- flat, enables operation at all speeds with rated load
- High efficiency, no voltage drop across brushes .

## 2.7 RELAY DRIVER

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts.

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits, the link is magnetic and mechanical.

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.

Relays are usuallly SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available.

The coil will be obvious and it may be connected either way round. Relay coils produce brief high voltage 'spikes' when they are switched off and this can destroy transistors and ICs in the circuit. To prevent damage you must connect a protection diode across the relay coil.

The relay's switch connections are usually labeled COM, NC and NO:

- COM = Common, always connect to this, it is the moving part of the switch.
- NC = Normally Closed, COM is connected to this when the relay coil is off.
- NO = Normally Open, COM is connected to this when the relay coil is on.
- Connect to COM and NO if you want the switched circuit to be on when the relay coil is on.
- Connect to COM and NC if you want the switched circuit to be on when the relay coil is off.

**THE ELECTROMAGNETIC RELAY**

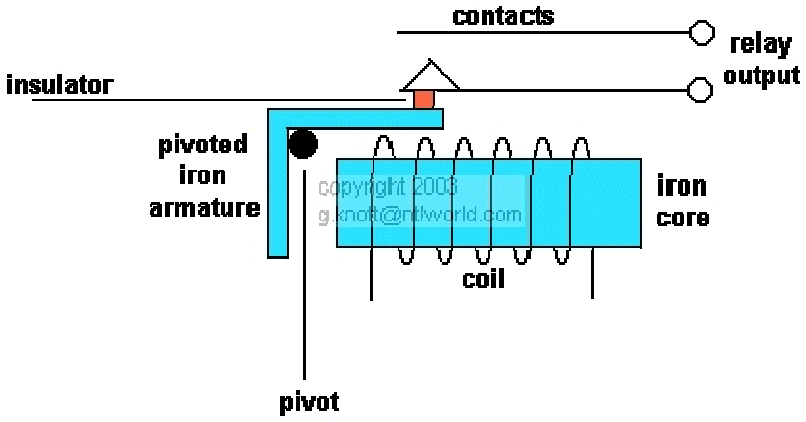



Figure 2.8 Electromagnetic relay

The electromagnetic relay consists of a multi-turn coil, wound on an iron core, to form an electromagnet. When the coil is energised, by passing current through it, the core becomes temporarily magnetised. The magnetised core attracts the iron armature.

The armature is pivoted which causes it to operate one or more sets of contacts. When the coil is de-energised the armature and contacts are released.

The coil can be energised from a low power source such as a transistor while the contacts can switch high powers such as the mains supply. The relay can also be situated remotely from the control source. Relays can generate a very high voltage across the coil when switched off. This can damage other components in the circuit. To prevent this a diode is connected across the coil.

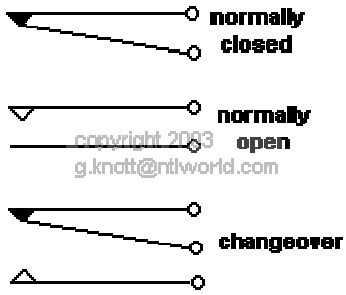



Figure 2.9 Relay electrodes

The springsets (contacts) can be a mixture of n.o n.c and c.o. Look at the page on switches to see how they can be used in circuits. Various coil operating voltages (ac and dc) are available. The actual contact points on the springsets are available for high current and low current operation. The REED RELAY has a much faster operation than the relays described above.

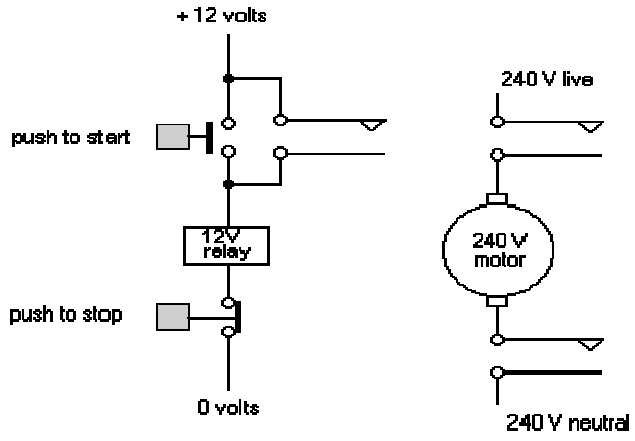



Figure 2.10 Reed Relay

The motor control circuit using a low voltage relay to control a high power motor. When the "start" button is pushed, the 12 volt circuit is completed and the relay is energised. The three sets of contacts close and 240 volts is applied to the motor. Since there is now a closed relay contact across the "start " switch, when the button is released the relay continues to be energised and the motor continues to run. The relay has "latched on". When the "stop" button is pushed the 12 volt circuit is broken. The relay is de-energised and the motor stops.

## 2.8 POWER SUPPLY

### 2.8.1 RECHARGEABLE BATTERY

A rechargeable battery is a type of electrical battery. It comprises one or more electrochemical cells which may be either Ni and is a type of energy accumulator used for electrochemical energy storage.

Rechargeable battery is also known as a secondary cell because its electrochemical reactions are electrically reversible. Rechargeable batteries come in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network.

Several different combinations of chemicals are commonly used, including lead–acid, nickelcadmium (NiCd), nickel metal hydride (NiMH), lithium ion (Li-ion), and lithium ion polymer.


Figure 2.11 Rechargeable Battery

Rechargeable batteries have a lower total cost of use and environmental impact than disposable batteries. Some rechargeable battery types are available in the same sizes as common consumer disposable types. Rechargeable batteries have a higher initial cost but can be recharged inexpensively and reused many time.

The energy used to charge rechargeable batteries usually comes from a battery charger using AC mains electricity, although some are equipped to use a vehicle's 12-volt DC power outlet. Regardless, to store energy in a secondary cell, it has to be connected to a DC.

The hardware section gives detailed description,working principles and the applications of all hardware components which are used in border monitoring system.Inorder to give complete operation of border monitoring system,hardware section needs programming too which is explained in following software section.

# CHAPTER 3

# CHAPTER 3

## SOFTWARE DESCRIPTION

Software section consists of Arduino and Labview.Arduino is a advanced software which uses embedded C programming and Labview consists of graphical diagram instead of programming**.**

### 3.1 ARDUINO PLATFORM

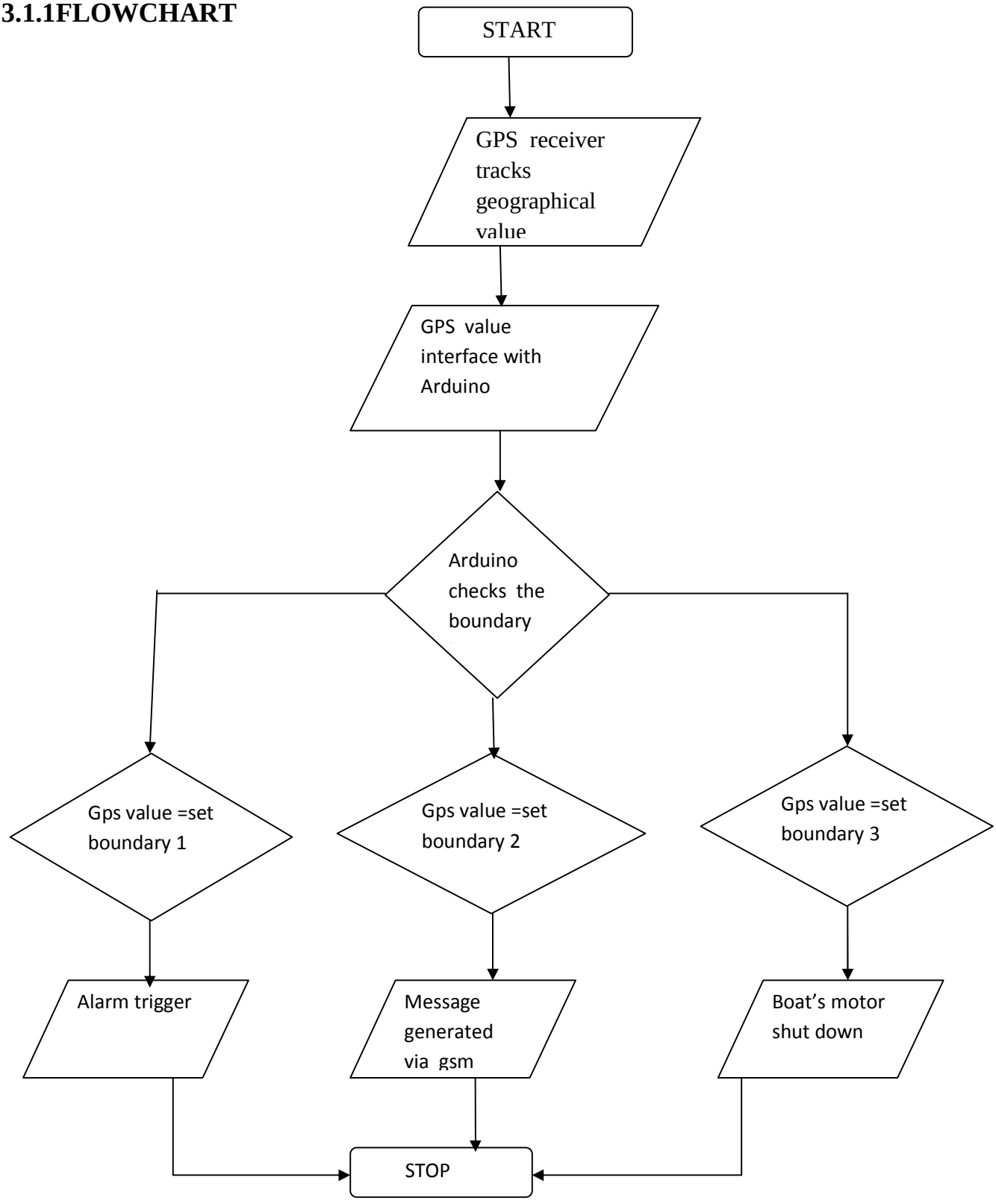
- Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board and a development environment for writing software for the board.

- Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors and controlling a variety of lights, motors and other physical outputs. Arduino projects can be stand alone or they can communicate with software running on your computer (e.g. Flash, Processing, MaxMSP.) The boards can be assembled by hand or purchased preassembled.

- The Arduino programming language is an implementation of Wiring, a similar physical computing platform, which is based on the Processing multimedia programming environment.

- Arduino projects can be stand alone or they can communicate with software running on your computer (e.g. Flash, Processing, MaxMSP.) The boards can be assembled by hand or purchased preassembled.

### 3.1.1FLOWCHART



### 3.1.2 PROGRAM

```
 int Gpsdata;            // for incoming serial data
unsigned int finish =0;  // indicate end of message
unsigned int pos_cnt=0;  // position counter
unsigned int lat_cnt=0;  // latitude data counter
unsigned int log_cnt=0;  // longitude data counter
unsigned int flg    =0;  // GPS flag
unsigned int com_cnt=0;  // comma counter
char lat[20];            // latitude array
char lg[20];             // longitude array
char val;
 void Receive_GPS_Data()
Function : setup()
void setup()
{
  Serial.begin(9600);   // opens serial port, sets data rate to 9600 bps
   pinMode(13, OUTPUT);
  pinMode(12,OUTPUT);
  pinMode(11,OUTPUT);
Function : loop()
void loop()
```

```
{
   while ( Serial.available()==0 );
 {
 val = Serial.read();
  if( val == '@' )
{
  digitalWrite(13, HIGH);
  delay(1000);
  Serial.println("Motor on");
}
if( val == '%' )
{
  digitalWrite(13, LOW);
  delay(1000);
  Serial.println("Motor off");
}
if( val == '<' )
{
  digitalWrite(12, HIGH);
  delay(1000);
  Serial.println("buz on");
}
```

```
  if( val == '>' )
{
  digitalWrite(12, LOW);
  delay(1000);
  Serial.println("buz OFF");
}
 if( val == '?' )
{
   digitalWrite(11, HIGH);
   delay(500);
    finish = 0;pos_cnt = 0;
    digitalWrite(11,LOW);
   delay(500);
   val ='0'
Function    : Receive_GPS_Data()
void Receive_GPS_Data()
{
  while(finish==0){
    while(Serial.available()>0)
    {         // Check GPS data
      Gpsdata = Serial.read();
      flg = 1;
```

```
      if( Gpsdata=='$' && pos_cnt == 0)   // finding GPRMC header
        pos_cnt=1;
      if( Gpsdata=='G' && pos_cnt == 1)
        pos_cnt=2;
      if( Gpsdata=='P' && pos_cnt == 2)
        pos_cnt=3;
      if( Gpsdata=='R' && pos_cnt == 3)
        pos_cnt=4;
      if( Gpsdata=='M' && pos_cnt == 4)
        pos_cnt=5;
      if( Gpsdata=='C' && pos_cnt==5 )
        pos_cnt=6;
      if(pos_cnt==6 &&  Gpsdata ==','){   // count commas in message
        com_cnt++;
      }
  if(com_cnt==3 && flg==1)
{
       lat[lat_cnt++] =  Gpsdata;         // latitude
       flg=0;
      }
 if(com_cnt==5 && flg==1)
{
```

```
        lg[log_cnt++] =  Gpsdata;         // Longitude
        flg=0;
      }
   if( Gpsdata == '*' && com_cnt >= 5){
        com_cnt = 0;                    // end of GPRMC message
        lat_cnt = 0;
        log_cnt = 0;
        flg     = 0;
        finish  = 1;
        }
   }
}
  {         // Check GPS data
       Gpsdata = Serial.read();
       flg = 1;
      if( Gpsdata=='$' && pos_cnt == 0)   // finding GPRMC header
        pos_cnt=1;
      if( Gpsdata=='G' && pos_cnt == 1)
        pos_cnt=2;
      if( Gpsdata=='P' && pos_cnt == 2)
        pos_cnt=3;
      if( Gpsdata=='R' && pos_cnt == 3)
```

```
        pos_cnt=4;
      if( Gpsdata=='M' && pos_cnt == 4)
        pos_cnt=5;
      if( Gpsdata=='C' && pos_cnt==5 )
        pos_cnt=6;
      if(pos_cnt==6 &&  Gpsdata ==','){   // count commas in message
        com_cnt++;
      }
  if(com_cnt==3 && flg==1)
{
       lat[lat_cnt++] =  Gpsdata;        // latitude
       flg=0;
      }
 if(com_cnt==5 && flg==1)
{
        lg[log_cnt++] =  Gpsdata;        // Longitude
        flg=0;
      }
   if( Gpsdata == '*' && com_cnt >= 5){
        com_cnt = 0;                    // end of GPRMC message
        lat_cnt = 0;
        log_cnt = 0;
```

```
        flg     = 0;
        finish  = 1;
        }
    }
}
```

## 3.2 LABVIEW

National Instruments has developed a quirky graphical programming language called LabVIEW specifically designed for data acquisition, analysis and control. It is easy to learn and use, powerful and flexible, efficient, and self-documenting. It resembles no other significant computer language.

NI LabVIEW system design software is at the center of the National Instruments platform. Providing comprehensive tools that you need to build any measurement or control application in dramatically less time, LabVIEW is the ideal development environment for innovation, discovery, and accelerated results. Combine the power of LabVIEW software with modular, reconfigurable hardware to overcome the ever increasing complexity involved in delivering measurement and control systems on time and under budget.

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 LabVIEW-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.

LabVIEW includes extensive support for interfacing to devices, instruments, cameras, and other devices. Users interface to hardware by either writing direct bus commands (USB, GPIB, Serial) or using high-level, device-specific, drivers that provide native LabVIEW function nodes for controlling the device.

### 3.2.1 GRAPHICAL PROGRAMMING

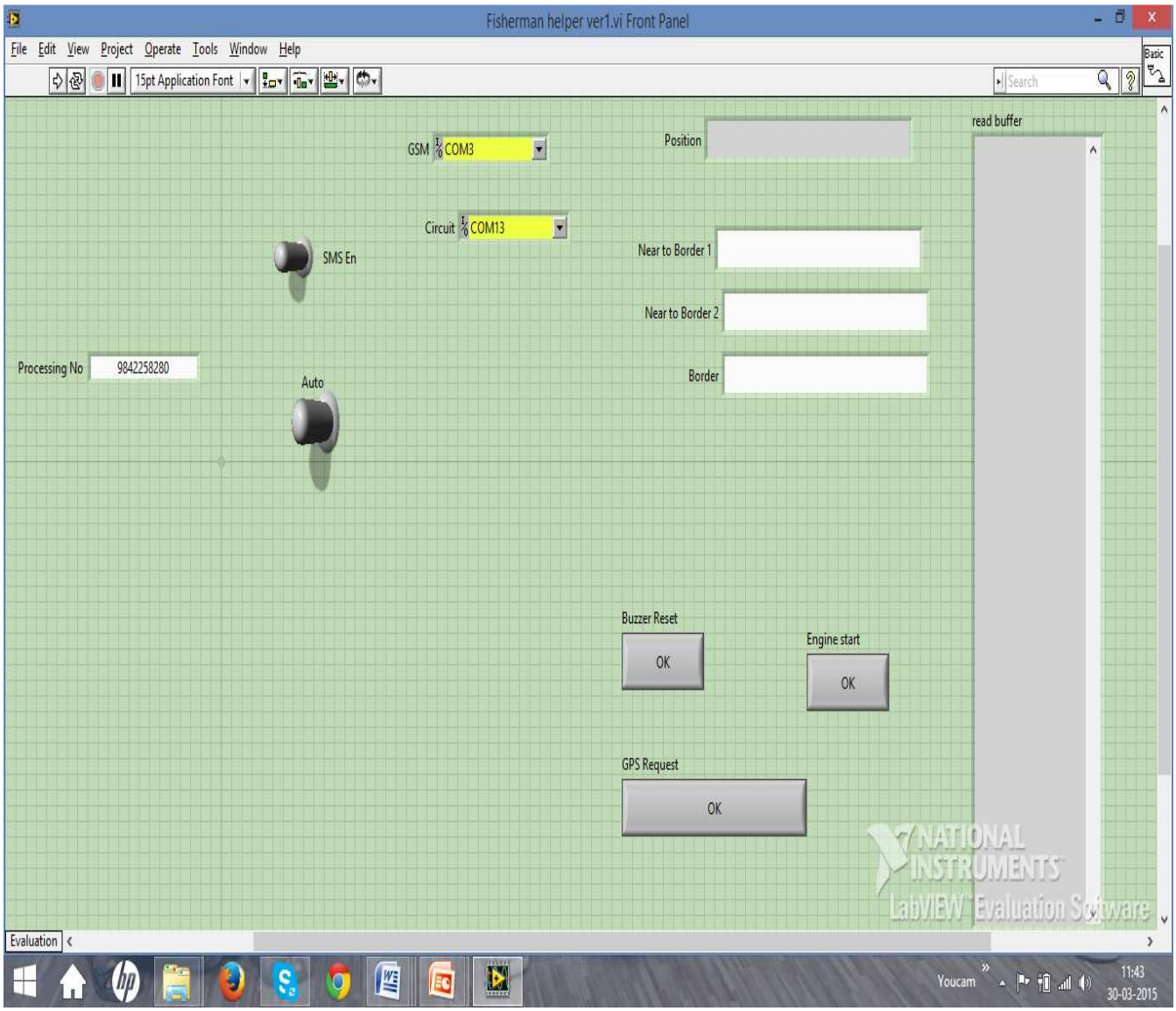
LabVIEW programs/subroutines are called virtual instruments (VIs). Each VI has three components: a block diagram, a front panel and a connector panel. The front panel is built using controls and indicators. Controls are inputs they allow a user to supply information to the VI. Indicators are outputs they indicate or display the results based on the inputs given to the VI. The back panel which is a block diagram contains the graphical source code.

All objects placed on the front panel will appear on the back panel as terminals. The back panel also contains structures and functions which perform operations on controls and supply data to indicators. The structures and functions are found on the Functions palette and can be placed on the back panel. Thus a virtual instrument can either be run as a program, with the front panel serving as a user interface.

The graphical approach also allows non-programmers to build programs by dragging and dropping virtual representations of lab equipment with which they are already familiar. The LabVIEW program environment with the included examples and documentation, makes it simple to create small applications.

For complex algorithms or large-scale code, it is important that the programmer possess 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.

## 3.2.2 LabVIEW FRONT PANEL



### 3.2.2 LabVIEW APPLICATION

## LabVIEW for Instrument Control:

NI LabVIEW software helps you acquire data from any standalone instrument over any bus and provides extensive libraries for signal processing and data visualization. Combine the power of LabVIEW software and IDNet instrument-specific drivers to automate third-party instruments to create reusable measurement solutions that you can program and reconfigure to meet your evolving needs.

## LabVIEW for Automating Test and Validation Systems:

NI LabVIEW, the leading system design software for automated test is optimized to give you the tools you need to quickly develop powerful test software. LabVIEW helps you stay ahead of demanding system needs by providing integration with a wide variety of instruments, ranging from traditional boxes to software-defined PXI modular instruments, so you can acquire nearly any measurement.

The software section gives the detailed description of arduino platform,labview programming and the program used in arduino uno.By combining the hardware and software section,the complete operation of boundary monitoring system is demonstrated.

## CONCLUSION

The boundary monitoring system for border alert and smart tracking has proven to be a low cost project. The boundary monitoring system also aims at providing peace at the borders and reduces the tension between the two countries. The proposed system's architecture is having greatest advantage of the GPS system is the ability of the device to work in any weather conditions and in any means. The system devised will also include a waterproof that the circuit is not prone to any damage. The system provide high accuracy and high precision values of latitude and longitude. The system proposed will not only alert the fishermen but also carries the information to the control station and also notifies the navy station through the GSM system.

## REFERENCES

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[2]. Dennis Rody “Satellite Communication”,McGraw-HHill Publication,Third edition 2001.

[3].‘Border Alert and Smart Tracking System with Alarm using GPS and GSM’Published in International Journal of Emerging Technology in Computer Science &Electronics (IJETCSE)**.**

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