

**International Conference on Emerging Innovation in Engineering and Technology
ICEIET-2017****Border Crossing Detector And Weather Parameter Alert System**¹A.ALLI, ²B.KAWIYA, ³K.GOWRI SANKAR^{1,2,3}DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING, RAJIV GANDHI
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gowri200@yahoo.com**Abstract**

In general, the problem faced by the fishermen for the past ten years is difficulty in identifying their nation border. During fishing, the fisherman may not be aware of their nation border. The other problem faced by the fishermen is that during dark hours, the obstacles are not visible to the naked eye. There are no existing systems to alert the fisherman about any sudden weather changes. So, the border crossing detector will alert the fishermen when the fishermen trespass the border or when an obstacle is detected. During dark hours, the engine will be controlled automatically if they trespass the border. In most of the existing systems GSM is used, and from the base station the alert is given to the fishermen who is in the middle of the sea for fishing, and Zigbee transmitter and receiver is used for all this process, so it will consume a large amount of time and the alert will not be given to the fisherman instantly. So, in the proposed system the default value is inbuilt in the system, the engine will be controlled automatically when the fishermen trespass the border, the alert can be given instantly, this will help the fishermen in all the aspects, and number palette system will be placed in the boat for the emergency and the safety of the fisherman.

Keywords — Arduino Uno, Ultrasonic Sensor, GPS, Motor Driver.**I. INTRODUCTION**

The border crossing detector and weather parameter system will help the fishermen in all the aspects. It helps the fishermen to alert when they cross the border and the alert will be given about the sudden weather change. At present, there are few existing systems which help to identify the current position of the boats/ships using GPS system and view them in an electronic map but they have many disadvantages in existing systems. GSM is used, which is difficult to place in the middle of the ocean. and for weather and tsunami alert short service message is used, difficult to the fishermen to use mobile phones in the middle of the sea and sometimes they may not receive the information due to some network fault and at present, there are few existing systems which help to identify the current position of the boats/ships using GPS system and view them in an electronic map. GPS provides the fastest and most accurate method for mariners to navigate, measure speed, and determine the location. This enables to increase the levels of safety and efficiency for mariners through worldwide. The accurate position, speed and heading are needed to ensure that the vessel reach its destination safely. The accurate position information becomes even more critical as the

vessel departs from or arrives in port. So our project is designed to avoid such kind of accidents and to alert the fishermen about the border areas, this is done using ultrasonic detector and arduino. The main aim of our project is to help the fishermen not to navigate beyond country border.

Ultrasonic detector is also used to find the obstacle in the middle of the sea, and the alert will be given to the fishermen, this will be very useful to the fishermen to detect the obstacle during the night times when they go for fishing. And fishing population is also detected. Ship monitoring and controlling by using ultrasonic sensor and GPS application permits finding and sending alert to the fishermen. Weather parameter alert system is used to recognize the sudden weather change in the middle of the sea and the alert will be given to the fishermen who is in the middle of the sea for fishing using barometer the weather is recognized by using the wind pressure in the middle of the sea.

II. LITERATURE SURVEY

At present there are few existing systems when the information is given from the base station to the fisherman

in the middle of the sea, the fisherman the main problem faced in this system is due to network problem fisherman may not receive the information properly and GSM module is used in the system, it is the major disadvantage of the existing system.

In [1] has proposed a tracking and alerting the fishermen in maritime using GPS. Navigation in marine is the most important factor used by the fishermen. The tracking system uses the electronic system installed on a vessel, and with software design which allows the user or owner to track the vessel location based on latitude and longitude data. Today Global Positioning System (GPS) technology is becoming the safe tool for navigation purpose. The position and location information can be viewed in electronic map via GPS receiver.

In [2] Navigation Alert System for Fishermen and to find the maritime boundary between the two countries. This mainly happens when fishermen crosses maritime border of neighboring country as he is not aware of the limits in sea. The proposed system uses a GPS concept to receive signals from the satellite and gives the current position of the boat. The latitude and longitude of the maritime boundary. To calculates the current position, stored boundary positions and indicates the fishermen that he has crossed the boundary by an alarm, vibrate& notification. The alert will be send to the server section and the fishermen will get the alert visually. This will be more user friendly for the fishermen near the border areas.

In [3] has proposed a Early Warning on Disastrous Weather through Cell Phone .This paper proposed a Weather Early Warning system for minimizing human life loss in natural disasters like tsunami, cyclone, tornado etc. The proposed system is a value added service which can be provided by telecomm operators to their subscribers. The proposed system alerts the subscribers through phone call and SMS depending on the weather condition of their locations.

In [4] has proposed ,Implementation of GPS Based Security System for Safe Navigation Of Fishermen Auto Boat This system also uses GPS technology for navigation and vessel tracking purposes. Using microcontroller, the stored border data between India and Srilanka is being compared with the current location details of the boat, and then alarm signal is being generated when the vessels crosses the border. Simply the message will be transmitted to the base station. In addition, some sensor is used to detect the natural calamities for sea way travel. MEMS is used for tsunami detection. In addition to this weather forecasting report can also be obtained with the help of temperature and humidity sensor.

In [5] has proposed Intelligent Boundary Alert System Using GPS ,An Intelligent Boundary Alert System (IBAS) is proposed. This system helps the fishermen in maritime navigation. The system uses a GPS which continuously receiving signals from the satellite and provide the current position of the boat based on the latitude and longitude data. ARM processor is already fetched details of the latitude and

longitude of the maritime boundary between India and Srilanka. Comparison is done by the processor with stored data and current position of the boat, and it generates the alarm signal whenever the boat crosses the border. They used wireless sensor network to transmit the message to the base station, there they monitors the boat in the sea. This system provides an indication to both fishermen and to coastal guard. Thereby fishermen lifespan will be saved.

Currently, there are no affordable systems that provides border alerting for the fishermen at sea. Using RF technology, also implementing a system which can be used by the fishermen to send out an SOS message with their GPS co-ordinates using zigbee technology, have included additional features such as audio and visual indicators to alert the fishermen when he is crossing the country's border. Also, sudden weather changes are immediately alerted to the fishermen using RF technology have made use of the ARM7 and 8051 microcontrollers as the core of the system & zigbee for wireless communication.

In this paper SOS message system is used to alert the fishermen, this may not work during the monsoon and zigbee technology is used for wireless communication, SOS message with their GPS co-ordinates when they are under distress using zigbee technology.

III. PROPOSED SYSTEM

In proposed system, the detector and the alert system will be fixed in the boat, so it is more safe compared to the existing system and the weather changes is stated to the fisherman immediately. The proposed system will help the fishermen in many aspect, the arduino compare the inbuilt value with the distance it has covered, when the boat nears the nation border the alert will be given to the fishermen, instantly and the engine will be controlled automatically and the weather condition will differ between the seashore and the weather condition in the middle of the sea, so the barometer is fixed in the working prototype, the weather condition is detected using the wind pressure. The weather changing alert is given to the fishermen for fishing , and the obstacle is detected during the dark hours, the engine will automatically controlled and the proposed working prototype model is easy replaceable when compared to the existing system and low cost and the alert is given instantly.

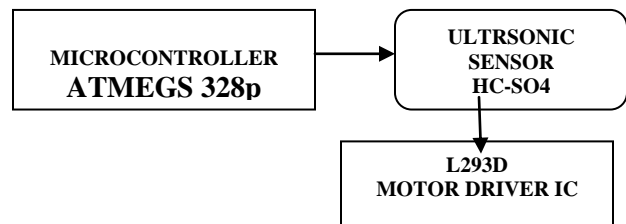


Figure 1: Border Crossing Detector

In the proposed system ATMEGA 328p and ultrasonic sensor module HC-SR04 programmed to detect the obstacle at the range of 20 cm, the L293D motor driver if fixed to tow fans, both the fans rotate the same direction when the obstacle is detected both the fans will rotate in opposite, hence the motor automatically get reversed, this system is used to give alert to the fishermen who is trespassing the country border and also used to detect the iceberg i.e. to detect the obstacle during the night time when the fishermen goes for fishing, and the arduino and ultrasonic sensor module is used to detect the obstacle , hence the fishing population is also detected.

IV. METHODOLOGY

Proposed border crossing detector is designed using GPS where the latitude and longitude value will be inbuilt in the system, the value will be compare with the position and the alert will be given. Border crossing detector is fixed to give alert of the fishermen in the middle of the sea for fishing. And also help the fishermen to detect the obstacle

A. Components Used In The Proposed System

- L293D motor driver IC
- Arduino Uno microcontroller
- HC-SR04 Ultrasonic sensor
- BMP180 Barometric pressure sensor

B. Motor Driver IC

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge *Motor Driver integrated circuit (IC)*. The l293d can drive small and quiet big motors as well, check the Voltage Specification at the end of this page for more info.

It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H-bridge IC are ideal for driving a DC motor .In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently. Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller .There are two Enable pins on l293d. Pin 1 and pin 9, for being able to drive the motor, the

Pin 1 and 9 need to be high. For driving the motor with left H-bridge you need to enable pin 1 to high. And for right H-Bridge you need to make the pin 9 to high. If anyone of the

either pin1 or pin9 goes low then the motor in the corresponding section will suspend working. It's like a switch.

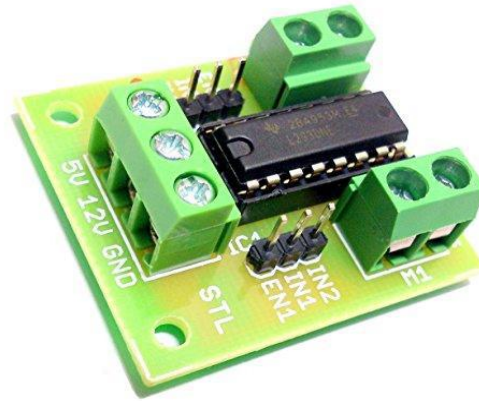


Figure 2: Motor Driver

PIN DIAGRAM

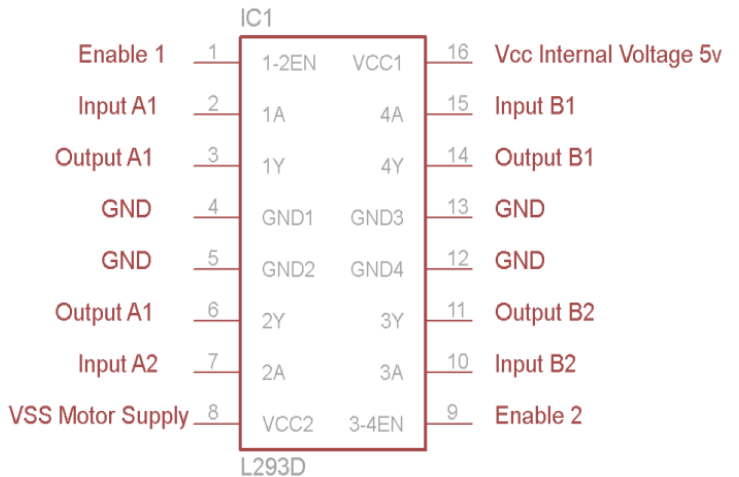


FIGURE 3:L293D Pin Diagram

Working of L293D

There are 4 input pins for l293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1.In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.

C. L293D Logic Table

Let's consider a Motor connected on left side output pins (pin 3,6). For rotating the motor in clockwise direction the input pins has to be provided with Logic 1 and Logic 0.

- **Pin 2 = Logic 1 and Pin 7 = Logic 0** | Clockwise Direction
 - **Pin 2 = Logic 0 and Pin 7 = Logic 1** | Anticlockwise Direction
 - **Pin 2 = Logic 0 and Pin 7 = Logic 0** | Idle [No rotation] [Hi-Impedance state]
 - **Pin 2 = Logic 1 and Pin 7 = Logic 1** | Idle [No rotation]
- In a very similar way the motor can also operate across input pin 15,10 for motor on the right hand side.

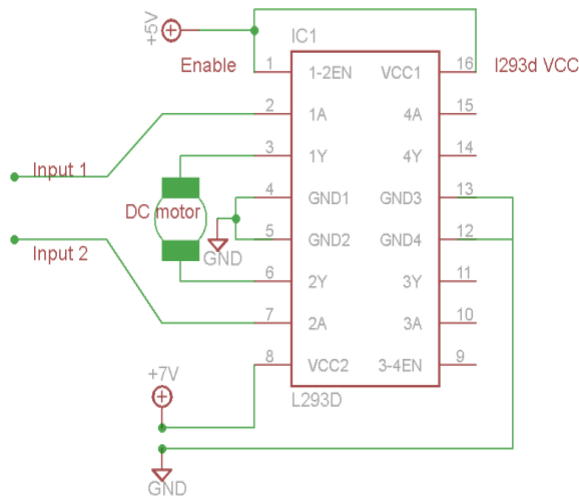


Figure 4: Circuit Diagram For L293d motor driver IC controller.

D. Voltage Specification

VCC is the voltage that it needs for its own internal operation 5v; L293D will not use this voltage for driving the motor. For driving the motors it has a separate provision to provide motor supply VSS (V supply). L293d will use this to drive the motor. It means if you want to operate a motor at 9V then you need to provide a Supply of 9V across VSS Motor supply. The maximum voltage for VSS motor supply is 36V. It can supply a max current of 600mA per channel. Since it can drive motors Up to 36v hence you can drive pretty big motors with this L293d. VCC pin 16 is the voltage for its own internal Operation. The maximum voltage ranges from 5v and upto 36v.

E. Arduino Uno Microcontroller

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains

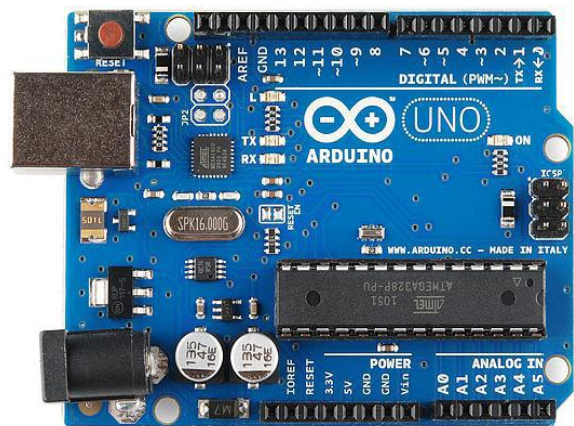
everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed *shields*) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named *Processing*, which also supports the languages C and C++.

The first Arduino was introduced in 2005, based on 8-bit Atmel AVR, aiming to provide a low cost, 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.

Arduino boards are available commercially in preassembled form, or as do-it-yourself kits. The hardware design specifications are openly available, allowing the Arduino boards to be produced by anyone. In mid-2011, it was estimated that over 300,000 official Arduinos had been commercially produced, and in 2013 that 700,000 official boards were in users' hands.

Official Arduinos had used the Atmel megaAVR series of chips, specifically the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560. In 2015, units by other producers were added. A handful of other processors have also been used by Arduino compatible devices. Most boards include a 5 V linear regulator and a 16 MHz crystal



oscillator (or ceramic resonator in some variants), although some designs such as the LilyPad run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions. An Arduino's microcontroller is also pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory, compared with other devices that typically need an external chip programmer. This makes using an Arduino more straightforward by allowing the use of an ordinary computer as the programmer. Currently, optiboot bootloader is the default bootloader installed on Arduino UNO.

At a conceptual level, when using the Arduino integrated development environment, all boards are programmed over a serial connection. Its implementation varies with the hardware version. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistor-transistor logic (TTL) level signals. Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header. Other variants, such as the Arduino Mini and the unofficial Boarduino, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods, when used with traditional microcontroller tools instead of the Arduino IDE, standard AVR in-system programming (ISP) programming is used. An official Arduino Uno Revision 2 with descriptions of the I/O locations

The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. The *Diecimila*, *Duemilanove*, and current *Uno* provide 14 digital I/O pins, six of which can produce pulse-width modulated signals,

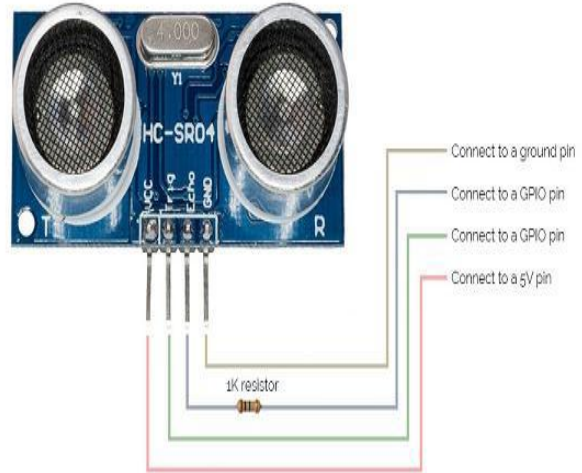
Working voltage	DC 5V
Working current	15mA
Working frequency	40Hz
Max range	4m
Min range	2cm
Measuring angle	15 degree
Input signal	10

and six analog inputs, which can also be used as six digital I/O pins. These pins are on the top of the board, via female 0.1-inch (2.54 mm) headers. Several plug-in application shields are also commercially available. The Arduino Nano, and Arduino-compatible Bare Bones Board and Boarduino boards may provide male header pins on the underside of the board that can plug into solderless breadboards. Many Arduino-compatible and Arduino-derived boards exist. Some are functionally equivalent to an Arduino and can be used interchangeably. Many enhance the basic Arduino by adding output drivers, often for use in school-level education, to simplify making buggies and small robots. Others are electrically equivalent but change the form

factor, sometimes retaining compatibility with shields, sometimes not. Some variants use different processors, of varying compatibility.

F. Ultrasonic Ranging Module HC - SR04

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The



basic principle of work:

- Using IO trigger for at least 10us high Level signal.
- The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.
- IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning. Test distance = (high level time×velocity of sound (340M/S) / 2

Figure 6: Ultrasonic Ranging Module HC-SR04

Table 1: Ultrasonic Ranging Module HC-SR04 specification

G. Timing diagram

The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: $\mu S / 58 = \text{centimeters}$ or $\mu S / 148 = \text{inch}$; or: the range = high level time * velocity (340M/S) / 2; we

suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal. Most timing diagrams use the following conventions:

- Higher value is a logic one
- Lower value is a logic zero
- A slot showing a high and low is an either or (such as on a data line)
- A Z indicates high impedance
- A greyed out slot is a don't-care or indeterminate

The Echo is a distance object that is pulse width and the range in proportion. You can calculate the range through the time interval between sending.

H. Border Crossing Detector

Proposed border crossing detector is designed using GPS where the latitude and longitude value will be inbuilt in the system, the value will be compare with the position and the alert will be given. Border crossing detector is fixed to give alert of the fishermen in the middle of the sea for fishing. And also help the fishermen to detect the obstacle

Figure 7: Timing Diagram

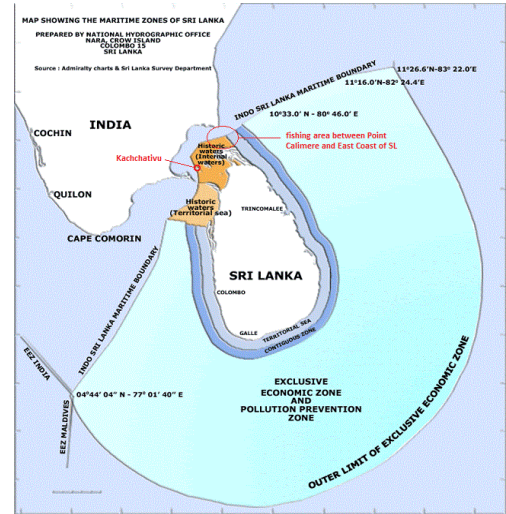
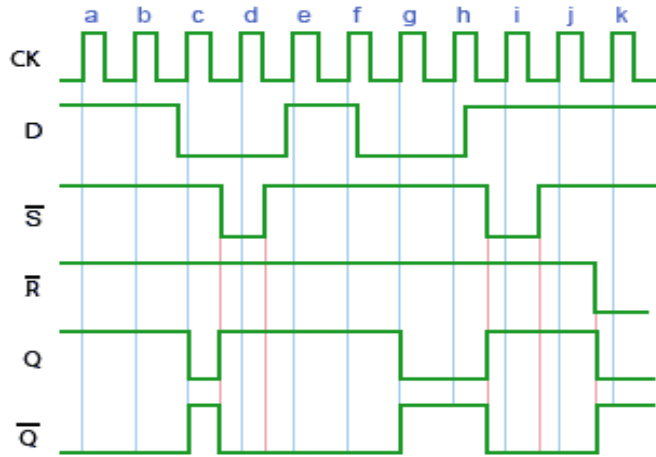


Figure 8: Maritime boundary of India and Sri Lanka

I. Distress Message Communication

When the fishermen are in distress (example: their boat is sinking) they need immediate help. Currently there is no system existing to achieve this. We have incorporated an “NUMBER PALETTE SYSTEM” wherein the fishermen, when in distress have to just push a button. This action will send out a distress message using wireless communication to all nearby boats and also to the base station. The distress message will contain a predefined message and the latitude and longitude coordinates of the boat when the button was pressed. The coordinates will be obtained using a GPS receiver present on the boat.

J. Weather Change Alerting

Suppose the fishermen have gone out for fishing, and the base station receives (say) a Tsunami alert. This information needs to be immediately sent to the fishermen at sea. Currently there is no such system that meets this demand. We have used BAROMETER technology to “weather update” messages to the fishermen instantly using wind pressure. We have used an audio indicator on the boat to inform him whenever an update is received. Thus he can come back to shore safely.

V. RESULT

“The border crossing detector” is implemented using Uno microcontroller to detect the border, which is very useful to the fishermen when they go for fishing, who may not aware of the country border. Fishermen who goes for fishing during the night time may not aware of detecting the iceberg in the seashore, ultrasonic detector is programmed in order to sense

20cm, when the obstacle is detected the two fans will rotate in opposite direction, hence the motor will be controlled automatically, this will be very useful to the fishermen during night times. Ultrasonic sensor is programmed in order to detect the entire obstacle so maximum fishing population is detected using the ultrasonic sensor and it is stated to the fishermen

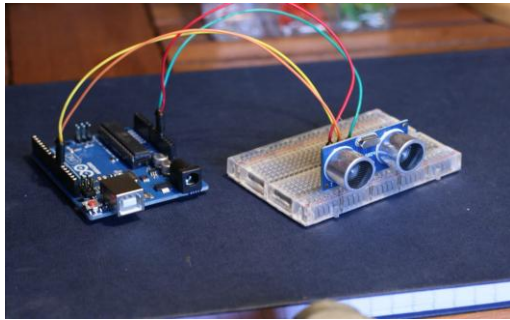


Figure 9: Working Model

VI. CONCLUSION

This paper successfully incorporate all the features mentioned, to a prototype model “Border Crossing Detector and Weather Parameter Alert System”. Main application is for our fishermen who unknowingly thread into international borders and get arrested by authorities of the other country for trespassing. The system guides them such that they are aware of the nation’s boundary and when they have crossed it. Also, this system automatically controls the engine when the obstacle is detected such as iceberg during the night time. Thus an overall robust and cost effective system is developed that can be used by them, when they venture into the sea every day to meet their livelihood. The proposed system will help the fishermen in many aspect, the arduino compare the inbuilt value with the distance it has covered, when the boat nears the nation border the alert will be given to the fishermen, instantly and the engine will be controlled automatically and the weather condition will differ between the seashore and the weather condition in the middle of the sea, so the barometer is fixed in the working prototype, the weather condition is detected using the wind pressure. The weather changing alert is given to the fishermen for fishing , and the obstacle is detected during the dark hours, the engine will automatically controlled and the proposed working prototype model is easy replaceable when compared to the existing system and low cost and the alert is given instantly.

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