Sea border alert system

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Abstract— **we have been hearing about fishermen being seized by custody from other end and even killed. This is purely because of unawareness and unable to identify sea border between countries. So, we have initiated a systems using Global Positioning System (GPS) and Received Signal Strength Indicator (RSSI) to notify and resist the fishermen crossing the border. We use Global Positioning System to get the current location (latitude and longitude) of fishermen's boat and Received Signal Strength Indicator to know the strength of the signal, followed further measures.**

This paper in brief states about various methods of tracking and resisting the fishermen on crossing the border. Navigation in the seawater areas is considered to be important aspect worn by any fishermen who goes for hunting. Basically, the tracking system is designed to make use of electronic device and a software installed in a system to track the current latitude and longitude measures and also detecting signal strength using Wi-Fi ports in the marine borders.

Now-a-days, Global positioning system has been widely used in market to detect the current or another location and Received signal strength has been populated much well than before as the telecommunication driving through it. These two distinct methods would be a safe tool in terms of navigation. Eventually, our paper makes a comparative analysis on both methods in the fishermen border alert system and gives detailed description of working procedure

1. INTRODUCTION

The marine navigation is not as easy as road navigation to identify the paths. The fishermen border alert system would resist the fishermen crossing over the border. The designed systems would in fact start buzzing once they reach the crossing border much prior. So, the Global Positioning System and Received Signal Strength help in achieving the on location point in much efficient way in turn leads to less deaths or brutality from other end of the border. In both of the systems we use LCD to exhibit the current location and in the RSSI model, we use it to display three different zones when you reach to respective on point Let it be, danger, and Moderate and Safe zone. The borders values can be locked on to code from sources from net and adds current location. The system halts you to get on to border.

This application helps the fishermen to track their location between India and Sri-Lanka borders. This embedded system continuously tracks the location using GPS. GPS works on with no halt tracking. The location of the boat is received by the GPS receiver continuously and the inputs are sent to the Arduino which compares the current location with the boundary location already stored. The Arduino which makes useful for LCD display act as an indicator for having zone in which the boat needs to reach to the border of the country.

A. Objective and goal of the project

The objective and goal of the project is to give solution for the hardships faced by fishermen at the border of their respective countries. Our project provides a signal and location traced at the place, it also navigates the path to fishermen. We make sure that the fishermen is also aware of any of climatic conditions such as cyclone, taking in wrong path and storm. The commination to fishermen and aware of current location and restricting the fishermen to not to cross the border.

B. Problem Statement

The borders across the sea are arising new issues in different countries. Fishermen are losing lives of not knowing the navigation, current location, inexistence of danger symbols and certain restrictions conditions in order to avoid the crossing of border. This paper briefs about the halting the fishermen and alarming them before they get closer to end point using two different mechanisms. In which one is using received signal strength indicator and Global Positioning system. A surveillance source says that around 30 percent of fishermen family has lost their existence. Based on this problem, we possess a solution to eradicate any of such sort of damaging of people's lives. As, identifying the sea border is tough task. Ironically, this situation has been solved yet by the government authorities as well.

2. LITERATURE SURVEY

S.NO	AUTHOR NAME	TITLE OF THE PAPER	BRIEF SUMMARY OF THE PAPER	SOURCE
1.	K. Aruli J. Asha	A Review on GPS Tracking	The paper briefs about several methods of detecting and alarming the fishermen in the sea	JSTE – International Jo

#	Author	Title	Description	Journal
	S. Mohamed Nizar M. Malathi	and Border Alert System for Fishermen	border using global positioning system. The main focus is to restrict the fishermen on crossing the border by completely relying on Global Positioning system.	urnal of Science Technology and Engineering
2.	MSivaramaganesh M Ramya V Gowtham T Bharathi G Jeevitha	IMPLEMENTATION OF MARITIME BORDER ALERT SYSTEM	In this paper, the requirement is again based on global positioning system. To ensure the safety to fishermen by designing system based on GPS tracking. The maritime border alert system also guides the fishermen navigation and make	INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING
3.	Nagaraj Balakrishnan • Reshmi S • Arunkumar R • M.S. Pradeepraj	A SURVEY ON BORDER ALERT SYSTEMS FOR FISHERMEN	This paper speaks about the border premise issues in our country. As the fishermen play a major role in the field of economy. Due to unawareness of the fishermen, it affecting the fishermen's family and in which to whole nation. This paper goal is to compares such instances and guide the most suitable of solving it.	PAK. J. BIOTECHNOLOGY
4.	C.Vij, S.Dhanalakshmi, K.Ab... inaya and V.Gayathri	Literature Review on Alert System for Fishermen Border Crossing	The paper briefs about the analysis on border alert system and its literature review and the study distinct methods designed for border alert system for fishermen and reviews about authors who penned their views on it.	Asian Journal of Applied Science and Technology (AJAST)
5.	Uthayakumar Jothilingam, Liston Deva Glindis	IOT BASED BORDER ALERT AND SECURED SYSTEM FOR FISHERMA	In this paper, the system is designed using global positioning system and Global System for mobile commination. Global System for mobile communication has come because, iot is used here. Which means, embedded work on both software and hardware. Iot states out the latest technology for easily accessibility and decision to make on.	INTERNATIONAL EDUCATIONAL JOURNAL OF SCIENCE AND ENGINEERING Jothilingam
6.	Shakkeera L Muzammil Banu Matteen Fathima Sharmasth Vali	Internet of Things Based SOS Signal and Border Alert System for Piscator's Hazard	On contrast act to all other paper, it briefs about using an app called Blynk which trace their exact location rather than relying on global positioning system. The system designed by using iot to get accurate results on transmission of messages and tracking the current location.	Journal of Computational and Theoretical Nanoscience,
7.	V.S.J ANANI S.PO ONGUZHALI	IDENTIFICATION OF SAFETY RANGE WITH DANGER ZONE ALERT SYSTEM IN TRIZONAL AREA FOR FISHERMEN SAFETY USING RSSI	In this paper, use of ultrasonic sensor is used to relish the obstacles faced by fishermen. The received signal strength indicator to fetch the signal strength from certain point to end point of border and global positioning system is also accompanying the system.	International Journal of Pure and Applied …, 2018 - acadpubl.eu

3. *REQUIREMENTS SPECIFICATION*

A. Hardware Requirements

a. Hardware Components in GPS module:

• Arduino uno

Arduino is used for integrating variety of electronic objects. It is flexible, feasible to open-source microcontrollers and low in cost. This ardunio in GPS module helps in integrating the motor, LCD, power supply and Buzzer.

• Buzzer

The buzzer is used for an audio signalling device. Buzzer in border alert system helps in buzzing out when you are about to reach on point. It acts as an alarm to resist fishermen to cross the border.

• 12V Motor

The motor device converts electrical energy into mechanical energy which means, it's a unit of electric power happening in the device gets converted to mechanical energy. In the border alert system.

• LCD display 16x2

The LCD is basically used to display visual image. It has a capacity of producing 16 characters per line and 2 of such lines. The detected current longitude and latitude values gets displayed in LCD. The LCD has a liquid crystals integrated with polarizes works for visual displaying.

• Bread board

The function of bread board to construct and check circuits. It has many holes which the circuit components get fit in and supply power into it. Bread board in GPS modules is used for setting up circuit connection.

• Jumper wires

The primary use of jumper wires is for connection. These are basically bunch of electrical wires or group of cable gets

connected on to one pin to another pin of other end. Mostly, these are displayed while using bread board for connections.

• USB Cable
This USB cable in border alert system is used to connect software ardunio ide and hardware ardunio

• Power supply
It's a device which produces power to electronic objects and sometimes arranged in order for proper flow of power in the devices. To all the devices that are connected, it supplies electric load, correct voltage and frequency to its load.

b. Hardware Components in RSSI module:

• ARDUINO UNO
Arduino is used for integrating variety of electronic objects. It is flexible, feasible to open-source microcontrollers and low in cost. This ardunio in GPS module helps in integrating the motor, LCD, power supply and Buzzer.

• IOT Ardunio
iot cloud builds up connections and connect to multiple devices to each other.

• POWER SUPPLY
It's a device which produces power to electronic objects and sometimes arranged in order for proper flow of power in the devices. To all the devices that are connected, it supplies electric load, correct voltage and frequency to its load.

• GPS module
The Global Positioning System is a navigation system which gives us location in any kind weather conditions. The GPS tracks the current location and sends it to microcontroller. This basically keeps track on longitudes and latitudes and makes us know whether the boat has crossed the border or not. Based on the longitude and latitude values of a restricted area given it in code compares with current location values and gives us required results. When the boat reaches to restricted area, the engine will get off.

• RSSI

Received Signal Strength Indicator functions on signal strength. How far a device can reach out to signal of access point. It is well equipped for possessing good signal strength when you working on wireless network.

• SWITCH

The functioning of switch in RSSI model is to make and break the electric current in a circuit. Where it also forwards the network packets from one to one networking device. The switch is connected to Arduino uno for performing its actions on border alert system for fishermen using RSSI.

• LCD

The LCD is basically used to display visual image. It has a capacity of producing 16 characters per line and 2 of such lines. The detected current longitude and latitude values gets displayed in LCD. The LCD has a liquid crystals integrated with polarizes works for visual displaying.

• APR VOICE

The APR 9301 is used to record voice and shortly a voice recorder. In border alert system, this has a huge role to play. As, it records the voice and playbacks whenever it is needed. In our case, when the boat reaches to safe, moderate or danger zone. The apr voice recorder helps in alarming the sound.

• DC MOTOR

The motor device converts electrical energy into mechanical energy which means, it's a unit of electric power happening in the device gets converted to mechanical energy. In the border alert system.

• MOTOR DRIVER

The motors driver be as interface between the circuits and motors. The use of motor driver in Arduino is that its control the existing speed and directs the two motor simultaneously.

• SPEAKER

This is used to voice out the alarming sound whenever boat reaches to particular zone whether it may be a safe, moderate or a danger. This speaks out loud and let the fishermen know about current location and sea border information.

B. *Software Components*
   a. **Software Components in GPS module**
      Arduino ide
   b. **Software Components in RSSI module**
      Embedded c
      Arduino ide

4. *SYSTEM DESIGN*

So, as mentioned earlier we are using the microcontroller Arduino uno which acts as a sandwich between the hardware and software part. Some of the hardware components we used for making the border alert system were, Arduino uno, buzzer, gps Module, Motor and Lcd Display. All the black lines indicates that it gets connected to the ground, the orange lines signifies the power supply, and the blue line indicates the connection happening to the pin modes in the arduino uno.

As we have got multiple ground and power supply, we are connecting a jumper from Arduino uno ground terminal to the bread board, and we are also connecting taking a jumper nad connecting from 5v of Arduino uno to the breadboard.

Gps connection with Arduino- 1 st for connecting the gps module, we have something called rtx, tx pin in a grp, we are connecting rx to 8th pin and tx to the 9th pin in the Arduino uno. The "tiny gps module" which used to work on the power supply of 3.3 V, so we are connecting the vcc input of the gps module to 3.3 power supply of Arduino uno, and the ground is connected in the bread board where we had multiple pins to connect ground and 5v power supply. buzzer Connection with Arduino- for connecting buzzer we have allocated the buzzer pin as pin number 7 in Arduino uno. So the I/P pin from buzzer is connected to the pin number 7 in Arduino uno and the vcc and ground is taken from the bread board's common connection.

Motor Pin- the motor has got only the positive ad negative terminals presnet in it, so I have connected the negative terminal of the motor pin to bread board, and the positive terminal to the pin mode number 13 in the Arduino uno. So, this pin number 13 controls the working and halting of the motor. Lcd with Arduino uno- so there are totally 16 pins present in the lcd, but we are using only 1st 6 and the last 6 pins to connect the lcd and Arduino uno.

So, the 1st pin from the lcd is signifies the ground. So, the 1st pin from lcd is connected to the breadboard [ground, here the Arduino uno ground is connected]. 2nd pin in lcd signifies the power supply, so the liquid crystal lcd requires 5 voltage of power supply, we are connecting the 2nd pin of lcd to the 5v power supply present in breadboard. We are enabling 4 data pins in the lcd. The next 4 pins after gnd and vcc is the data pins, the 1st, 2nd, 3rd and 4th data pin from the lcd is connected to the pin number 2,3,4 and 5 in the Arduino. No now the first 6 pins of connected to the Arduino uno. Now we come from the last.

The last pin of Arduino is again grounded, and the pin before it is connected to the vcc, the 3rd pin from the last signifies the contract control of the lcd, which is connected to pin number 6, the 4th pin from last signifies "register select" which is connected to the pin number 12, the 5th pin from last signifies "read/write" which is connected gnd. The 6th pin

from last means to enable which is connected to the pin number 11 in Arduino uno.

5. *IMPLEMENTATION OF SYSTEM*

A. **Implementation system for GPS module**

We code using Arduino ide+ software, where in we specify the function that should be carried out by each and every hardware component connected to the Arduino uno microcontroller. So, we set all the pin mode in the code, which simply menas we are informing the Arduino that we'll be using these pins for its respective purposes.

The key logic used here is, we already set the border values in the microcontroller and we get the current latitude and longitude position using the gps [which uses tiny gps library]. After we obtain the current lat and long values, we take the absolute distance between the current latitude - stored latitude and current longitude - stored longitude, and if its equivalence is less than or equal to 5 then we can know the border value is reaching and we turn off the motor and enable the buzzer. [This is done by setting the pin number 13 and 7 high]. If the value is said to be greater than 5, then the boat keeps sailing.

We are taking the absolute distance because, the lat and long values have polarity, and say if the stored latitude is -12.3345[border val] and the current value read by the gps is 12.1234, we if find the difference the value would be less than 5, and the boat stops. To, avoid the confusion related to polarity we are taking the absolute difference of the stored value and the current position.

B. **Implementation system for RSSI module**

I/P and O/P
14 Digital Pins on the Arduino Uno
Methods used:
1. pinMode()
2. digitalWrite()
3. Digital Read()
Pin1 -TX and Pin0-RX-Serial:
Transmit and receive TTL serial data, and these are connected to the ATmega8U2 USB to TTL Serial data, and these are connected to the ATmega8U2 USB to TTL Serial chip equivalent pins
 Pin 2 and pin 3 (External Interrupts): External pins can be connected to activate an interrupt over a low value, change in value.
Pins 3,5,6,9,10,11 (PWM): This pin gives 8-bit PWM o/p by the function of analogWrite().
SPI pins(Pin-10 (SS), Pin-11 (MOSI), Pin-13 (SCK) : These pins maintain SPI-communication Pin-13(LED): The inbuilt LED can be connected to pin-13 (digital pin). Negative high valued pin .the pin emits low then there is light emitting diode emerged.
Pin-4 (SDA) & Pin-5 (SCL) (I2C):

The device play role in combinations of TWI followed with wire library.
AREF (Reference Voltage):
The input analog relies on reference voltage (analogrefrence()).
Reset Pin:
 To reset the microcontroller, we use RST.
Take a Plywood or cardboard and place the arduino at the top right corner. Place all the components in the cardboard using gluegun. Place the buzzer at the bottom left. Place all the modules near the digital pins.

GND ==> GND
 TX ==> Digital pin (D0)RX of Arduino
 RX ==> Digital pin (D2) or Tx of Arduino
Vcc ==> 3.3 V
Buzzer:
 A buzzer has two wires as Vcc and GND. it can work in 3.3V so u can connect it with one of the digital pins.
Buzzer VCC => Digital pin 8(D8)
 GND => GND
Emergency Interrupt:
red to GND
 brown to pin2
DC Motor
white to powersupply +
 brown to powersupply – buzzer
APR voice speaker Green to Yellow Apr voice channel – Speaker
Arduino UNO
APR channel blue and violet M2 & M1 To A0 and A1 in Arduino
ESP8266 Wifi module
G==>Green , RX==> White ==>TX
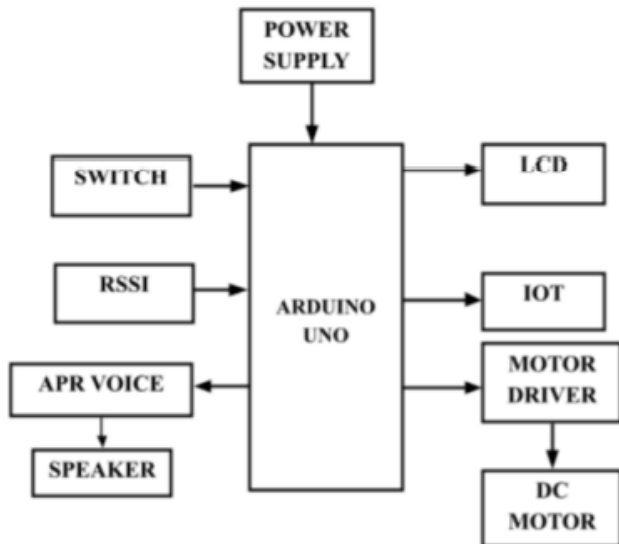TX-Green , D5 White to 3 in Arduino
Power Supply IN2==>Orange and IN1==>Red to 7,6 in Arduino
GND,5V Orange and yellow to 5v ang GND of APR voice channel
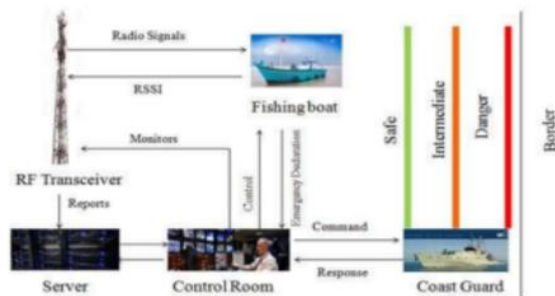5V,GND Violet and Grey 5v GND to Status in voice APR
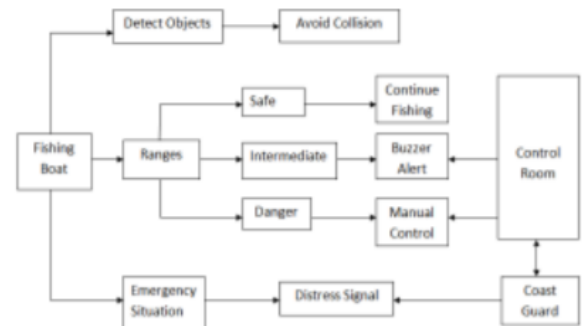
C. **Block Diagram:**

RECEIVER SECTION: BOAT

G. **Dataflow**

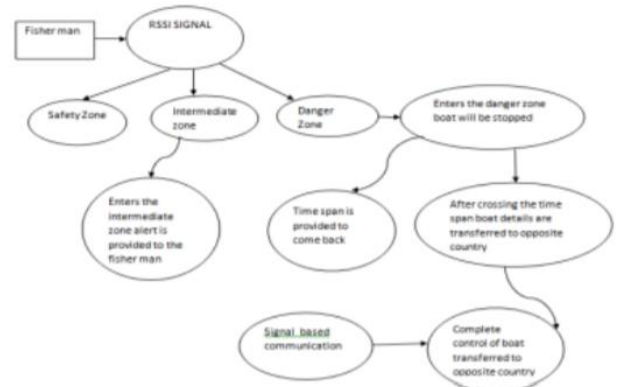D. **Transmitter Section: Harbor**

H. **Simulation Of Border Alert Using Gps Module**

E. **Flow Chart**

F. **Overall Architecture**
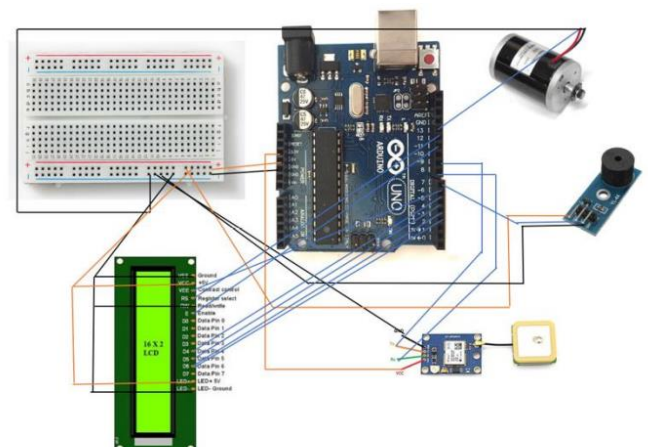
## I. Simulation Of Border Alert System Using Rssi
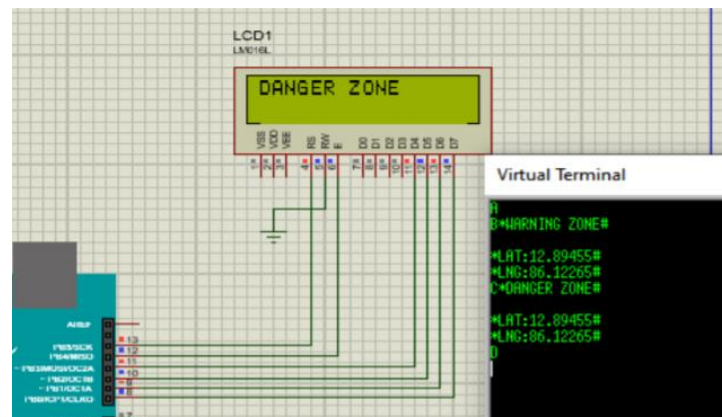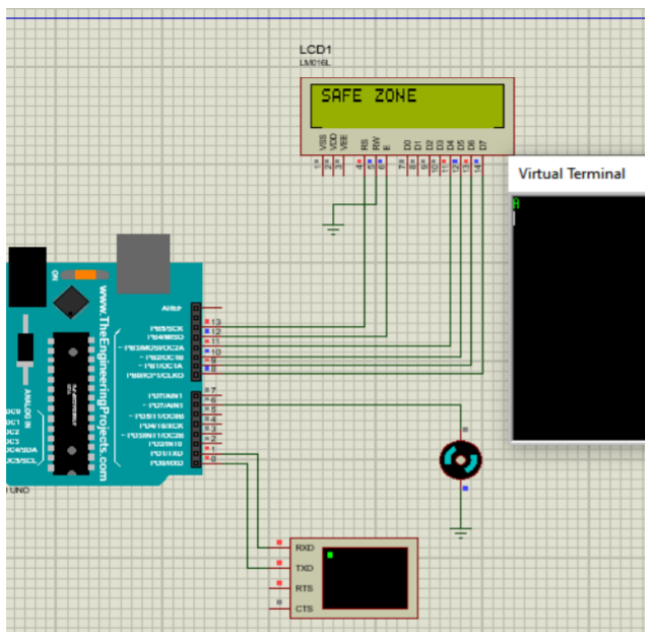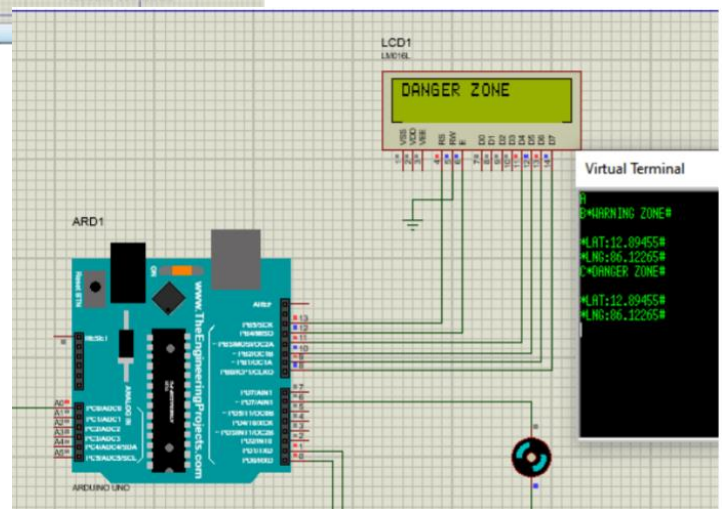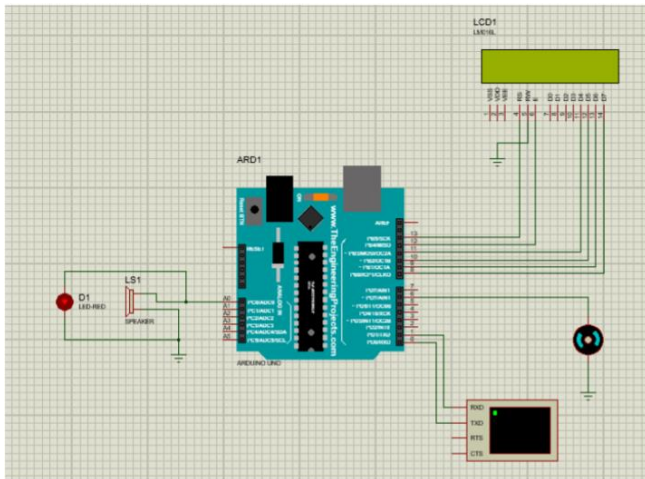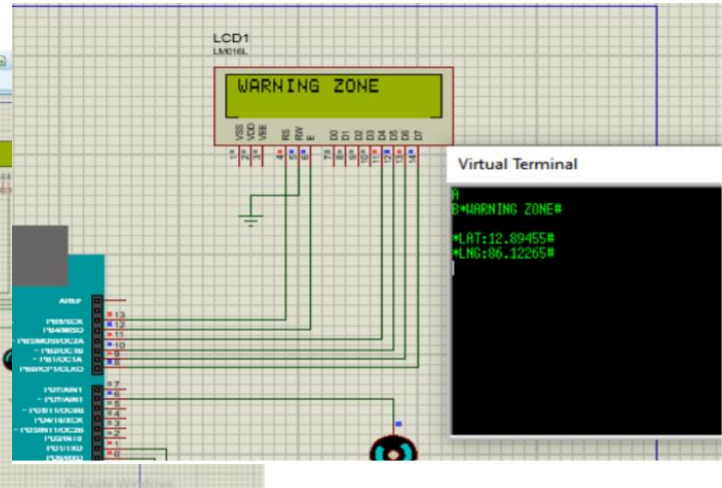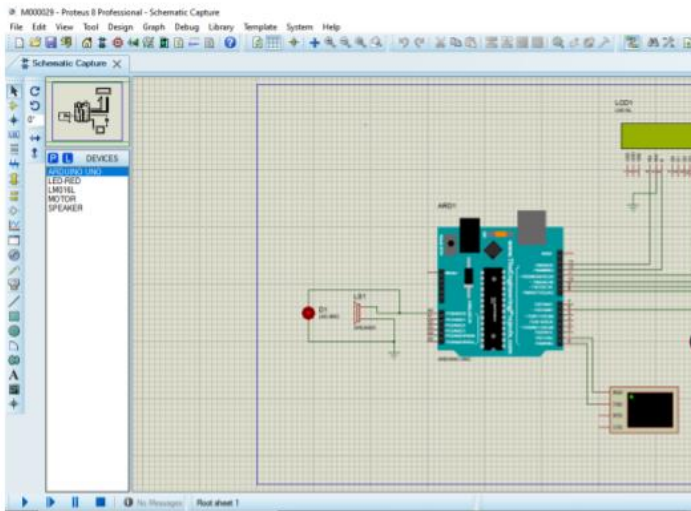

6. RESULTS AND DISCUSSION

Border alert system is to overcome problems faced by fishermen during their hunting and rescue them in danger situation. It not only finds the GPS value, but also compares with the stored value in the microcontroller, and makes a decision as to whether the fishermen is in the warning range

or not.After the initialization the GPS values of current position will be displayed in the LCD. The calibration of GPS module takes some delay to display the actual boundary values. Until then a default value will be displayed in LCD. After the calibration the actual latitude and longitude values are displayed in the LCD.if the current location value is found to be greater than the stored value in the microcontroller, the fishermen are warned with the help of series of events. The first event is an alert message that will be displayed in the LCD, followed by buzzer sound. Finally an SOS message will be sent to the present number showing warning as shown in Fig.

A. Gps Module Connection
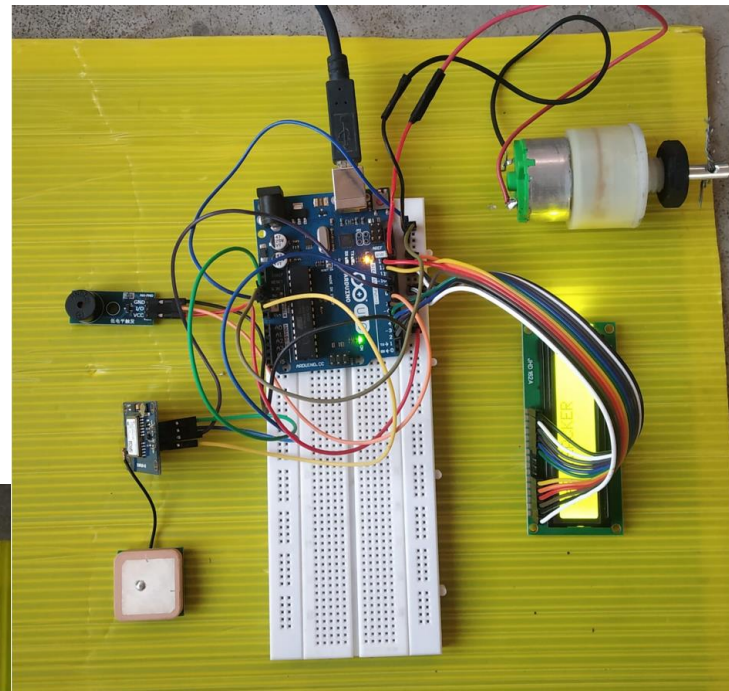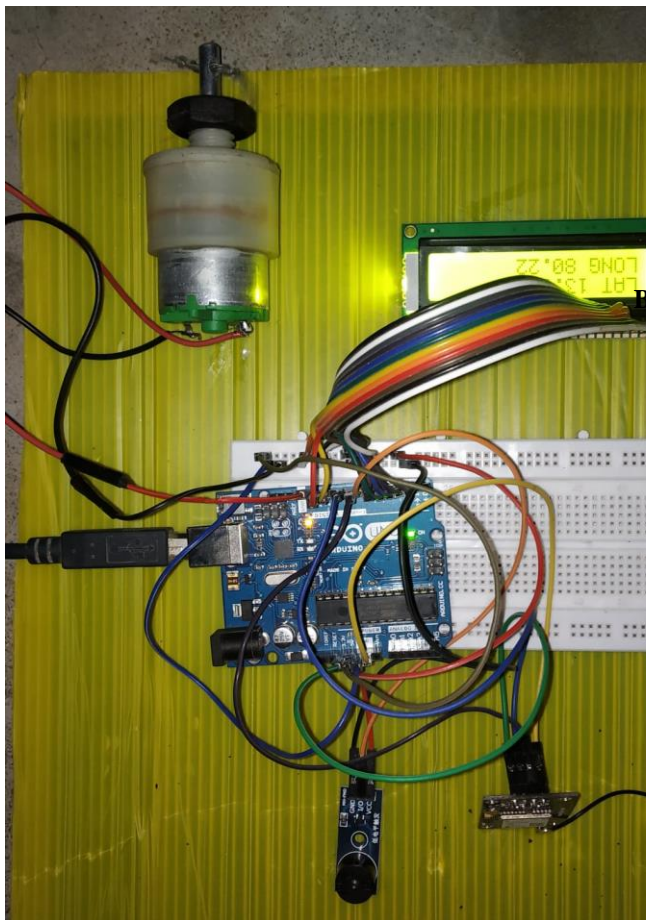
B. Rssi Module Connection
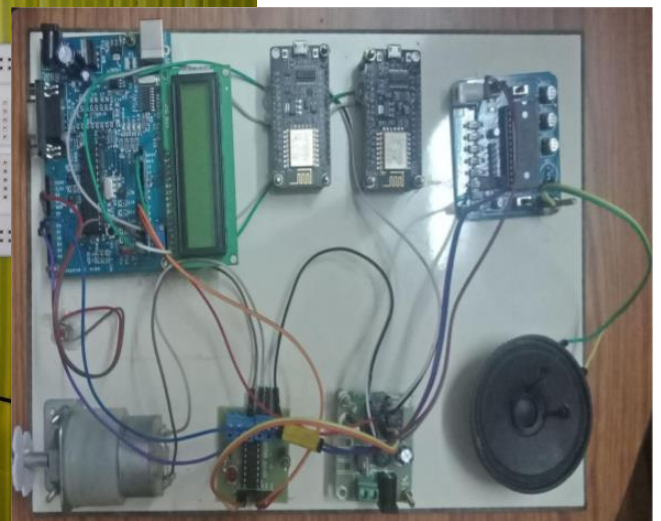
7. CONCLUSION AND FUTURE WORK

We conclude that the fishermen can safely navigate through the sea and get notified when fishermen getting closer to border. As, we have discussed the study on this paper is made on two different methodologies which are using Global Positioning System and Received Signal Strength Indicator.

The system functions in such way that there won't be losing lives of fishermen anymore in at sea border. Both system works with high accuracy and high precision based current location (latitude and longitude). The paper also provides a study on comparative analysis of working of both the systems. Global positioning system tracks restricts the boat based on current location values. Whereas the Received Signal Strength Indicator halts the fishermen's boat on detecting how far the signal strength have been registered. On using, these two systems, certainly, the difference in the lives of fishermen effects positively.

The information comes which shows the current latitude and longitude. Between India and Sri Lanka, this Navigation System will help them know their current latitude and longitude position and it allows the poor fishermen to reach by avoiding consequences of crossing the border by reaching to a safest place. The project is low budget which help the poor fishermen to move to a great extent. This navigation system provides proper and sufficient information for both the coastal guards and to the fishermen in which it currently shares the latitude and longitude value through GPS data received by Arduino.

Thus the poor fishermen can easily identify the national sea borders and therefore prevents them from entering their border between India and Sri Lanka. Thus while saving people from borders and having good consequences with nearby borders between India and Sri Lanka, they can be easily brought where they are near to the border.

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