

# Multi-Purpose Marine Wireless Network for Boats

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**Abstract:** The fishing is one of the most dangerous profession in the world. In South Asian Countries like TamilNadu and Gujarat faces many problems because of crossing Indian Maritime border limits. The proposed system prevents the fishermen from these problems.

The proposed project aims at providing a possible solution to the various hardships faced by the fishermen because they are cut off from any form of communication. In this project a portable device will be made, which uses GPS for real time location detection and uses Zigbee for wireless communication. The device also has a small LED display and a button which acts as a multipurpose signalling switch. Each of the fishing boats is provided with this portable device. Using the Zigbee transceivers on each of the units, all the boats can form a AD Hoc network within themselves.

## I. INTRODUCTION

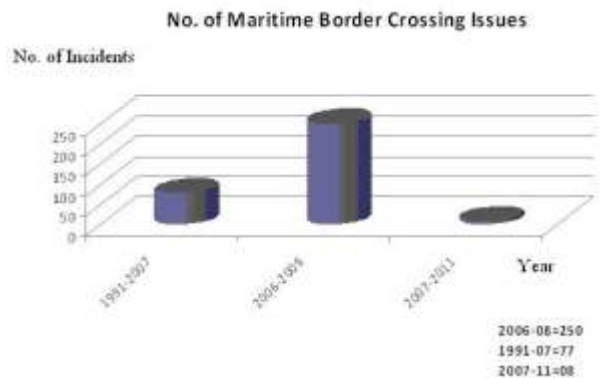
Thus a marine AD Hoc network once created can serve multiple purposes, and this project aims at demonstrating these possibilities using a prototype of the portable unit, and using a simple multi hop communication demonstration. This project can be extended to accommodate text communication like that in mobile phones, between various fishing boats within a certain area, if the portable unit is provided with a additional keypad and RFID tag is also used for accessing in further future developments . In case of any accidents on a boat, the button can be pressed on the unit, and an automatic SOS message will be broadcasted on the AD Hoc network, thus enabling rescue operations. Information about weather conditions: Using the AD Hoc network, a weather warning can be provided to the fishermen from a costal station / from coast guard vessels. Once a network like that is in place, it can also be used for applications like Tsunami Warning using seismic sensors that are planted on the ocean bed, and connected to a surface wireless transmitter. Each of the portable units will be programmed with the GPS boundary coordinates for Indian Territory on sea. With this, every time a boat comes close to or crosses over into international waters, an alarm will be raised and a message will be transmitted over the network about the cross over.

The technology proliferation of Global Positioning System (GPS) is used to provide location based positioning, Navigation and time details in all climatic conditions and even anywhere any time. Though it comprises three units namely control unit, space and user unit and has become

popularly used technology for time and location sensitive navigation, tracking and surveillance applications. The requirements of safety civilian in the sea as the maritime boundary (navigation) of a country cannot be achieved. The marine GPS navigation device and packages became a revolutionizing tool for fisherman boat's maritime border crossing issues. The proposed system coins a low cost maritime border crossing alert system that amalgamating the potency of marine GPS device. It continuously monitoring, tracking, alerting and controlling the fisherman's activity from the remote station located on the shore.

## II. BASIC ISSUES:

Once they rude the border, they arrested or killed by the relevant navy and they are being abducted and their boats are being captured by the neighbourhood countries coastal guards.



As far as the fishing activity has not been peaceful since the issue of maritime border crossing. Coastal route is

always a choice of intruders. Fig 1 shows between the years of 1991-2011, 86 Indian fishermen are killed in 167 incidents by Sri Lanka navy and in the one week of February, 88 fishermen from Gujarat were arrested by the Pakistan Navy for crossing the border limits in Karachi.

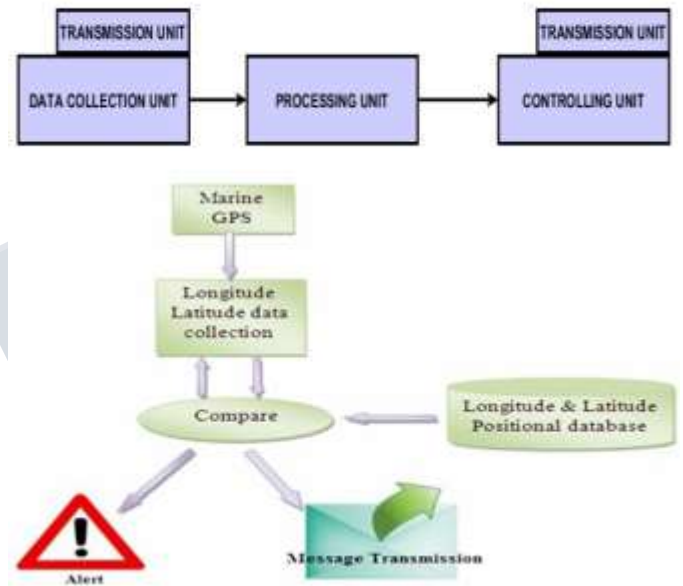
**III. EXISTING SYSTEMS:**

The earlier one are using the Global Positioning System(GPS) and GSM for finding the real time location of the boats, but it has the disadvantage of poor accuracy in exactly finding the border and it gives an alert signal after it crosses the border limit as it has no use in preventing these people from arresting. The another method of existing system uses GNNS(Global Navy Navigation System) has the use of GNNS satellites which is not easily permitted by the government for accessing by the each and every person as it is a highly secured method of finding the exact location of the boats. The method of existing system uses Android application for finding the exact location. It has the main disadvantage that poor fishermen are not familiar with android apps and it has also the huge cost problem.

**IV. PROPOSED SYSTEM:**

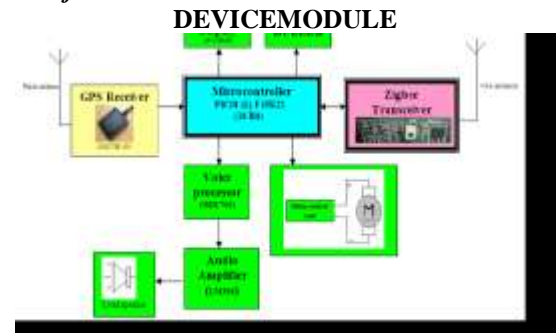
In this work, we propose a wireless network, which provides an efficient positioning service and restores the lost sea-to-land link from small fishing boats which help to our fishermen from border crossing problem by getting alert sound and message in display before crossing the border. We adopted wireless network using zigbee (operating frequency 2.405Ghz~2.480Ghz) for sending and receiving the information between fishermen boat and control room. The proposed networks combine global positioning system (GPS) and wireless sensor network communication system. The proposed concept approach provides continuous reporting and monitoring of all boats and its exact locations for search and rescue process during emergency situations by mistake the fishermen try to cross the border first they will get audio announcement with special voice chip and another few minutes the boat will shutdown automatically. For any emergency situation the fishermen get help from control room by pressing SOS switch in boat, and also by using seismic sensor they get prior whether alert like tsunami etc.. The data collection unit consists of location detection components like GPS, transmitter and other components attached in the boat that accomplish the vessel localization by

collecting the geographical positions. The processing unit holds the set of latitude and longitude values of these in the form of databases that can be used for comparing the present boat position with legal border limits. The controlling unit resides in the sea shore (remote station) from where the decision has been made if the vessel crossed the maritime border. All the communication among these three units is handled by transmission unit..



**BLOCK DIAGRAM**

**1. Block of Fishermen's**



**MICRO CONTROLLER:** It is used to transmit the information with the GPS location to the monitoring station when are near to the International border and also alert the fishermen.

**GPS:** Used to give the exact position of the boat by giving out its latitude and longitude. Basic information like Location, Time, and Speed can be determined by any GPS receiver. Additional features like maps and navigation are also available on many commercial GPS receivers. The project uses a G mouse type GPS receiver that gives the location information as data. In the project GPS information is used to detect the present location and provide navigation assistance.

**ZIGBEE:** Used to do communication between the control room module and the fishermen units. Zigbee module is used in the project and it's frequency of operation is in the license free ISM band – 2.4GHz Distance of up to 100mts possible with the Zigbee module Is Zigbee compatible Maximum data rates of up to 250Kbps possible.

**Audio Amplifier:** The output from the voice processor is a low power signal. It is not sufficient to produce a voice output on a loud speaker. Hence a audio amplifier is used to increase the power level of the voice signals. The audio amplifier is used to amplify the audio output from the voice synthesizer. LM386 is used for audio amplification.

**2. Block of SEISMIC sensor Module:**



Its help to detect boat location and boat number and also help to give alert system for fishermen in versatile navigational aid, Weather updates, Emergency reporting on a boat.

**SAMPLE MARITIME BOUNDARY IN BAY OF BENGAL**

Border s B1 B2 B3

Boundary Values

*Latitude Longitude*

B1 10° 05'.0 N 80° 03'.0 E

B2 10° 08'.4 N 80° 09'.5 E

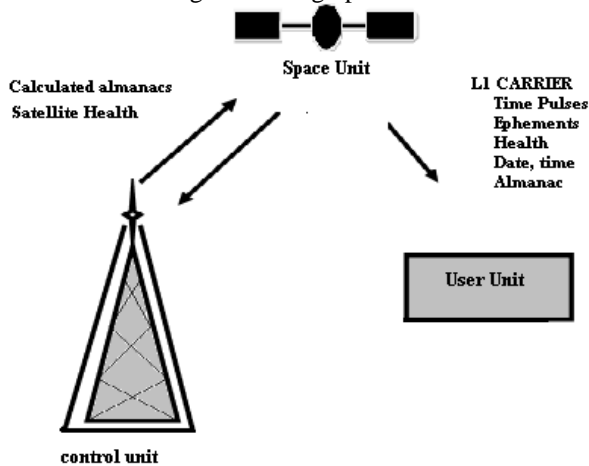
B3 10° 33'.0 N 80° 46'.0 E

Though the latitude and longitude value is retrieved through satellite, GPS device has the internal component for calculating exact location value based on the retrieved information from satellite.

**V. TECHNOLOGIES USED:**

**A. Global Positioning System (GPS)**

It is a space based satellite navigation system and radio navigation system that produces timing and location information in all climate conditions, nearby the Earth where there is an unobstructed line of sight to 4 or more Global positioning system satellites. The system produces critical capabilities to army, civil users and commercial users everywhere the world. The GPS RX receives the signals from GPS satellites that can only be used suitably in outdoors. Conventional receivers did not suitable for forest regions or metropolitan cities due to the buildings obstruction but the latest receiver designs have high performance.



**Other Components:**

Mechanical energy converted into electrical energy by DC motor. Principle of Lorenz force which states that when a wire carrying a current this will produce some magnetic field in a region the wire experience the force based on this DC motor will works & it give torque to coil to relate. When the Boat is nearer to the Border then a signal is generated and this signal reduces the back EMF of the motor of the boat using control system and then stops the rotation of the motor for preventing it from crossing the border area boundary. It also uses a SOS button for sending the emergency signals similar to the mobile phones to the control rooms and a multipurpose signalling switch for giving alert signals during the occurrence of accident or climatic and oceanographic changes.

**VI. AD-HOC NETWORK USING**

**COMMUNICATION:**

A *wireless ad hoc network (WANET)* is a decentralized type of wireless network. The network is ad hoc because it does not rely on a pre existing infrastructure, such as routers in wired networks or access points in managed (infrastructure) wireless networks. Instead, each node participates in routing by forwarding data for other nodes, so the determination of which nodes forward data is made dynamically on the basis of network connectivity. In addition to the classic routing, ad hoc networks can use flooding for forwarding data.

Wireless mobile ad hoc networks are self-configuring, dynamic networks in which nodes are free to move. Wireless networks lack the complexities of infrastructure setup and administration, enabling devices to create and join networks "on the fly" – anywhere, anytime. A wireless ad-hoc network, also known as IBSS - Independent Basic Service Set, is a computer network in which the communication links are wireless. The network is ad-hoc because each node is willing to forward data for other nodes, and so the determination of which nodes forward data is made dynamically based on the network connectivity. This is in contrast to older network technologies in which some designated nodes, usually with custom hardware and variously known as routers, switches, hubs, and firewalls, perform the task of forwarding the data. Minimal configuration and quick deployment make ad hoc networks suitable for emergency situations like natural or human-induced disasters, military conflicts.

Here, we are using the SPAN (Smart Phone Adhoc Network) for the establishment of wireless networks.

SPANs leverage the existing hardware (primarily Bluetooth and Wi-Fi) in commercially available smart phones to create peer-to-peer networks without relying on cellular carrier networks, wireless access points, or traditional network infrastructure.

**Advantages**

- ❖ It utilizes the currently existing and functioning radio system in the mainland and radio transmitter installed in all fishing boats.
- ❖ It harnesses the freely available GPS for location monitoring.
- ❖ The efficient combination of GPS and wireless ad hoc network remedies the fundamental limitation of sea to-land communications and the bottleneck of monitoring, search and rescue process

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- ❖ The short range ad hoc connection between neighbouring fishing boats is inherently more reliable and less susceptible to weather condition during disasters. As the result, this system increases the probability.

#### **Objective**

To construct and demonstrate a multi hop wireless network for marine applications small scale fishermen offering the following applications

- ❖ Versatile navigational aid
- ❖ Weather updates
- ❖ Emergency reporting on a boat

#### **Simulation Environment**

The simulation of this project has done with the help of PROTEUS simulation tool. Printed circuit board layout now offering automation of both component track routing and, placement getting the design into the computer can often be the most time consuming element of the exercise. This simulation tool helps in keeping and tracking of the record of a person during their travelling time on the sea.

#### **VII. CONCLUSION:**

In the conventional, the fishermen have to keep watch the maritime border, which cannot be easily separated as land region. If they crossed certain limit on the sea. They have to pay the penalty or got arrested by the naval guards of the neighbour country. The project generates alarm if they cross the border by mistake. With the simple circuitry and the use of sensors (low cost sensors) makes the project a low cost product, which can be purchased even by a poor fisherman. This project is best suited for places where the fishermen continuously monitor the boundary limit. This project also aims at solving relevant social problems with the appropriate use of satellite geographical location data for through wireless networking.

Our goal is to confront wireless networking with a concrete problem of worldwide dimensions, the sustainability of fishermen community are taken care by the simulation experiments. The simulation result shows the circuit level work is outperformed well that can be extended to circuit Fabrication in future. This paper will be used for advancement of coastal border averment. This also will give

sufficient process to both ship and coastal guardians, if anyone crossing the border. The process of routing the fishermen will make more efficient. The process of increasing the accuracy will be achieved greater in future. In future we have plan to adopt fish tracking system by fixing RFID active tag in to the fish for identify maximum fish location so that the fishermen get benefited.

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