Multi Purpose Marine Wireless Networks For Fisherman Aid And Other Applications

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ABSTRACT

The fishing is among the most dangerous of professions in the world over because once out on the sea, the fishermen are subject to various oceanographic and climatic conditions. Especially, so in the developing countries of South-East Asia, where fishing is a integral part of the economy, but there are no proper established systems for the safety of fishermen.

This 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 LCD display and a button which acts as a multi purpose signaling 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. Once this AD Hoc network is established, then the following applications will become possible.

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.

Distress management: If there is any accident or emergency situation 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, an weather warning can be provided to the fishermen from a costal station / from coast guard vessels.

Natural Calamity Warning: Once a network like that is in place, it can also be used for applications like Tsunami Warning using sensors that are planted on the ocean bed, and connected to a surface wireless transmitter.

Prevention of fishermen from crossing into international areas:

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.

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 LCD display and a button which acts as a multi purpose signaling 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. Once this AD Hoc network is established, then the following applications will become possible

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- Lack of communication between shipping boat.
- Inability to identify the border.
- Fishermen suffering in emergency cases.
- Could not carry heavy antenna in small fishing boat.

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 to central base stations.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

II. LITERATURE SURVEY

GPS-based Wireless Ad hoc Network for Marine Monitoring, Search and Rescue (MSnR T.D.Ta and T. D. tranelectronic and telecommunication Faculty University of Engineering and Technology

A GPS-based wireless ad hoc network is proposed for marine monitoring, search, and rescue applications in Vietnam. The network routing protocol and algorithm are evaluated using Network Simulator 2 software. The results indicate a success rate of packages transmission higher than 85% and show the great potential of the proposed concept.

Keywords-Ad hoc network, marine monitoring and searching, Global Positioning System (GPS)

. LITERATURE SURVEY AND LIMITATIONS OF CURRENT SYSTEMS

In Vietnam, there are two systems that are suitable for marine monitoring, search and rescue services. The operation as well as advantages and disadvantages of each system are summarized below.

COSPAS-SARSAT system is jointly sponsored by Canada, the Unites States, the Soviet Union and France. This project requires special purpose radio frequency transmitters,

i.e. Emergency Locator Transmitters (ELTs) and marine equivalent Emergency Position Indicating Radio Beacons (EPIRBs), which are automatically activated by aircraft or vessels during emergency and transmit distress signals to multiple low, near-polar orbits satellites. The signals received by the satellites are relayed to a network of dedicated ground stations where the location of the emergency is determined by measuring the Doppler shift between the satellite, with a precisely known orbit, and the distress signal.

MOVIMAR system is a joint project between Vietnam and Collecte Localisation Satellites (CLS), a worldwide leader of satellite-based environmental data collection, location and ocean observations by satellite of the French Space Agency [3]. With satellite images collected from Envisat, Radasat-1, and Radasat-2 (starting from July 2007), this project is going to provide continuous updated activities in the South China Sea to the Vietnamese government and its corresponding agencies and to help in the search and rescue process of missing boats and fishermen in case of natural disasters. This is again a satellite-based project, which provides the broadest and best coverage. While satellite access is provided by the French Space Agency via CLS, this solution requires a GPS receiver and a satellite transceiver with a large parabolic disk-antenna to establish a communication link. A full-satellite equipment is currently not affordable by most fishermen and its considerable size is not appropriatefor small fishing boats.

Ship Detection with Wireless Sensor Networks Hanjiang Luo,Student Member IEEE,Kaishun Wu Member IEEE, Zhongwen Guo Member IEEE

Abstract

Surveillance is a critical problem for harbor protection, border control or the security of commercial facilities. The effective protection of vast near-coast sea surfaces and busy harbor areas from intrusions of unauthorized marine vessels, such as pirates smugglers or, illegal fishermen is particularly challenging. In this paper, we present an innovative solution for ship intrusion detection. Equipped with three-axis accelerometer sensors, we deploy an experimental Wireless Sensor Network (WSN) on the sea's surface to detect ships. Using signal processing techniques and cooperative signal processing, we can detect any passing ships by distinguishing the ship-generated waves from the ocean waves. We design a three-tier intrusion detection system with which we propose to exploit spatial and temporal correlations of an intrusion to increase detection reliability. We conduct evaluations with real data collected in our initial experiments, and provide quantitative analysis of the detection system, such as the successful detection ratio, detection latency, and an estimation of an intruding vessel's velocity

DISTINGUISH BETWEEN SHIP-GENERATED WAVES AND OCEAN WAVE

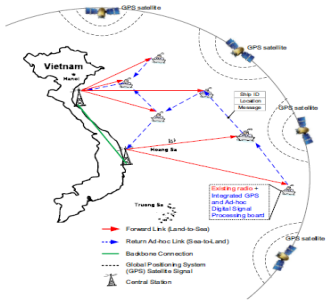
Ship Wave Patterns and Wave Dissipation

When a ship moves across a surface of water, it generates waves which comprise divergent and transverse waves as shown in Fig. 2. Kelvin found that V-shaped patterns were formed by two locus of cusps whose angle with the sailing line is 19_280 in deep water [7], and the angle between the sailing line and the diverging wave crest lines at the cusp locus line should be 54_440. Note that this pattern is independent of the size and velocity of the ship. When the ship's waves spread out sideways and propagate from the sailing line, both the height and energy of the waves decrease. The research in [15] pointed out that the transverse waves decrease inversely proportional to the square root of the distance from the vessel, which means that transverse waves decline much faster than divergent waves. In addition, when we observe ship-generated waves at a fixed spatial point, the ship-generated wave train has a limited duration

III. Proposed Solution

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. Weadopted wireless network using zigbee (operating frequency 2.405Ghz~2.480Ghz) for sending and receiving the infromation 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 fisermen 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 sesismic sensor they get prior whether alert like tsunami etc...

AD-HOC NETWORK USING COMMUNICATION



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 seato-land communications and the bottleneck of monitoring, search and rescue process
- 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

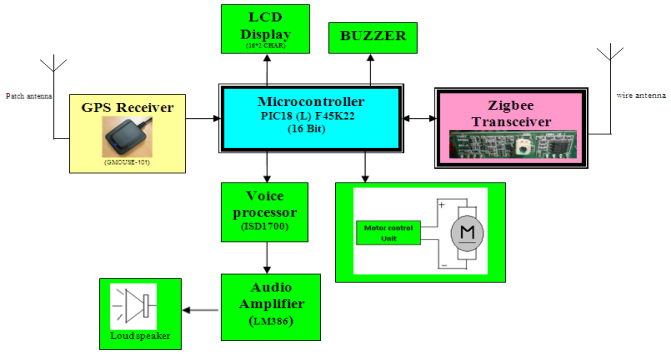
Objective

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

BLOCK DIAGRAM

1. **BLOCK OF FISHERMEN'S DEVICE MODULE**



MICROCONTROLLER-

It is used to transmit the information with the GPS location to the monitoring station when they 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. Created and operated by the USA DoD under the name NAVSTAR. Is a free system using which many geographic information can be obtained. Basic information like Location, Time, Speed can be determined by any GPS receiver. Additional features likes 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 assiatance

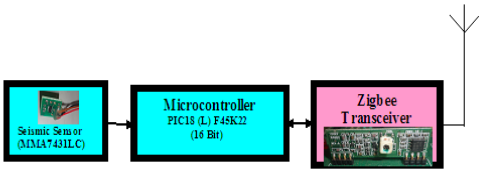
ZIGBEE-

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 ofup to 250Kbps possible Uses DSSCSMA/CA technologies for reliable communication

AUDIO AMPLIFIER-

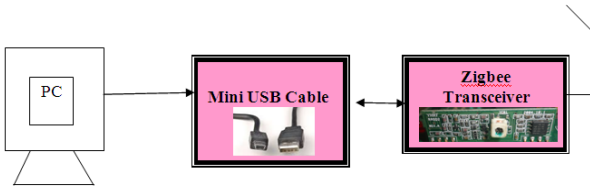
The output from the voice processor is a low power signal. It is not sufficient to produce a voice output on a loud speaker. Hence a audio amplifier is used to increase the power level of the voice signals. The audio amplifier is used to amplify the audio output from the voice synthesizer. LM386 is used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

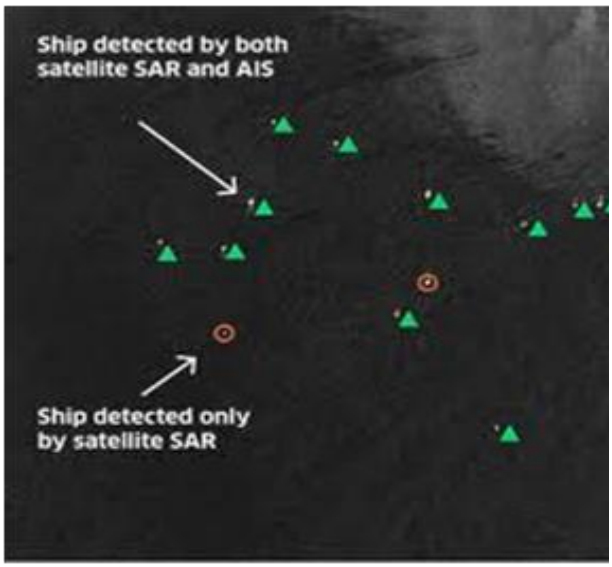
2. BLOCK OF SEISIMIC SENSOR MODULE



SEISMIC SENSOR- is a compact device which senses seismic shocks or earthquakes. The sensor's main component is a 3-axis accelerometer sensitive enough to detect a seismic event as small as 0.01G. The device automatically records the date, time, duration, and peak acceleration in each axis for up to 15 seismic events.

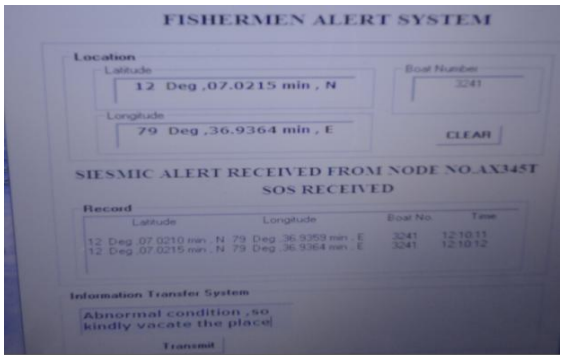
2. BLOCK OF CONTROL ROOM MODULE





OUTPUT

OUTPUT FOR SEISMIC SENSOR



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.

CONCLUSION

Using this project we protect the fishermen from daily facing problem.

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.

REFERENCES

[1] Z. Zhang, Routing protocols in intermittently connected mobile ad hoc networks and delay tolerant networks in Algorithms and Protocols for Wireless and Mobile Ad hoc Networks, A. Boukerche (Editor), Wiley, 2009, chapter 8

[2] H. Karl and A. Willig, Protocols and Architectures for Wireless Sensor Networks, Wiley 2005.

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[3] S. Basagni, I. Chlamtac, and V. R. Syrotiuk, A distance routing effect algorithm for Mobility (DREAM) in Proceeding of
MOBICOM 98, October 25-30, 1998, Dallas, Texas, USA.

[4] Table of working frequency for Vietnam Coastal Radio Stations
System.

[5] COSPAS-SARSAT: Search and Rescue Satellite System.

[6] MOVIMAR project.