International Journal of Scientific Engineering and Technology (ISSN : 2277-1581)
Volume 2 Issue 3, PP : 129-132 1 April 2013

Deep Sea Fishermen Patrol System for Coastal Intruder Positioning

S. Mani Sundar, M. Hariharan

Department of Electronics & Communication Engineering,
Jaya Engineering College, Prakash Nagar, C.T.H Road, Chennai-602024.
smanisundar@gmail.com, hariharan18101984@gmail.com

Abstract— ***This paper introduces a design which deals with an innovative handheld device which would transform the fisherman community as the eyes and ears of the Indian Coastguard. Upon sighting an intruder or poacher, the device allows fisherman to calculate its exact location using the integrated GPS receiver, and radiates the information to the nearest coastguard station via GSM communication. The coastguard is then able to dispatch a patrol boat to intercept the intruder. The device would also warns the fisherman (beep and vibrate) when they approach near the national sea border and controls them to trawl (go fishing) within the correct region safely. Community surveillance allows the coastguard to patrol efficiently because they could go only on an alert call and not to patrol at random.***

Keywords— Integrated GPS Receiver, GSM-assisted Community, TFT Touchscreen Display, GUI interface, Digital MEMS Compass Module, Cooperative Localization

I.INTRODUCTION

The Indian Coastguard was formally inaugurated on 18 august 1978. It is set as an independent armed force of the Indian Union, through an act of parliament. It is the fourth armed force under the Ministry of Defence- the first three being the Army, the Navy and the Air Force. It has a specific character for non-military security but addresses to National Defence. It normally deal with marine safety, maritime security, lifesaving, law enforcement, maritime environmental security and fisheries. These call for monitoring, control, surveillance and response. The Coastguard has multiple responsibilities and strengthening the safety of fishers. Fishers are vulnerable to disasters of several kind-accidents, casualties, abduction, and alien interventions. The Indian coastguard cannot assist fishers exclusively but concern for fishers is central to its aims.

The strategic role of the Coastguard is to protect the maritime zones from illegal activities including infiltration through maritime routes and environmental damage and provide humanitarian and scientific assistance within the maritime domain.

The Indian Coastguard too has its exclusive duties and functions as spelled out in the Coastguard Act 1978, include

- Safety and protection of islands and offshore structure
- Protection and preservation of maritime environment and endangered species
- Prevention and control of pollution in maritime zone
- Assistance to the customs in anti-smuggling operations
- Assistance to fisherman in distress at sea
- Safeguarding life and property at sea
- Preventing poaching in Indian water
- Assisting in ocean research
- Enforcing maritime law

Even though we have this much of coastguard security, all things happening opposite to our thinking. Indian Coastguard has openly admitted its failure in failure in preventing Mumbai attack even after getting a warning from intelligence sources prior to the attack. This clearly shows that our sea defence is weaker than we believe. The foreign trawler easily overcoming our coastguard security force.

Every day we hearing news about fishermen killed or imprisoned when they cross the national sea border inadvertently. The most outstanding problem is being going on for transborder fishing i.e., on the Indo-Srilankan border. Here two distinct issues are arising. First is the movement of Indian boats into Srilankan water without any intimation or prior information that they crossed the border area. Historically there is no border problem which is being raised and fixed in 1974 and having no conflicts till civil war in 1983. After this both country authorities restricted due to security concern. After that restriction also, smaller scale fisherman undergo for fishing and get attacked. In India, they have always been at loggerheads with the trawls fleet. So going

beyond that limit to catch fish is being done by our fisher and got the punishment either death or severe injuries.

Also when fishermen sight a foreign trawler poaching in their fishing grounds, they watch helplessly, sometimes trying to fight resulting in injuries and death. The trawler would often leave without fear of penalty. Poaching is getting a serious problem since this would cause environmental crisis in coastal zones.

This all happening in governance of our coastguard force only. Daily we get news about the happenings being going on in coastal areas. Many fishermen get injuries and even to death only because of the insecurity. Proper steps should be taken out in favour of our fishermen to have independent freedom with prior security to protect them.

Here many effective measures can be taken out to reduce these accidents. Most effective solution would be to reduce the trawler fleet on the Indian Side. This can be done easily now. We are going to design a new device that would help to remove all these problems.

We expect our device with GPS tracking and our concept of GSM-assisted community patrols will prove successful in India and elsewhere in the world. We are sure that this technology will benefit the poor fishermen and protect the coastal environment.

The safety being carried out by this device will take out a good name for the Indian Coastguard. They can easily overcome the problems that they are facing now-a-days. Everyone fingering Indian Coastguard force whenever some problems happen. So to overcome and protect everyone without any harm, this device is very helpful.

II. EXISTING SYSTEM

Initially the utility of wireless networks for any applications is increased if the locations of the nodes in the networks can be tracked based on the measurements between communicating nodes. Thus for many applications, such as tracking fire fighters in large buildings, require the deployment of mobile ad-hoc networks.

Wireless networks are ubiquitous and utilized for a wide range of applications, and for many applications, it is valuable to know the locations of nodes. In sensor network deployments, sensor data needs to be tagged with sensor location. "Cost and power restrictions, however, often prevent the use of satellite based systems such as the Global Position System (GPS) to locate the nodes". Mobile Ad-hoc Networks (MANETS) can be deployed for providing communication to fire fighters in building or to miners in underground mines. "Cooperative Localization" is a relatively recent concept that attempts to measure the range between mobile nodes in addition to the measurements between mobile and anchor nodes. The challenge in cooperative localization is that a mobile node can be multiple hops away from most or all of the anchor nodes and hence, they cannot be localized using single hop localization algorithms.

Figure 1 shows a sample diagram indicating the mechanism occurring for cooperative tracking held with the help of anchor nodes indicated by Star "*", and mobile nodes indicated by "o".

The mobile nodes are communicated with the satellite through the connection held between mobile nodes and anchor nodes. With the communication between these two nodes, the position is being tracked and localized.

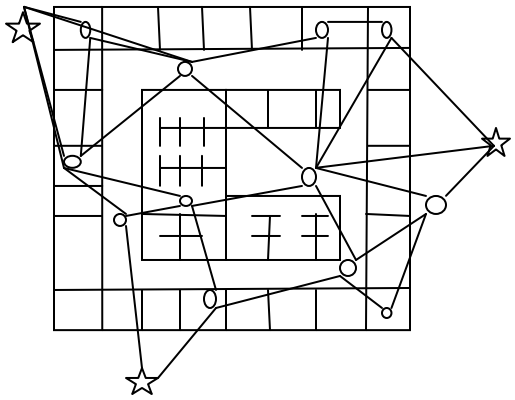

Fig.1. A motivating scenario for cooperative tracking (☆ Denotes Anchor node and o denotes mobile nodes)

So the use of GPS is not possible, since it is not available in these environments. So the tracking gets lack without the presence of GPS. Cooperative Localization gets failure in communicating the anchor and mobile nodes in order of time domain. Satellite view is the only option for the coastguard station. They view overall through the information send by the satellite.

No preliminary alert is there to avoid the problem. Only after the occurrence, the recovery force is being sended off. Many live's has been ended up by this way.

Community surveillance allows the coastguard to patrol at any call or problem occurrence only. Only the position data can be provided by the module.

There is no accurate direction sensing. It senses through earth magnetic field which indicates the directions in only one direction.

III. PROPOSED SYSTEM

The proposed method has the following steps to be followed as in the block diagram as shown in fig.2

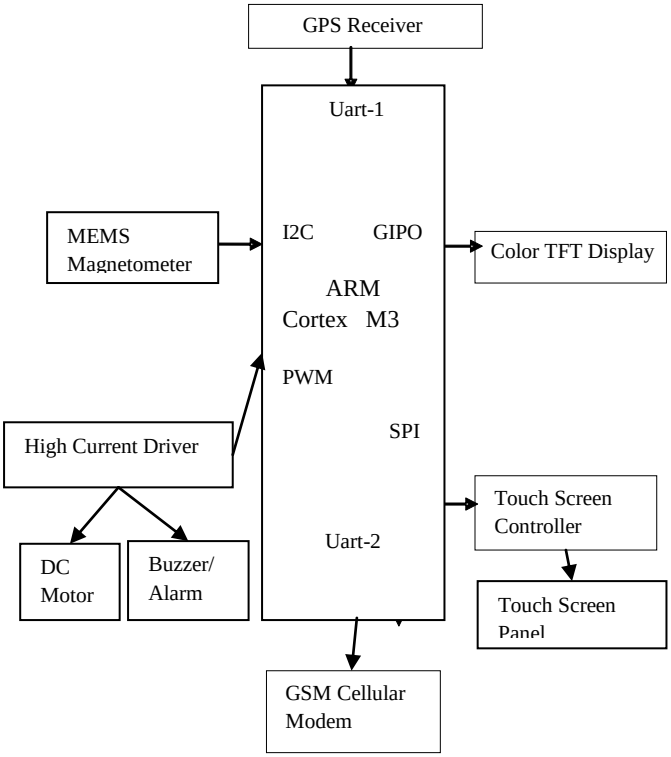

Fig.2. Block diagram

GPS Coastguard is used to alert the coastguard when an intruder or poacher is found within the protected sea water using an innovative technology. It also warns and prevents the fishermen in not crossing the national sea border.

Here according to the diagram above, the operation is being done with the help of two satellites region:-

(i) Communication Satellite

(ii) Global Positioning Satellite

Through these two satellites, the operation of the system is done. Here we are taking an innovative handheld device which would transform the fisherman community as the eyes and ears of Indian Coastguard. Upon sighting an intruder or poacher,

- The device allows fishermen to calculate its exact location using location using the integrated "GPS receiver", and
- Radio the information to the nearest coastguard station via "GSM communication".

The coastguard is then able to dispatch a patrol boat to intercept the intruder. The device would also warn the fishermen (beep and vibrate) when they approach near the National sea border and controls them to trawl (go fishing) within the correct region safely.

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

Working:-

- Upon sighting an intruder or poacher, the fisherman enters the distance and direction of intrusion using the GUI interface displayed on the TFT Touchscreen Display.
- The intruder position is calculated by combining this data with the known position of the fishermen device using the integrated GPS receiver.
- The resulting intrusion location (approximate) will be sent to the nearest coastguard station via GSM communication. The coastguard could then be able to dispatch a patrol boat to intercept the intruder.
- The device warns the fishermen (beep and vibrate) when they approach near the National sea border and controls them to trawl (go fishing) within the correct region safely.

- This involves monitoring boat location using GPS and the boat direction using a Digital MEMS Compass Module. If they cross the sea border, it will send a notification SMS using GSM to the coastguard and fishermen authority.

Peripheral description:-

- LPC1114 is a 32-bit ARM Cortex-MO microcontroller from NxP semiconductors.
- Touchscreen TFT Display with 320*240 resolution and 65k colors acts as the GUI interface.
- GPS module for location tracking and GSM module for sending intruder alert SMS.
- A 6-DOF MEMS Compass that is a combination of 3-axis MEMS accelerometer and a 3-axis MEMS magnetometer is used to find the direction of travel of the fisherman boat/ship.
- A Piezo-buzzer and Vibrating motor to warn the fishermen while approaching borders.

IV.CONCLUSION

GPS Coastguard is used to alert the coastguard when an intruder or poacher is found within the protected sea water area using an innovative technology. It also warns and prevents the fishermen in not crossing the National sea border.

This approach describes the intruder positioning is being implemented with the help of GPS by integrating the code given by it and the code generated in ARM microcontroller through timer.

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Mr. S. Mani Sundar received his B.E (Electrical and Electronics Engineering) degree from S.K.P Engineering College, Anna University in April 2011, and currently pursuing his M.E (Applied Electronics) degree from Jaya Engineering College, Anna University. His areas of interest are embedded system, Transmission and Distribution, and Control Engineering

Mr. M. Hariharan received his B.E (ECE) degree from Jayam College of Engineering and Technology, Anna University in 2006 and also received his M.E (Communication System) degree from Kumaraguru College of Technology, Coimbatore in 2008. Now he is working as an Assistant Professor in the department of ECE in Jaya Engineering College, has a teaching experience of 5 years. His areas of interest are DIP, DSP and Communication System. He presented his papers in 3 National Conferences.