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ARM BASED FISHING BOAT SECURITY SYSTEM

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Abstract: In this research paper, the proposed concept is to safeguard the uneducated fisher men crossing the border and guides them to go in a right path and save their life. Our proposed idea helps in locating the Fishing boat using GPS system. This information is transmitted using wireless mode to the control system. Then by detecting the latitude and longitudinal location of the Fishing boat, the control system detects the present area of the Fishing boat and send command signal to the Fishing boat using wireless mode to guide the vehicle if the boat is out from the border. The GPS system is the latest technology which helps us in identifying the Fishing boat either inside or outside the border. The ZIGBEE technology also helps us to communicate from both the ends i.e., the control system and Fishing boat. Hence with the both improved technologies, it can be saved the human life from danger. GPS is used in this system to monitor the boat position anywhere in the sea. In other words, the GPS unit simply measures the travel time of the signals transmitted from the satellites, then multiplies them by the speed of light to determine exactly how far the unit is from every satellite its sampling. GPS receiver receives the boat position with the help of latitude and longitude from satellite through GPS antenna and sends the information to the microcontroller. Microcontroller displays the latitude and longitude on the LCD display. Then information signal is transmitted through ZIGBEE. Similarly the wind speed also calculated using anemometer. All the information related to the process is sent to the Microcontroller unit and the process takes place. Microcontroller is pre-programmed in such a way to undergo the process. Similarly tsunami alert is sent to the boat from the controller section through the ZIGBEE transmitter.

Keywords: ARM,GPS module, DC motor and ZIGBEE.

I.INTRODUCTION

Navigation technology is a branch of autonomous intelligent systems, which is steadily gaining in importance and is being recognized by government, funding agencies and industry. Development of effective tools to assist commercial vessels in navigating safely through waterways is vitally important for global commerce. A study gathered in this paper aims to build an autonomous intelligent system to assist group-wise vessel navigation in the open sea and sends the current location of a particular boat to the control station. Specifically, this paper presents a progress ongoing research effort that makes use of a system designed to safe the fisherman from crossing the boundary. This proposed research paper entitled “Fishing boat security system using arm” is very much helpful in preventing the fisher men from crossing the boundary. Previously projects have been implemented only to locate the location of the boat using GPS. The proposed system identifies the location of the travelling boat and alerts the boat itself if it nears the boundary and also passes information to control section when it almost nears the boundary.

II. LITERATURE SURVEY

Kawaguchi akira *et al* [1] This paper deals with a marine traffic simulation based on an autonomous ship cluster behaviour model in which each vessel's manoeuvring decision is made by taking into consideration of four independent forces that act on it, namely, goal attainment, centripetal, collision avoidance, and following forces. The compositional force, which determines each vessel's behaviour, is calculated based on the four forces with a specific weight function for each. The weight functions in the present paper were designed so that (1) they could reflect ship operators' individual differences with respect to safety precaution by introducing smooth, non-linear curves, and (2) the same simulation result could be obtained when the ratio of the outputs of these four functions were the same. The ranges of the simulation parameters were determined so that they would reflect realistic ship operation environment. Nine thousand and six hundred cases were simulated varying the number of ships, initial interval between ships, weights of the centripetal, collision avoidance, and following forces. The influences of the simulation parameters on the mean distance between ships, the collision ratio, aspect ratio and the collision limit parameter region are discussed. The results should contribute to an optimal parameter setting for the ship cluster behaviour simulator to be built in the future.

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Kondo hayato *et al* [2] This paper presents a simulation study of the characteristics of obstacle avoidance and passage navigation by multiple ships forming a group. To make this possible, They added two new forces, i.e. obstacles avoidance force and scrape avoidance force to the previous model that only had four independent forces, i.e., goal attainment, contracting, expanding, and cluster collision avoidance forces. In this new model, manoeuvring decisions of ship agents are computed by combining the above-mentioned six independent forces. The weight for obstacle avoidance force was determined based on the behaviour characteristics of a single ship case. The simulation results revealed that collisions occur immediately before ships reach, and immediately after they have avoided an obstacle in case of avoiding an obstacle. When navigating through a passage, collisions occur immediately before and after entering a passage, and shortly after ships have left a passage. It is also discussed that the time change of the cluster's emergent characteristics (mean distance, cluster configuration keeping ratio, number of collisions, aspect ratio) in passage navigation, the effect of passage width on the cluster width, and the impact of way point location in entering a passage.

Akaira kawaguchi *et al*[3] The aim of this research is to realize a computerized, intelligent, and an autonomous system to support navigation for multiple ocean-going vessels that share the same sailing course like a transport convoy. Detecting and evading other clusters in close proximity is one of the most important tasks in navigation as contacting these will potentially cause serious risks to the ship. Focus of this paper is to investigate computational capabilities added to the so-called ship cluster behaviour model of our previous work. Enhancement is made to predict a risky situation and to guide for multiple ship clusters, enabling them to move safely and avoid contact with each other. Such improvement is critical, especially when the traffic becomes congested with a number of clustered ship groups moving to distinctive directions. Foundations for and preliminary experimental results of this study are presented.

Wang *et al*[4] This Chapter briefly describes both the offshore safety case approach and formal safety assessment of ships. The current practices and the latest development in safety assessment in both the marine and offshore industries are outlined. The relationship between the offshore safety case approach and formal ship safety assessment is described and discussed. The study of risk criteria in marine and offshore safety assessment is carried out. The recommendations on further work required are finally given.

III. SYSTEM ANALYSIS AND ITS PROCESS

A .OVERVIEW OF EXISTING SYSTEMS

In the existing system of the project, GPS is used to monitor the boat position anywhere in the sea. The boat which wants to monitor has to have the GPS sensor. The GPS sensor consists of GPS antenna and GPS receiver. GPS uses satellite ranging to triangulate your position. In other words, the GPS unit simply measures the travel time of the signals transmitted from the satellites, then multiplies them by the speed of light to determine exactly how far the unit is from every satellite its sampling. By locking onto the signals from a minimum of three different satellites, a GPS receiver can calculate a 2D (two-dimensional) positional fix, consisting of your latitude and longitude. GPS receiver received boat position latitude and longitude from satellite through GPS antenna. GPS receiver is interfaced with the microcontroller through RS232 converter. RS 232 converter is used to convert RS232 logic to TTL logic vice versa because GPS receiver is the RS232 logic and microcontroller is the TTL logic. Then the receiver sends the received signal to microcontroller. Then position information signal is transmitted through GSM network or mobile. The mobile is interfaced with the microcontroller through data cable. Data cable is the special type of cable which is available with mobile phone. In the receiver section the mobile or GSM network is interfaced with PC. In PC we can monitor the boat current position on the earth.

B. DISADVANTAGES OF THE EXISTING SYSTEM

- The existing system, traces out only the position of the system and produces an alarm indication.
- No longer do you need to carry a map around with you when exploring a town by car or hiking in an area that you are unfamiliar with. Instead, there are Global Positional Systems, known as GPS that can help you find your location and the area you are attempting to travel to.
- These GPS devices can be mounted in cars, boats or can even be handheld devices. Before you rush out and get a GPS device, however, here are some of the disadvantages to consider.
- Purchasing a GPS based on price can be a major disadvantage. If you purchase a "bargain GPS," you will get what you pay for, and features such as traffic and up-to-date maps could be lacking.
- GPS devices are limited by having clear access to the satellites that provide the tracking. In locations with tall buildings or sparse coverage, reception can be poor.

C. AUTOMATIC IDENTIFICATION SYSTEM

The automatic identification system (AIS) is an automatic tracking system used on ships and by vessel traffic services (VTS) for identifying and locating vessels by electronically exchanging data with other nearby ships and AIS Base stations.

AIS information supplements marine radar, which continues to be the primary method of collision avoidance for water transport. Information provided by AIS equipment, such as unique identification, position, course, and speed, can be displayed on a screen or an ECDIS.

AIS is intended to assist a vessel's watch standing officers and allow maritime authorities to track and monitor vessel movements. AIS integrates a standardized VHF transceiver with a positioning system such as a LORAN-C or GPS receiver, with other electronic navigation sensors, such as a gyrocompass or rate of turn indicator.

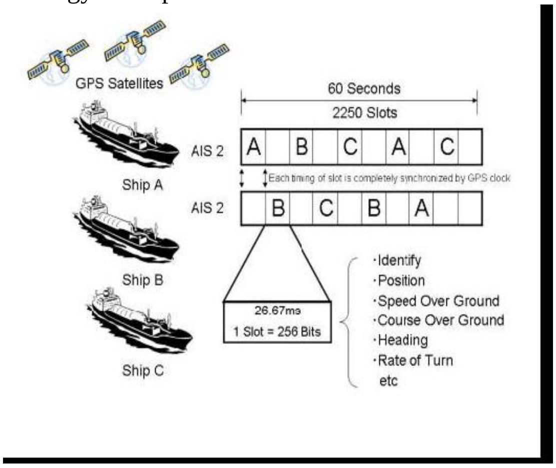

Fig.1 Schematic diagram of AIS

Vessels fitted with AIS transceivers and transponders can be tracked by AIS base stations located along coast lines or, when out of range of terrestrial networks, through a growing number of satellites that are fitted with special AIS receivers.

IV. APPLICATIONS AND LIMITATIONS

A. COLLISION AVOIDANCE

AIS was developed to avoid collisions among large vessels at sea that are not within range of shore-based systems. Due to the limitations of VHF radio communications, and because not all vessels are equipped with AIS, the system is meant to be used primarily as a means of lookout and to determine the risk of collision rather than as an automatic collision avoidance system, in accordance with the International Regulations for Preventing Collisions at Sea. A vessel's text-only AIS display, listing nearby vessels' range, bearings, and names. When a ship is navigating at sea, information about the movement and identity of other ships in the vicinity is critical for navigators to make decisions to avoid collision with other ships and dangers (shoal or rocks). Visual observation (e.g., unaided, binoculars, and night vision), audio exchanges (e.g., whistle, horns, and VHF radio), and radar or Automatic Radar Plotting Aid are historically used for this purpose. These preventative mechanisms, however, sometimes fail due to time delays, radar limitations, miscalculations, and display malfunctions and can result in a collision. While requirements of AIS are to display only very basic text information, the data obtained can be integrated with a graphical electronic chart or a radar display, providing consolidated navigational information on a single display. Recent regulations have mandated the installation of AIS systems on all Safety Of Life At Sea (SOLAS) vessels and vessels over 300 tons.

B. MARITIME SECURITY

AIS enables authorities to identify specific vessels and their activity within or near a nation's Exclusive Economic Zone. When AIS data is fused with existing radar systems, authorities are able to differentiate between vessels more easily. AIS improve maritime domain awareness and allows for heightened security and control. Additionally, AIS can be applied to freshwater river systems and lakes.

C. AIDS TO NAVIGATION

AIS was developed with the ability to broadcast the positions and names of objects other than vessels, such as navigational aid and marker positions and dynamic data reflecting the marker's environment (e.g., currents and climatic conditions). These aids can be located on shore, such as in a lighthouse, or on water, platforms, or buoys. The U.S. Coast Guard has suggested that AIS might replace racon (radar beacons) currently used for electronic navigation aids.

The ability to broadcast navigational aid positions has also created the concepts of Synthetic AIS and Virtual AIS. In the first case, an AIS transmission describes the position of a physical marker but the signal itself originates from a transmitter located elsewhere.

In the second case, it can mean AIS transmissions that indicate a marker which does not exist physically, or a concern which is not visible such as submerged rocks or a shipwreck. Although such virtual aids would only be visible to AIS-equipped ships, the low cost of maintaining them could lead to their usage when physical markers are unavailable.

V. RANGE LIMITATIONS AND SPACE-BASED

Shipboard AIS transponders have a horizontal range that is highly variable, but typically only up to about 74 kilometres (46 mi). They reach much further vertically – up to the 400 km orbit of the International Space Station (ISS).

A.TYPE TESTING AND APPROVAL

AIS is a technology which has been developed under the auspices of the IMO by its technical committees. The technical committees have developed and published a series of AIS product specifications. Each specification defines a specific AIS product which has carefully created to work in a precise way with all the other defined AIS devices, thus ensuring AIS system interoperability worldwide. Maintenance of the specification integrity is deemed critical for the performance of the AIS system and the safety of vessels and authorities using the technology. As such most countries require that AIS products are independently tested and certified to comply with a specific published specification. Products that have not been tested and certified by a competent authority, may not conform to the required AIS published specification and therefore may not operate as expected in the field. The most widely recognized and accepted certifications are the R&TTE Directive, the U.S. Federal Communications Commission, and Industry Canada, all of which require

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independent verification by a qualified and independent testing agency.

VI. HARDWARE DISCRIPTION

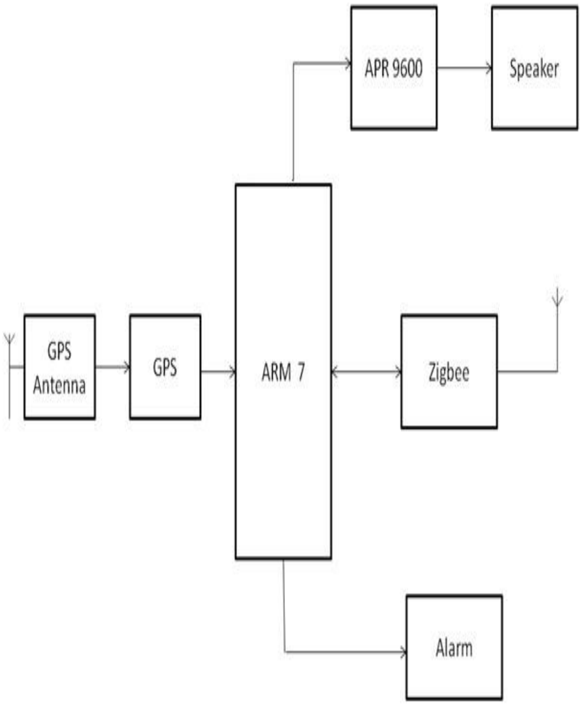

Fig.2 Block Diagram of Boat Section

The proposed system of this paper is GPS system indicated the Fishing Boat position in sea, and by the help of GPS it is provided in the ship position in sea, border crossing warning and warning alert for fisherman. The GPS antenna and receiver detects the current location of fishing boat i.e., the latitude and longitudinal value is received by the GPS module from the satellite, and this information is sent to the ARM Processor. The Processor is programmed to get the GPS value information. This latitude and longitude value is send serially to the ZigBee transceiver, from which ZigBee information is obtained using wireless mode. Also this unit consists of Alarm and Voice IC with speaker which is controlled from the control unit.

The Voice IC is APR9600, in which eight different commands can be recorded and playback. This unit consists of other ZigBee transceiver to receive the Fishing boat location. The microcontroller is programmed to receive the location information and the latitude and longitude value is displayed in LCD display. By detecting the location of Fishing boat the control unit send commands through keypad to the microcontroller if the Fishing boat is in dangerous location. When the signal is received by the controller in the Fishing boat section, the Fishing boat is alerted through buzzer alarm, and also the path is announced in the speaker through Voice IC to guide the Fishing boat in a right path.

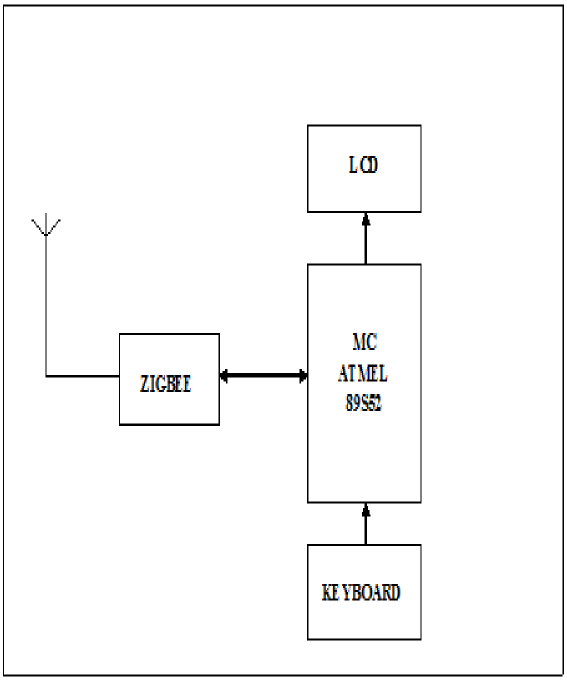

Fig.3 Block Diagram of Control Section

The block diagram represents the circuit placed in the control section consisting of ARM7, ZIGBEE modem and antenna ,LCD and keyboard.. The control section monitor the location of boats and alerts them first and then prevents them from crossing the boundary .

BENEFITS OF PROPOSED NOVEL SYSTEM

- The system grants adequate safety for the tourists.
- Integrate Passenger Information Systems inside the Boat.
- GEO-FENCES to define the Boundary of operations can easily be monitored.
- MIS reports help in measuring the performance of the Crew.
- Increases the Tourism Revenue by obtaining actual information.

VII. CONCLUSION

In first phase we have compared the existing system and studied various journals regarding the technologies used. The requirements have been analysed and the block diagram of both the boat section and the control section were designed. A part of the proposed concept was simulated. In the second phase we have added features such as automatic turn off of boat engine hen trying to cross the border, identification of tides, Tsunami and emergency buzzer in addition to the location of the position of boat and intimating the crossing of boundary, making the system more efficient. By implementing this proposed concept e can safeguard the uneducated fisher man crossing the border and get shot dead. The future work to be implemented is the temperature to be notified and the ice bergs using the UV rays to be pre-detected

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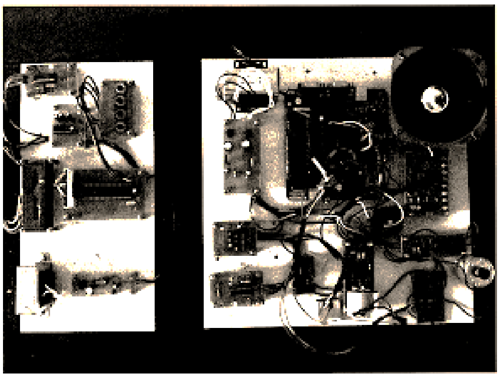
before 1km. And also to implement the water level under the sail to be measured using the sensor.

VI. IMPLEMENTATION MODEL OF PROPOESD SYSTEM



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