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IMPLEMENTATION OF EMBEDDED SYSTEM FOR DETECTING WHIRLPOOL GIANT WAVES AND TO CONTROL CRITICAL BORDER CROSSING USING SATELLITE COMMUNICATION

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Abstract

This generous of paper presents how the protection of fishermen from the abnormal weather, shooting and arresting by the other country navy. An Embedded technology which uses gyroscope and accelerometer, Arduino ATMega328T microcontroller, motor, buzzer, display and SIM card can avoid this. The whirlpools are formed due to the collision of hot and cold waves in sea. This causes the boat to lose its stability and will force the boat to change its direction. The gyroscope and accelerometer sensor used to sense the change in direction. The sensor sends the signal to

the arduino microcontroller which will automatically sends alert signal to the naval basal shore using satellite communication. Another overcome for protecting the acquitted fishermen from crossing the boundary. Three boundaries of borders were taken. Last boundary will be the border between two countries and other two border before that comes under parental country border. Fishermen alerted by caution devices such as buzzer and LCD display.

***Index Terms*:**Fishermen, Sea border, GPS, GSM, Arduino microcontroller,Gyroscope and accelerometer, motor, buzzer, display and SIM card.

1 INTRODUCTION

In modern world, satellite communication are significant current research subject in the world. It is a combination of devices with arduino microcontroller for monitoring environmental condition through a sensing devices such as gyroscope and accelerometer. A gyroscope is a device used for measuring angular orientation in the boat in six axis direction on the basis of angular momentum. An accelerometer is an electromechanical device that will measure linear acceleration of the ship in three orthogonal axis based on vibration. To sense motion of ships in multiple direction, an accelerometer must be designed with multiaxis sensor. It is used to measure motion in three dimension. Gyroscope sensor is used to provide tremendous facilities in aircraft instruments such as altitude compass and turn coordination. Whereas accelerometer gives user a direction of gravity in an aircraft. GSM is used for the transmission and reception of signals of the fishermen and fishermen boat to the naval station. GPS is a radio navigation system that maps the location of the fishermen boat on the particular longitude and latitude.

2 MAPPING OF LOCATION

Positioning is a crucial once the fishermen boat or ship is riding within the ocean. Fishermen might not have the data concerning the border space and theres the possibility of crossing the border. So they might be assaulted or captured by the claimed association

of other nation naval force. It can be prevented by using this engaged technological innovation which uses the GSM and GPS. GPS is inspired by target tracking in army and fast programs. For positioning there are wide range of techniques and algorithms but in the realm of sea based locations, that has been recommended for a close by node. There are several key problems may occur during positioning such as,

- Positioning is more essential for accuracy.
- More protection.
- Complexity in hardware and software.
- High cost
- Problem in wide variety of protection.

To overcome those problem an embedded technology is designed for security with low cost in real time environment. The latitude and longitude information of a fishermen are provided by a GPS on the fishermen boat. The information provided by the GPS is sent to the naval base station On- shore rescue team through satellite communication.

3 IMPLEMENTATION OF FUNCTIONAL BLOCK

The diagram shows an embedded technology comprises of GSM and GPS, gyroscope and accelerometer, arduino ATmega328T microcontroller which are embedded with various components like motor, switches, buzzer and a LCD display. The motor can be controlled with the help of relay operation. The marine borders are divided into three zones Z1,Z2 and Z3. Z3 is the border between two nations while Z1 and Z2 are parental border.

4 BLOCK DIAGRAM REPRESENTATION

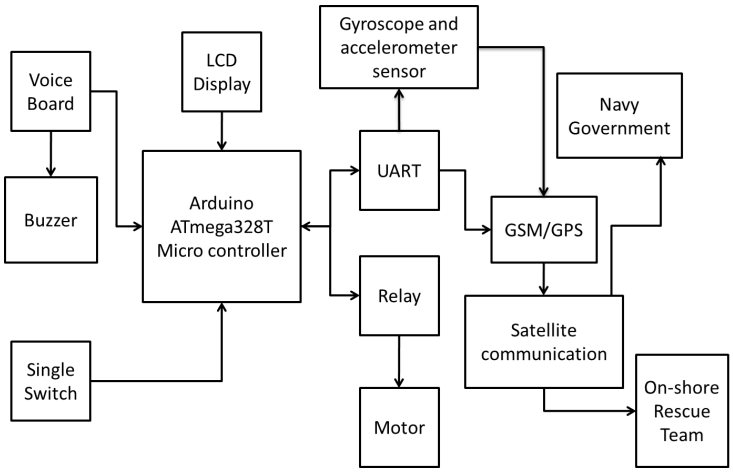

Fig.1 Block diagram

The gyroscope and accelerometer sensor present in the embedded system sense the angular orientation of the ship periodically. Whenever the angular orientation of the boat exceeds the threshold value the signal sends to the GPS by arduino microcontroller through UART. The position of the boat is acknowledged to the naval sea shore and on-shore rescue team. The motor is controlled with the help of relay operation.

When the boat crosses the first two border it will alert with warning signal through a caution device such as buzzer and LCD display. When the boat crosses final boundary the motor of the boat turns automatically by the tripping operation of relay. After a certain time, arduino sends a command signal for changing the polarity in DC motor for reverse operation.

5 COMPONENTS USED

A. GPS MODEM

Global Positioning system is most popularily used in mobile phones for enabling the subscriber for finding the particular location in the world in all weather condition. It is a network of satellite

orbiting the earth at an altitude of 20,000Km. GPS receiver pinpoints our location by a trilateration technique. Initially, they are used for military purpose. Now, they are using for object tracking, tine and speed calculations of automobiles. The major advantage of GPS is no subscription fees to use GPS. There are essential two types of GPS in automobiles. They are In-dash and portable GPS.

B. GSM MODEM

GSM Modem RS-232 works on frequency 900/1800MHz. GSM is a basic standard for mobile communication. RS-232 interface allows to connect to PC as well as microcontroller with RS232. With the use of modem you can make audio call, SMS, attending the incoming call through AT commands.

MODULE NAME: SIM900A
PRODUCT DESCRIPTION:.

1. Dual band GSM/GPRS 900/1800MHz.
2. RS232 for direct communication.
3. Configurable baud rate.
4. ESD compliance,
5. Input voltage: 12V DC.
6. With slit in SIM Card tray.
7. Power control using 29302WUIC.

C.GYROSCOPE AND ACCELEROMETER:

Gyroscope and accelerometer are interfaced UART to send and receive the information about the stability of the fishermen boat through satellite communication. It uses MEMS technology to solve automotive stability problem to avoid accident. Acclerometer is used to provide both static and dynamic acceleration.

6 HOW IS THIS POSSIBLE?

In the field of sea transport the main problem caused is because of the abnormal environment conditions caused by the sea waves and the whirlpools formed because of the collision of the hot and cold

waves.This causes the boats to loose its stability and will force it to change its direction. At that time the sailor will have to suffer in order to bring the boat to his control and to maintain make the boat to run in desired direction. So in this project we will be making a system which will sense the presence of the whirlpools and giant waves heading in front of boat are making the boat to lose its stability.The sensor used here is the gyroscope and accelerometer which will sense the change in direction and sends the signal to microcontroller which will automatically send the alert message to the naval base at the shore regarding the emergency situation of the boat in sea using the satellite communication.The main parts used in this system is gyroscope sensor, microcontroller and the communication medium to communicate with the naval base at the shore. The protection of innocent fishermens from the shooting and arresting by the other country navy. Embedded technology which uses GSM (Global System for Mobile) and GPS(Global Positioning system).There are three boundaries of borders taken.Final state boundary will be the border between the two countries,other two borders before that comes under the parental country circumstances. First two border crossing will be monitored by Indian government. The fishermens are warned by the warning devices such as speaker (a buzzer) and an LCD display.If warning system fails there is another option. While crossing third border, the motor in the boat turns off automatically. Now Information about the fishermens will be acknowledged to both the government.

7 RESULT OF THE SYSTEM

When the gyroscope and accelerometer of the fishermen boat exceeds the threshold value it gives a sensing signal to the arduino microcontroller by these the status of the ship is sent to the naval base shore via., information of latitude and longitude. Unknowingly,when the fishermen crosses international border embedded system alerts with a buzzer and information sent to the naval base station.

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