Design and Implementation of GPS Based Border Alert and Identification System for Fishermen

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Abstract— In day-to- day life we hear about many Tamil fishermen being caught and put under srilankan custody and even killed. The sea border between the countries is not easily identifiable, which is the main reason for this cross border cruelty. Here we have designed a system using embedded system which protects the fishermen by notifying the country border to them by using Global Positioning System (GPS) and Global system for mobile communication (GSM). We use GPS receiver to find the current location of the fishing boat or vessel. Using GPS, we can find the current latitude and longitude values and is sent to the microcontroller unit. Then the controller unit finds the current location by comparing the present latitude and longitudinal values with the predefined value. Then from the result of the comparison, this system aware the fishermen that they are about to reach the nautical border. The area is divided into four zones- normal zone, warning zone, zone near to restricted zone and finally the restricted zone. If the boat is in normal area, then the LCD displays normal zone. Thus they can make it clear that the boat is in normal area. In case it moves further and reaches the warning zone, the LCD displays warning zone. If the fisherman ignores the warning or fail to see the display and move further and if the boat enters the zone nearer to the restricted zone the alarm will turn on and the speed of the boat engine automatically gets controlled by 50%.

Keywords— *Global Positioning System; Global system for mobile communication; LCD displays; fisherman; latitude and longitudinal values.*

I. INTRODUCTION

In day-to- day life we hear about many Tamil fishermen being caught and put under srilankan custody and even killed. The sea border between the countries is not easily identifiable, which is the main reason for this cross border cruelty. From Tamil Nadu about 18,000 boats of different kinds conduct fishing along the India-Sri Lanka maritime border. But by accidentally crossing the border without knowledge, they get shot by the Lankan navy. This leads to loss in the both humans as well as their economic incomes. We have developed a system which eliminates such problems and saves the lives of the fishermen.

In this project we used GPS (Global Positioning System), GSM (Global system for mobile communication) and Li-Fi technology. By using GPS, location of ship or boat will be identify and tracking continuously. If the ship will reach the certain area before border the intimation message will send to given numbers through GSM. Due to network problem arising in GSM, we also used alternative technology namely Li-Fi. Here we have designed a system using embedded system which protects the fishermen by notifying the country border to them. Using GPS, we can find the current latitude and longitude values and is sent to the Arduino. Then the controller unit finds the current location by comparing the present latitude and longitudinal values with the predefined value. Then from the result of the comparison, this system aware the fishermen that they are about to reach the nautical border. The area is divided into four zones- normal zone, warning zone, zone near to restricted zone and finally the restricted zone. If the boat is in normal area, then the LCD displays normal zone. Thus they can make it clear that the boat is in normal area. In case it moves further and reaches the warning zone, the LCD displays warning zone. If the fisherman ignores the warning or fail to see the display and move further and if the boat enters the zone nearer to the restricted zone the alarm will turn on and the speed of the boat engine automatically gets controlled by 50%. If the fisherman did not take any reaction about the alarm and move further, then the boat will enter into the restricted zone, the alarm continues to beep as before, and once it touches the restricted zone, the boat engine gets off by the control of fuel supply to engine, and also the information or location of the fishermen and the boat will send to some specified numbers like there family members or any control station. Through this SMS they can easily know, where the fishermen is in the sea. Apart from that if there is an any network problem arise in sea suddenly the system switch over to the Li-Fi technology, which transmit the data with help of high intensity light like Laser and Fresnel prism(light house lens). The main objective of the project is to make a protection for fishermen and also create the awareness about the sea border between Tamilnadu and srilankan. Suppose them nearer to border our system will intimate them, their families and also intimate the costal guard.

II. GPS TERMINOLOGY

A. 2D Positioning

In terms of a GPS receiver, this means that the receiver is only able to lock on to three satellites which only allows for a two dimensional position fix. Without an altitude, there may be a substantial error in the horizontal coordinate.

B. 3D Positioning

Position calculations in three dimensions. The GPS receiver has locked on to 4 satellites. This provides an altitude

in an addition to a horizontal coordinate, which means a much more accurate position fix.

C. Real Time Differential GPS

Real-time DGPS employs a second, stationary GPS receiver at a precisely measured spot (usually established through traditional survey methods). This receiver corrects any errors found in the GPS signals, including atmospheric distortion, orbital anomalies, Selective Availability (when it existed), and other errors. A DGPS station is able to do this because its computer already knows its precise location, and can easily determine the amount of error provided by the GPS signals. DGPS corrects or reduces the effects of:

- Orbital errors
- Atmospheric distortion
- Selective Availability
- Satellite clock errors
- Receiver clock errors

III. GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATIONS)

GSM (Global System for Mobile Communications, originally Group Special Mobile) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation digital cellular networks used by mobile devices such as tablets, first deployed in Finland in December 1991As of 2014, it has become the global standard for mobile communications – with over 90% market share, operating in over 193 countries and territories.2G networks developed as a replacement for first generation (1G) analog cellular networks, and the GSM standard originally described as a digital, circuit-switched network optimized for full duplex voice telephony. This expanded over time to include data communications, first by circuit-switched transport, then by packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution, or EGPRS).The 3GPP developed third-generation (3G) UMTS standards, followed by fourth-generation (4G) LTE Advanced standards, which do not form part of the ETSI GSM standard. In February 1987, Europe produced the very first agreed GSM Technical Specification. Ministers from the four big EU countries cemented their political support for GSM with the Bonn Declaration on Global Information Networks in May and the GSM Module was tabled for signature in September. The Module drew in mobile operators from across Europe to pledge to invest in new GSM networks to an ambitious common date. In this short 38-week period, the whole of Europe (countries and industries) had been brought behind GSM in a rare unity and speed guided by four public officials: Armin Silber horn (Germany), Stephen Temple (UK), Philippe Dupuis (France), and Renzo Faille (Italy).

In 1989, the Grouped Special Mobile committee was transferred from CEPT to the European Telecommunications Standards Institute (ETSI).In 2000, the first commercial GPRS services were launched and the first GPRS-compatible handsets became available for sale. In 2001, the first UMTS (W-CDMA) network was launched, a 3G technology that is not part of GSM. Worldwide GSM subscribers exceeded 500 million. In 2002, the first Multimedia Messaging Service (MMS) were introduced and the first GSM network in the 800 MHz frequency band became operational. EDGE services first became operational in a network in 2003, and the number of worldwide GSM subscribers exceeded 1 billion in 2004.

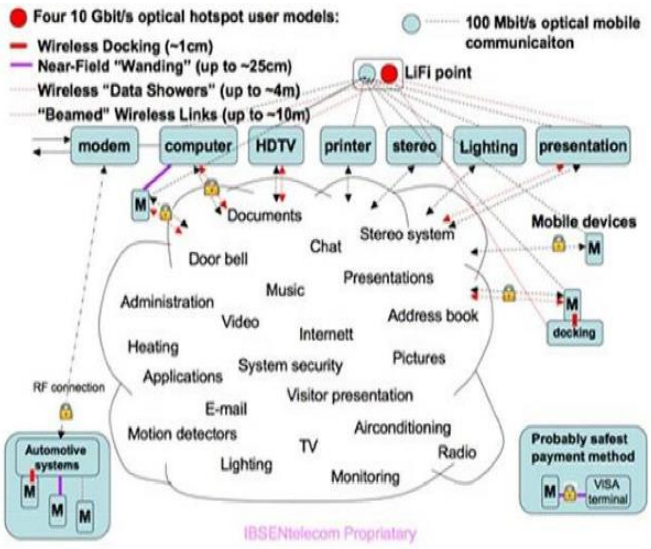

Fig 1: Global System for Mobile

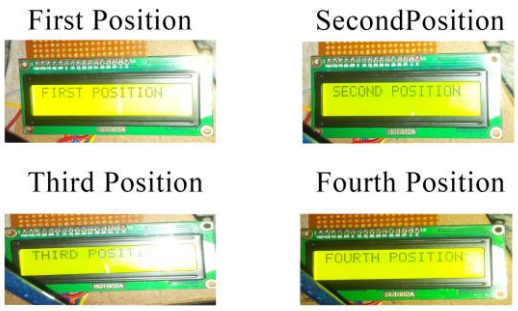

Fig 2: Fisher man positing identification using simulation software

IV. CONCLUSION AND FUTURE SCOPE

Here by we conclude that The "Border Alert System for Fishermen Using GPS System" is a system that implements GPS and Embedded system together to create a security system for fishermen boats. The fisherman, while navigating crosses the maritime boundary, unknowingly as they are unable to visualize it in the ocean which causes loss to its life. Through this paper a GPS based security system is provided to the fisherman so that they can find out when they are in danger. Thus the fishermen can easily identify the national sea borders and therefore prevents them from entering their area. Thus saving their lives and providing good relationship with the neighboring countries. This system is an implication of security system for safe navigation of mariner's auto boat. It is a helpful step in saving lives of fisherman and a useful contribution to the society .It alert the fishermen, their families and coast guard by alerting message from the boat when they cross the border,

in this project we can also send alert information without telecommunication through Li-Fi technology.

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