A Secured Strategic Approach for Monitoring Vessels on Sea with Alert Notification using DGPS

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Abstract

Boundary identification on the sea border is crucial for fishermen and costal guard. In India tamilnadu fishermen are arrested by Srilankan navy. The paper deals with a system of monitoring the location of the boat using DGPS and to trigger an alarm which consists of a buzzer, when the border is approached or crossed. Also, in addition, the DGPS information is sent to nearby vessel where it is read and then through a GSM device, information is sent to the costal guard at regular time intervals who are in anticipation about fishermen safety. The paper aims at providing a system that will alert the fishermen well in advance and ensure maximum safety and also notify the costal guard.

Keywords: DGPS, GSM, buzzer, Latitude, Longitude

I. INTRODUCTION

The Tamil Nadu fishermen even today invoke the historical rights and routinely stay into the International Maritime Boundary Line (IMBL) for fishing. 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. The paper uses a GPS device, GSM, microcontrollers and an alarm system to alert the fishermen whenever the border is crossed by unauthorized means.

II. SYSTEM ARCHITECTURAL DESIGN OF THE SMART MONITORING SYSTEM

The proposed architectural design consists of a DGPS devicewhich is interfaced to the 8051 Microcontroller which in turn is connected to the alarm circuit. The DGPS information tracked in the control room is sent to costal guard and nearby vessel through a GSM system.
The design and function of block is explained below:-

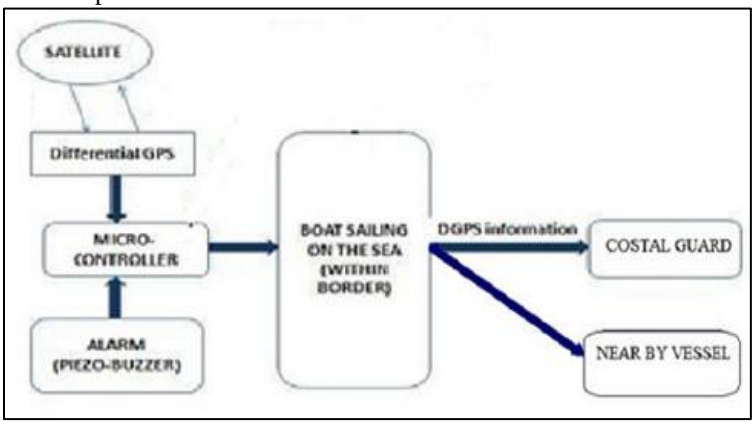

Fig. 1: System Architectural Design of Thesmart Monitoring System

III. GLOBAL POSITIONING SYSTEM DEVICE

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions. The Global positioning system basically consists of two parts: Transmitter and Receiver. The transmitter's job is to track the location with the help of information from satellite. The satellite information is taken and this is sent to the receiver where the exact longitude and latitude of the place is found. The working of GPS is explained as follows. First, the

signal is transmitted to the satellites and the time taken for transmissionis calculated. Depending on the time taken, the latitude and longitude information is fed into the receiver.

Each GPS satellite transmits data that in dicates its location and the current time. All GPS satellites synchronize operations so that these repeating signals are transmitted at the same instant. The signals, moving at the speed of light, arrive at a GPS receiver at slightly different times because some satellites are further away than others. The distance to the GPS satellites can be determined by estimating the amount of time it takes for their signals to reach the receiver. When the receiver estimates the distance to at least four GPS satellites, it can calculate its position in three dimensions.

IV. DIFFERENTIAL GLOBAL POSITIONING SYSTEM DEVICE

Differential Global Positioning System (DGPS) is an enhancement to Global Positioning System that provides improved location accuracy, from the 15-meter nominal GPS accuracy to about 10 cm in case of the best implementations. Its accuracy is about of +/-1m.

A. Working:

DGPS uses a network of fixed, ground-basedreference stations to broadcast the difference between the positions indicated by the satellite system s and the known fixed positions. These stations broadcast the difference between the measured satellite pseudo ranges and actual (internally computed) pseudo ranges, an d receiver stations may correct their pseudo ranges by the same amount. The digital correction signal is typically broadcast locally over ground-based transmitters of shorter range.

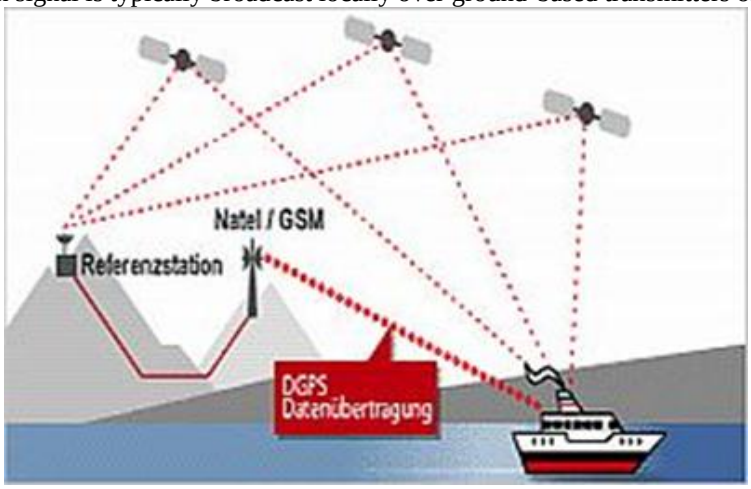

Fig. 2: GSM Device

V. ALARM CIRCUIT

Buzzer is used to indicate that the boat has crossed the border. Under normal conditions, i.e., when boat is inside country's border, current flows through emitter. And hence, buzzer is not activated. When boat crosses border, circuit is closed and current flows to buzzer. Thus alarm is generated.

VI. GSM DEVICE

GSM refers to Global system for mobile communication which is the key factor in this paper to inform about the where-about of the fishermen in the vast seas. The control room output is taken and it is fed into the GSM where, the information is sent to the mobile phones of the costal guard and nearby vessel through SMS, informing them about the status. In case the boat is lost due to rough conditions of the sea (or) intentional crossing of the border is done, then the information is immediately sent to the base station.

A. Working:

The working of the GSM system in place is very simple. Here the GSM is placed in the control station. The control station continually receives the GPS information of each boat through the unique GPS address. This address is linked up with the GSM system and then gets the information. Now, the main use of this GSM is to alert the nearby vessels of the fishermen who have gone into the seas of their situation.

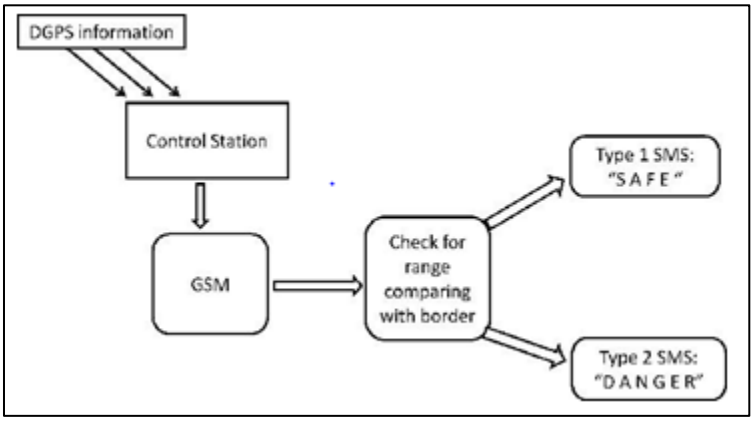

Fig. 2:

There are two types of SMS that will be sent to the costal guard. The GSM will have an inbuilt storage and it will compare the DGPS value with the standard values already fixed by the authorities. Depending upon this comparison, the types of messages sent will be 'SAFE' and 'DANGER'. By using vessel id the nearby vessel will be identified.

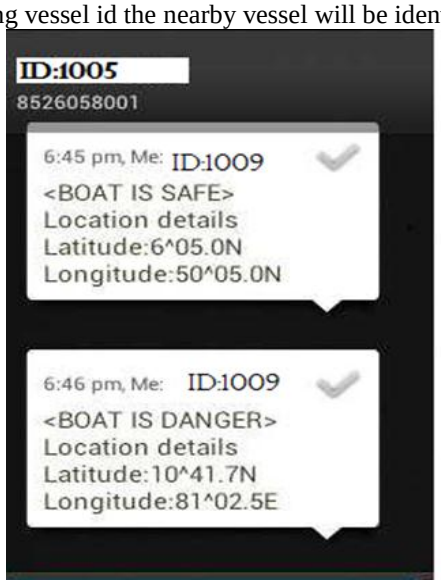

Fig. 3: Sample Message Alert To costal guard

VII. IMPLEMENTATION OF THE SYSTEM

The architectural views of the project were discussed earlier and the system implementation is discussed below. The main systems to be implemented are the interface of the DGPS circuit with the 8051 microcontroller and the ALARM to it. The other interface would be the retrieval of the DGPS information from the device and then latching it with the GSM system and sending the SMS.

Fig. 4: System Implementation

VIII. CONCLUSION

The proposed paper of the Border alert and smart tracking with alarm using DGPS and GSM has proven to be a low-cost project. The system proposed will not only alert the fishermen but also carries the information to the control station and also notifies the nearby vessel through the GSM system.

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