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BOAT LOCALIZATION AND ALERT SYSTEM FOR BORDER IDENTIFICATION USING RSSI

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Abstract - The technology proliferation of Received Signal Strength Indication (RSSI) is used to provide location based positioning and time details in all climatic conditions and even anywhere and at any time. This method focuses on implementing border identification system in the boats to help the fishermen. However, the current system is not much powerful to prevent the crime against fishermen as it gives only the information about the border identification but not about the exact distance that the boat has travelled from the border The proposed system's transmitter section includes Arduino Mega microcontroller, RSSI module, APR voice playback circuit and DC motor. The proposed system restricts the boat from crossing the sea border by turning off the DC motor. As the boat moves, the zone in which the boat and the signal strength will be displayed in the mobile phone. During an emergency situation the switch can be used to send an alert message to the mobile phone. The receiver section includes RSSI and a personal computer/mobile phone for monitoring database in the control room in the port. The message will also be sent to the fishermen's home and control through GSM module. The RSSI is used to set the range in the sea by which the fishermen can easily identify the sea border and can prevent them from imprisonment.

Key Words: RSSI, Arduino Mega, APR voice playback, GSM

I. INTRODUCTION

Fishing is one of the prime sources of food and profit for essentially all coastal lands irrespective of its geological location. Since fishing has an important role to play in the economy of a country, there is no query that neighboring countries share the same oceans frequently engage in issues regarding to the ownership of the area. This issue has resulted in many problems to the fishermen community residing in the coastal regions of these countries. In order to solve this issue, the governments of these countries decided to have a common territory of ocean as international waters and that it would act as the region common as well as a separation between the two countries. But even this couldn't prevent the fishermen from unknowingly wandering off into the other country's waters. Hence, there is a strong need of device that prevents this from happening and save the fishermen from severe punishments and border issues.[1] This model helps to identify the location of the fishing boats through a new technology using radio waves.

II. RELATED WORKS

Many research efforts have been reported in target tracking literature to deal with distance in RSSI measurement. In the earlier stage the wireless sensor were used by many applications to locate and track the boat navigation.[1] The RSSI parameter in tracking strategy for constrained position localization. Significant criteria are given to ensure the capability of the proposed tracking approach by providing a trade-off between the grid resolution and parameter variation. A tracking test is implemented to corroborate the effectiveness of the proposed tracking strategy.[4]As the boat moves into each zone the APR voice will alert the fishermen about the zone I which the boat is there.

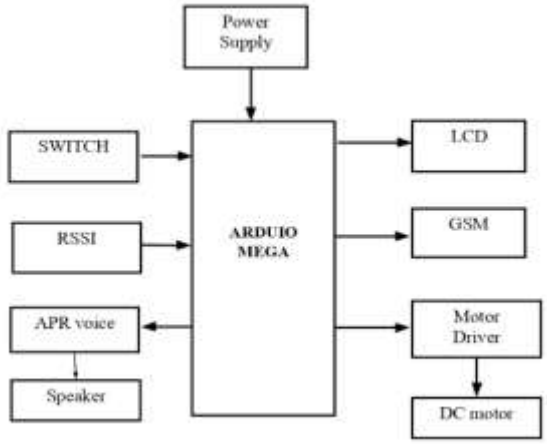
[1] The RSSI is used in indoor navigation of inertial smartphone sensors using a step detection and an orientation estimate. During navigation, the client fetches the position from the server, together with the corelative map to visualize the user's position on the mobile phone display. The Received Signal Strength Indication (RSSI) based approaches are highly appreciated because of their minimal complexity.

III. PROBLEM DEFINITION

The problem faced by the fishermen is not identifying the respective sea border. Due to this unidentification of the sea border it leads the fishermen to imprisonment and fine payment in other country due to border unidentification. To resolve this problem an improvement made is made in the proposed system. The proposed system contains RSSI(Received Signal Strength Indication)which identifies the sea border. This helps the fishermen from crossing the border.

IV. SYSTEM DESIGN

This is the structure in the boat



This is the setup of the control room in port

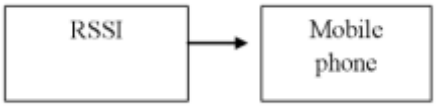


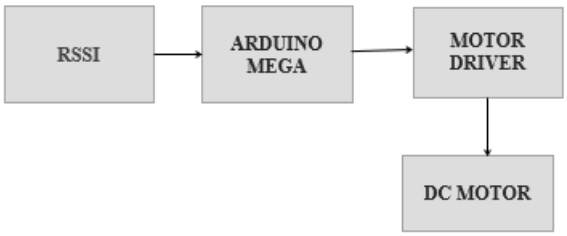
Fig 1. Block Diagram of proposed system

V. WORKING PRINCIPLE

As per Fig(1), in the proposed system, the boat distance can be measured using the Received Signal Strength Indication from the slave RSSI (boat). By using this RSSI we can find the location of the boat in the sea. Whenever the boat reaches the border the APR voice alert the concern person in the boat and at the same time boat will automatically turn OFF. GSM is used to send the message from the controller. LCD is used to print the current status from the controller.

VI. MODULE DESCRIPTION

A. BORDER IDENTIFICATION



Fig(2).Border Identification

To identify the distance travelled is calculated by RSSI(Received Signal Strength Indication).Fig(2) represents the diagrammatic view of the border identification. The signal produced by the RSSI (Received Signal Strength Indication) helps the fishermen to identify the sea border. As the boat moves the distance travelled will be displayed in the LCD monitor installed in the boat. From the microcontroller (Arduino Mega), it sends the signal to motor driver to stop the boat before the border using DC motor. DC motor is used to stop the boat before the border in particular distance. The main purpose of the DC motor and motor driver is to prevent the boat from crossing the sea border. DC (Direct Current) motor converts direct current electrical energy into mechanical energy. As the boat motor stops there is no scope for the boat to cross the border which helps the fishermen from being imprisoned and also from paying fine.

B. BORDER INDICATION

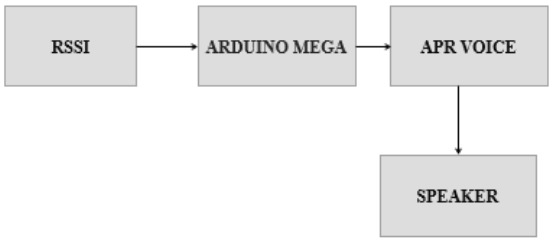


Fig 3.Border Indication

Fig(3) represents the border indication module, the RSSI sends the signal to the microcontroller(Arduino mega) and it transmits to APR(Audio Playback Recorder) Voice via speaker. The main purpose of APR Voice and speaker is to ask help from the nearby fishermen in boat at an emergency situation. APR9600 Voice IC is a low-cost high performance sound record/replay IC incorporating flash analogue storage technique. APR Voice(Audio Playback Recorder) play back provides high quality recording and playback in series are powerful audio processor along with high performance audio. The IC can be controlled simply using push knob keys. It is also probable to control the IC using external digital circuitry such as micro-controllers and computers. The switch will be connected to the Arduino Mega microcontroller which will send the alert message to the controller in the shore. With the help of the switch an immediate rescue team will be sent to the sea to help the fishermen at the same time the APR Voice is used to ask help from near by boats. The APR Voice indicates the fishermen that the boat is nearing to the border which is consider as a red zone or danger zone.

C. INFORMATON TRANSMISSION

Fig 4.Information Transmission

Fig(4) represents the information transmission module from the boat to the controller in the port. The switch will be pressed by the fishermen in emergency situation which will send an alert message to the controller in the shore via GSM(Global System of Mobile Communication). GSM is used to send the alert message from the boat to the shore in the emergency situation. GSM is a standard that is accepted globally for digital cellular communication. A GSM is a wireless modem that works with a GSM wireless network. The GSM Modem is having internal TCP/IP stack to enables the connection with internet via GPRS. In the emergency situation the fishermen press the switch for asking help from the controller of the shore .Using the switch the alert message can be sent to the shore and they will send the rescue team to safeguard the fishermen.

D. ALERT INTIMATION

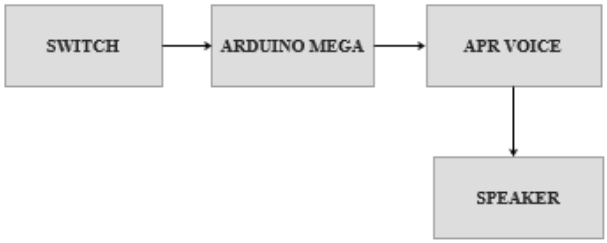


Fig5.Alert Intimation

Fig(5) represents the alert intimation to the nearby boats in the sea. The switch will be pressed in the emergency situation and it sends the alert message to the control room in the shore to intimate that the fishermen in the danger. The alert message is sent to the control room and other way to send the alert intimation is through via APR voice which sends the signal to the speaker by the recorded voice will start to seek help from the nearby boats. The diagram represents how the alert intimation is done during an emergency situation. As the switch is pressed the signal is sent to the Arduino Mega microcontroller and it sends the signal to the APR voice module and the recorded voice is executed through the speaker.

VII. ALGORITHM

STEPS

STEP1: The boat is started first and as it moves the APR voice indicates the zones(safe zone, mid zone ,danger zone).

STEP2: The zones will also be displayed in the LCD monitor.

STEP3: The boat will automatically turn off as it reaches 90% of the signal.

STEP4: The DC motor will reverse by itself as the signal strength reaches 90%.

STEP5: During an emergency situation the switch is used send an alert message to the mobile phone.

VIII. CONCLUSIONS

RSSI is used to alert the coastguard when an intruder or poacher is found within the protected sea water. It also warns and prevents the fishermen from crossing the national sea border. It is useful device for the safer navigation for the fishermen. The main advantage is the low cost and the wireless system. It also provides security and saves the fishermen from imprisonment and fine payment.

The future work can be done by enhancing the proposed system by implementing in the boats and the RSSI can be installed by using the satellite connection for sending the alert message to the control room in the port. The alert intimation will be seen by the controller at the shore in the PC.

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