

AN INTELLIGENT BOUNDARY ALERT SYSTEM (IBAS)

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Abstract— The fishermen of Tamil Nadu are still invoked in the historic rights and are straying into the International Maritime Boundary Line (IMBL) for fishing. This is considered offensive by the Ceylon Navy and also in some cases fishermen are shot dead or being arrested. This pulls down the economic growth and also becomes havoc to life. The main drawback is that boats do not have GPS or Automatic Identification System (AIS) stations along the Tamil Nadu coastal areas. We propose a system which uses ultrasonic sensors and various modules in order to protect the fishermen folk. It has three major parts that will make the coastal guards to respond for the alarming issues, fishermen can guard themselves from the Lankan navy and the unaware fishermen are automatically warned. These issues are met by making use of An Intelligent Boundary Alert System (IBAS). The main objective of this system is used to help the fishermen to navigate inside our maritime country border.

Index Terms— Arduino Uno, automation identification systems, IBAS, ultrasonic sensors.

I. INTRODUCTION

In Tamil Nadu, over 18,000 boats of different kinds on go fishing along the border of India-Sri Lanka. Due to accidental border cross over by the fishermen, they are shot by the Lankan navy. This pulls down the economic growth and also becomes havoc to life. We propose a system that will eliminate such kind of problems and will save the lives of fishermen.

We are using ultrasonic sensors to sense the object/vessel. Then the microcontroller unit tracks the present location by comparison of the current latitude and longitudinal data with the predefined data. Then, from the outcome of the comparison, this system alerts the fishermen that they are nearing the maritime border. The total area has been divided into 4 zones- normal zone, warning zone, zone near to the restricted area and the restricted zone. If the boat is found in the normal area, the LCD will display as normal zone. Thus, it shows that the boat is in normal area.

Suppose, it keeps on moving further and reaches the warning zone, the LCD displays the same. If the warning is being ignored by the fisherman or doesn't notice the display and moves further, or if the boat enters the area near to the restricted zone the alarm will be turned on and the boat engine speed automatically gets reduced by 50%. If the fisherman did not take any action for the alarm and move further, the boat will enter the restricted zone while the alarm continues to beep, and once it touches the restricted zone the boat engine turns off by the control of fuel supply to engine.

II. EXSISTING MODEL

Currently, there are few systems which help in identifying the current position of the vessels/objects using GPS/RADAR Navigation system and view them in an electronic map or to localize their location. These provide methods for mariners to navigate, measure speed, and determine location. It may provide increased levels of safety for mariner's worldwide and accurate position, speed and to ensure the vessel is safe.

The accurate position information becomes even more critical as the vessel departs from or arrives in port and a person has to watch the system for detection of malpractice of vessels/objects. In this case there may be manual error; the information regarding the crossing of the boundary has to be passed to the higher officials, coastal guards manually. This will also give a time to trace the boats.

Another such system is GPS72H by GARMIN which is commonly used by the fishermen which is battery based power supply which stands for 18 hours. But the fishermen who unfortunately miss their backup batteries will lead to danger.

In another system the operation is performed only after the vessel/object had crossed the border such as alarm triggering, GPS message trigger, etc.

A. Drawbacks

In few existing systems an alarm is triggered only to alert the fisherman and not to prevent them from crossing the border. There is no use of sending a GPS message to coast guard, base station or higher officials as sometimes they may not see the message and most of the time it will be too late to react and save them. No existing system completely prevents the vessel from crossing border.

III. PROPOSED MODEL

In the proposed model we are using an ultrasonic sensor to sense the object/vessel. We can also use GSM or GPS to implement this proposed model in real time. When the sensor senses the object/vessel it will calculate the distance between the sensor and the object/vessel.

On calculating the distance the microcontroller does the comparing operation and single-outs an instruction/command to the specified constraint. The singled-out instruction is transmitted from the transmitter buoy and received at the receiver side module by via zigbee which is a transceiver.

On receiving the command/instruction the respective operation for that command/instruction is triggered and executed.

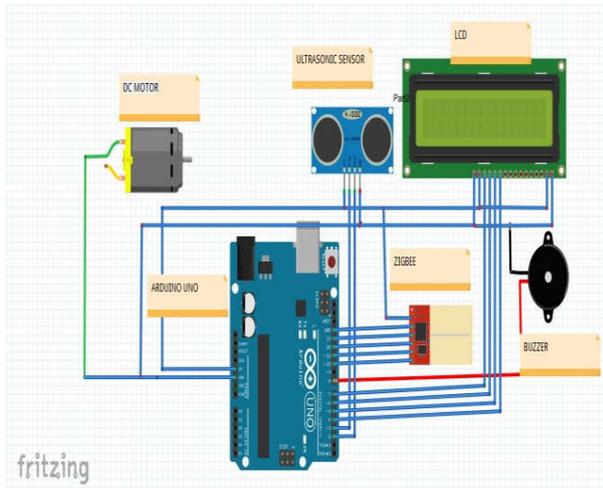


Fig 1: Circuit Diagram

If the vessel is at range one, the alarm will be triggered in the vessel. If the vessel is at range two, the motor will be shut down in the vessel. If the vessel is at range three, the motor speed will be diminished by half. If the vessel is at range four, the forward acceleration will cease and backtrack is possible. All the above specified operations will occur before the border and not beyond the border. Thus our project prevents the vessel from crossing the border.

A. Advantages

This prevents the vessel from nearing the border. Efficient operations are performed, thus reduces the interference of coast guards.

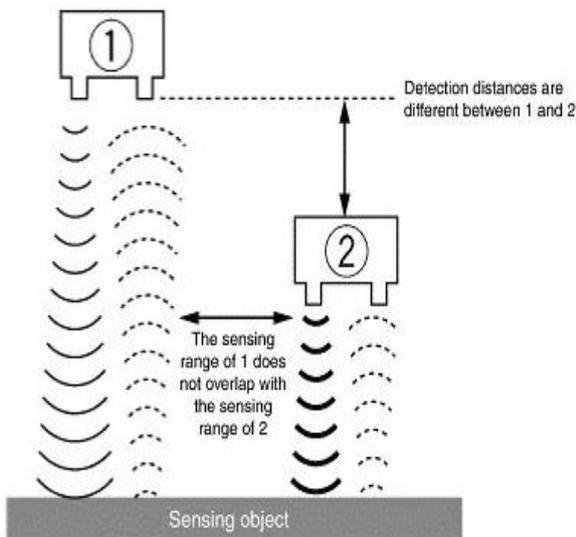


Fig 2: Ultrasonic Sensing

IV. SYSTEM ARCHITECTURE

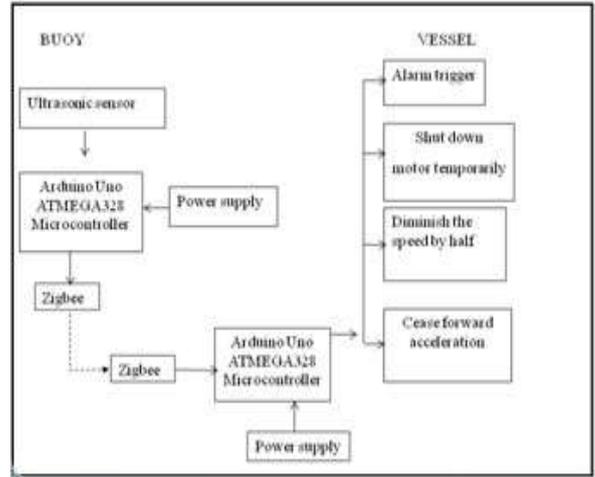


Fig 3: Block Diagram

A. ARDUINO UNO ATMEGA 328

Arduino uno ATMEGA 328 is used which has Low power consumption. It operates at a voltage of 5V. It has a Digital I/O Pins 14 (of which 6 provide PWM output) with a Flash Memory 32 KB of which 0.5 KB used by boot loader SRAM 2 KB EEPROM 1 KB Clock Speed 16 MHz.

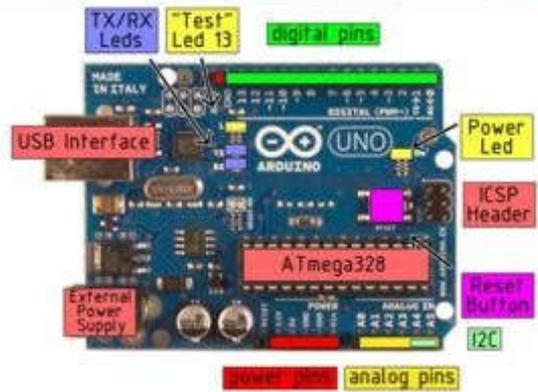


Fig 4: Arduino Uno ATMEGA 328

B. ZIGBEE NRF 24L01

It is of Low cost and is a single-chip with 2.4GHz frequency and GFSK RF transceiver IC. It has worldwide license-free 2.4GHz ISM band operation. The data rate is 1Mbps and 2Mbps on-air. Enhanced ShockBurst™ hardware protocol accelerator is used. The battery lifetime is from months to years. ZigbeeNRF 24L01 is Compatible with all Nordic nRF24L Series in 1 and 2Mbps mode. ZigbeeNRF 24L01 is compatible with Nordic nRF24E and nRF240 Series in 1Mbps mode

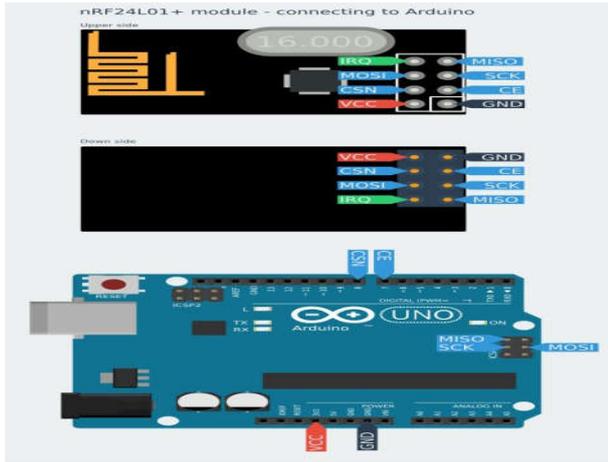


Fig 5: ZigbeeNRF 24l01with Arduino Uno ATMEGA 328

identify the maritime sea boundaries and protect themselves by not crossing the boundary.

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Power Supply	+5V DC
Quiescent Current	<2mA
Working Current	15mA
Effectual Angle	<15°
Ranging Distance	2cm – 400 cm/1" – 13ft
Resolution	0.3 cm
Measuring Angle	30 degree
Trigger Input Pulse width	10uS
Dimension	45mm x 20mm x 15mm

Table 1: Ultrasonic sensor HCSR04 Specification

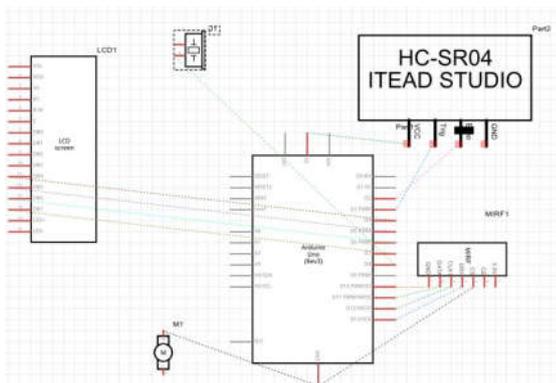


Figure 6: schematic diagram

V. CONCLUSION

An IBAS system proposes a new methodology for guarding the fishermen folk's valuables and their lives from the Sri Lankan navy. Thus, the fishermen can effortlessly