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A SAILING BOAT

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ABSTRACT
The spread of ocean over the vast area has led to the development of the sailing boats. The sailing boats are used for making measurements over the sea surface for exploring the sea bed, marine environment, marine habitats, etc. The sailing boats also prove advantageous for navigational research and for measurements over the surface of the ocean. The sailing boats mostly are self-operated and perform evaluation of the sea bed and surface using sensors. An idea presented has been with a sailing boat which on activation detects the presence of an unknown object over the surface of the sea. The IR sensor measures the distance of an unidentified object and the metal detector helps in detecting whether the object is a metal. The GSM and GPS are used to alert and notify the location of the unidentified object detected. The movement of the boat is controlled using the DTMF. With the use of DTMF we can control the movement of the boat even from a remote location.

KEYWORDS: ARM 7, IR sensor, DTMF circuit, metal detector, GPS, GSM

INTRODUCTION
Sailing boats are basically robotic vehicles used for various oceanographic research, navigation, surveillance purposes and cruising. These boats can perform ocean observations and measurements over the sea surface. These measurements are predominantly required for navigation, marine habitat monitoring, cruising, weather predictions etc.. Navigation and surveillance operations carried out by military sailboats are done in order to monitor any illegal and unwanted activities over the sea. The deployment of sailboats for surveillance and rescue operations are a major lead in curbing any illegal activities over the oceans. Such variety of boats can also be used for cruising options. Navigation, surveillance or ocean observation in such types of boats are done using sensors. The deployment of such automatic sailing boats have been successfully been demonstrated for various applications that include underwater exploration as well as planetary research. Unlike the previous dinghies or boats that used jibs for their sailing purpose these boats use motors and automatic control for their movement over the sea. Nowadays there are various types of sailing boats available that allow a wide range of operations and features embedded within them for smooth sailing and cruising in the sea waters. The oceans are unpredictable and hence they should be continuously monitored so that, sailing in such harsh waters and high speed currents can be easy. The various advanced features that sail boats today have in them are GPS chart plotter, electric winch system, electric motors, reverse osmosis, long waterline lengths, generators, rudder angle detectors, SONAR ,RADAR, etc.. Sailing boats today unlike the traditional boats that were just made up of hulls and buoys, have greater advanced features.

MATERIALS AND METHODS
Literature Survey
The sailing boats mostly are the large sailing vessels that include sailing mega yachts, tall ships, sailing cruising ships and large sailing military ships. Catboat, dinghy, schooner, ketch, sloop, yawl are some of the existing small sized sailing boats. Sailboats work by catching the wind i.e. their movement is predominantly based on the direction of winds and water. The common sailboats contain a mainsail attached to a mast and a jib which capture the bulk of the wind power in order to propel the sailing boat. The keel and rudders are used to move the boat forward by cutting it through the water resistance. There are additional equipment and tools present in the sailboat.

The GPS chart plotter which allows to mark the course of the boat and constantly receives updates on weather conditions. A winch system is present that contains a button which when pressed adjusts the jib even in high winds and also adjust the mainsail. A reverse osmosis system is also employed in recent sailboats that convert sea water into freshwater by removing parasites and bacteria from it. They even have a SONAR and RADAR whose measurements can be easily observed on a TV screen present on the boat. Sailboats today use both fuel and motors for sailing. They even have generators as backup. Along with the various features in such boats the mechanical design is also of utmost importance. The hulls of such boats can be either made up of wood or steel. They have a streamlined shape in order to cut through the water resistance.

In this paper we have tried to demonstrate a sailing boat of low power and size. The prototype is built in order to understand the sailing mechanism and features present in the sailboats.

Figure:

The prototype model of the sailing boat

Sailing Mechanism

The boat model is made of thin polymer material. Two brush-less DC motors are fixed to the boat model. Pedals are fixed to the DC motor. Pedals are of mild steel. For sailing the boat signals are passed from a mobile unit placed at remote control station to another mobile phone which connected to the DTMF module, placed at the boat. According to the tones sent from the remote station the boat is moved in the particular direction, forward, backward, right or left. For moving the boats the motors are rotated either in clockwise or anticlockwise direction with the help of motor driver.

Methodology

Here, basically identification of unknown object is to be carried out and thus alerting the detection to the remote location is done. Along with this, measurements such as distance of the object detected and whether it is a metal or not are also to be performed. For detecting whether the object is a metal a metal detector sensor is used and An IR sensor is used to find out the distance of the object from the boat. The GPS and GSM modules are used to identify the location of the object and as well send it to a remote control station. An ARM7 microcontroller is used to interface the sensors and GPS and GSM modules. The DTMF module is also interfaced to the ARM7 along with the motor driver L293D. The DTMF module is used to control the movement of the boat. The two DC motors are connected to the driver H-bridge relay driver which is nothing but the motor driver L293D. MAX232 protocol IC is used for communicating with the GSM and GPS.

Proposed Approach

A.Block Diagram

The block diagram of sailing boat is shown below:

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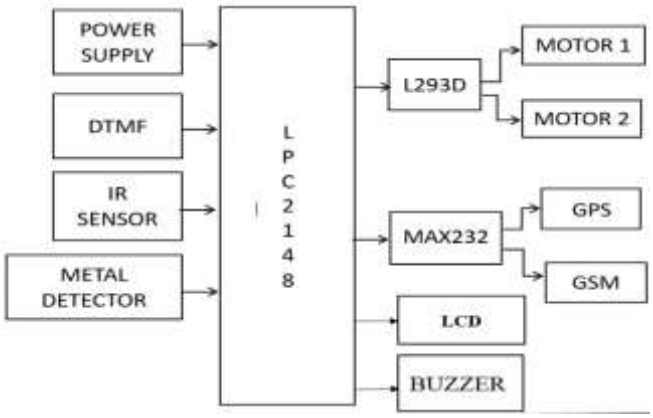
Transmitter section

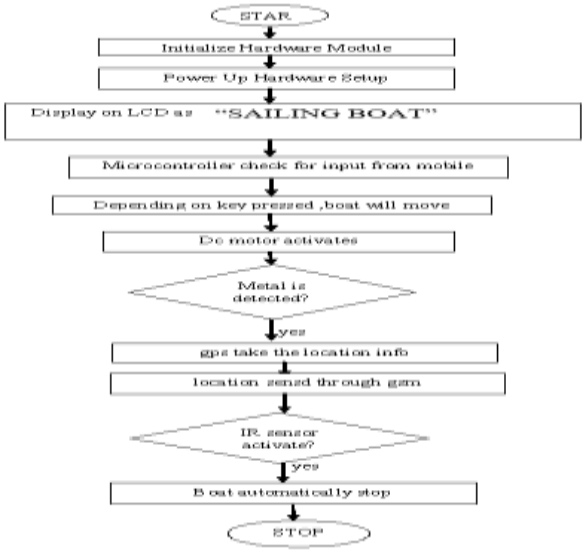
The transmitter section is nothing but the mobile phone unit placed at a faraway location.

Receiver Section



In transmitter section we press mobile phone keys that generate DTMF tones that are sent over long distances towards the mobile phone placed in the sailing boat. According to the different keys pressed on the mobile phone the sailing boat will move in different direction. After the LPC2148 has completed the transmission pulse the receiver stage is entered. The receiver stage waits a certain amount of time before checking for signal reception.
If any metal detector is use to detect metal at place if any metal get detected then GPS Module will get activated and location will kept by microcontroller. That location will send to the remote location by GSM module. IR sensor use to identify unknown obstacle. If obstacle is detected then the buzzer alert gives an indication for obstacle detected.

B. Flowchart



RESULTS AND DISCUSSION

The conventional and existing sailboats are highly dependent on the weather conditions. They are propelled by the winds. The introduced automatic sailboat works on the motors and is automatic. It eliminates the need of fuel. With the use of a DTMF module we can sail our boat from a remote location as well. The measurements taken can also be sent to a remote control station. Along with this the mechanical design is made up of thin polymer and the hull also has a streamlined structure which can effectively be deployed in real time application over the sea.

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CONCLUSION

The introduced system is ideal for operations over the sea surface. The sailing boat is an ideal solution for making measurements at the sea surface. The various modules and sensors used make it accurate and fast. The presented sailing boat can further be made more advanced by adding additional features that can be used for making weather predictions so that sailing becomes smooth. A solar panel battery can also be used in these boats for backup power. Such sailing boats can ideally be used over the sea surface for making measurements, monitoring and surveillance operations.

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