SWUMANOID: AN AUTONOMOUS MANOEUVERS SAILING ROBOT FOR OCEANOGRAPHIC RESEARCH

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INTRODUCTION: Ocean Exploration and Navigational Research is leading efforts by supporting expeditions with computer vision techniques have shown potential for Sailbot robots developed in order to make measurements at the surface. The marine environment presents an almost ideal test-bed for the evaluation and development of robotic technologies. Robot sailing is a challenging task in both building and controlling the boat therefore it brings together many different disciplines. The sailing robot explores in interpretation of video footage, the identification of sailing features, human-robot interaction, vehicle control, position estimation and mechanical design. An idea presented has been with a Robotic vehicle which activates automatically and manually control the moving object in the water the robot will capture and sends the information to the pc (personal computer) which uses advanced image processing technology and compares relevant images by identifying underwater features which will follow the object present in the surface of ocean.

The development and deployment of Autonomous boat sailing is possible by the effective combination of appropriate new and novel techniques that will allow for a number of applications has been successfully completed .Autonomous robots have been successfully demonstrated in a number of applications, including planetary and underwater exploration. While the use of unmanned buoys for ocean observation is well established, the use of unmanned systems capable of long term purposeful navigation is still in its infancy. A sailing vessel will only require minimal electrical power to adjust its control surfaces and power on board computers. Sail propelled vessels thus prove an attractive prospect for investigation.

OBJECTIVE: The main objective of the project is designing a “Swumanoid: An Autonomous Maneuvers Sailing Robot for Oceanographic Research”. The proposed project explains the sailing robot explores in interpretation of video footage, the identification of sailing features, human-robot interaction, vehicle control, position estimation and mechanical design. An idea presented has been with a Robotic vehicle which activates automatically and manually control the moving object in the water the robot will capture and sends the information to the pc (personal computer) which uses advanced image processing technology and compares relevant images by identifying underwater features which will follow the object present in the surface of ocean. It tracks the movement with the help of wireless cam attached to the robot through RF PRO wireless sensor network.
METHODOLOGY: The overall block diagram of the robotic system consists of Transmitter and Receiver sections. The Transmitter section consists of PC with commands, RF Module and the Receiver section consists of RF module, ARM processor (LPC2148), H- Bridge and DC Motor.

A. Transmitter:
The Transmitter section having the four switches placed around the neck and RF Module. An idea presented has been with a Robotic vehicle which activates automatically and manually control the moving object in the water the robot will capture and sends the information to the pc (personal computer) which uses advanced image processing technology and compares relevant images by identifying underwater features which will follow the object present in the surface of ocean. It tracks the movement with the help of wireless cam attached to the robot through RF PRO wireless sensor network. Initially the switches are at logic1. When the switch is pressed the concerned switch level goes to logic0. The switches are the inputs to RF transmitter through the RF encoder is shown in Figure 1.

![Figure 1 Transmitter section](image1.png)

B. Receiver
The received signal from the transmitter is fed to the RF decoder (Serial input and parallel output). The output of the decoder is given to H-Bridge through the ARM processor shown in Figure 2. The output of H-Bridge drives the DC motors. The surface environment of ocean i.e., ocean exploration and navigational research can be studied through wireless cam, GPS & GSM, Metal detector, IR sensors, Ultrasonic sensors interfaced to the robot. Further development is required to demonstrate the feasibility of a sailing robot for long term use in open sea and helpful for oceanographers and scientists. Here ARM7 processor is in build with interfacing a wireless camera which uses RF based communication. The DC motors are used to rotate the arms of the robot to catch habitats.

![Figure 2 Receiver section](image2.png)

RESULTS AND CONCLUSION: In this project, we introduce a successful working prototype model of manoeuvre sailing mobile robot is designed for oceanographic research. An autonomous sailing robot offers major advantages compared to submerged operated vehicles. It tracks the movement with the help of wireless cam attached to the robot through RF PRO wireless sensor network. The surface environment of ocean i.e., ocean exploration and navigational research can be studied through wireless cam, GPS & GSM, Metal detector, IR sensors, Ultrasonic sensors interfaced to the robot. Further development is required to demonstrate the feasibility of a sailing robot for long term use in open sea and helpful for oceanographers and scientists. The autonomous manoeuvre sailing robot for oceanographic research is used to explore all the details on the surface of the water. This robot is used for locating the position of the system using GPS & GSM, detects metals present in the ocean, and measures the depth and boundaries, used for surveillance and rescue operation.
**SCOPE FOR FUTURE WORK:** Further development is required to demonstrate the feasibility of a sailing robot for long term use in open sea and helpful for oceanographers and scientists. The sailing robot navigates itself based on starting point and destination given to it and finds the exact coordinates of the location. Pick and place mechanism can be implemented in a better manner by using a robotic arm. GPS can be advanced to giving the start and destination coordinates and it will navigate itself to the destination. Better camera can be used with high resolution and pixels. The long lasting battery can be used instead of using power supplies. The boat model is made of thin Aluminium Sheet. Two brush-less DC motors are fixed to the boat model. Pedals made of MS (Mild Steel) are fixed to the shafts of the DC motors. Pick and place operation is done by robotic arm. The other key factor which must be considered in designing such a vessel is that of the sail type. Traditional fabric sails are typically controlled through a series of ropes known as sheets and halliards, these frequently break or jam (particularly when swollen by salt water) and require regular attention from the crew. Performing such tasks autonomously would incur significant overheads resulting in excessive power usage, weight and financial cost. A potential alternative is that of a rigid wing shaped sail attached directly to the mast. The sail is manipulated through the rotation of the entire mast via an electric motor. This design eliminates common points of failure found in traditional sails and is therefore ideal for use in an autonomous sailing vessel.

Figure.3 Result