Life Saving Rover

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Abstract — The Life Saving Rover is an innovative project aimed to increase the water safety by rescuing drowning person. The rover is designed in such a way that it hovers stably on the water body. The caries a tube which is deployed into the water to the person. The tube is controlled by a servo motor, enabling timely assistance to the person in distress. The device on saving the needy person in the water bodies by supplying the life-saving tube to the person. LSR also ensure that it can move to the target destination smoothly. LSR is a remote-controlled device which can be tracked in the emergency situation.

Keywords — BLDC Motor, esp8266, esp cam module, ESC SimonK, gps module

I. INTRODUCTION

EVERY year, many people lose their lives because of drowning in the water bodies. Humans have evolved technologically still we cannot provide immediate help to someone who is drowning. Our research paper's aim is to help these people at emergency, so we have come up with an idea of creating a unique device called as 'Life Saving Rover (LSR)'.

The LSR is small aquatic boat-type device, designed with the main purpose of supplying a life-saving tube to a person who is drowning in the water. The design process of our device starts with putting together a rectangular plastic container that serves as the base. This base also consists of all the electronic components we are using, rectangular base ensures the rover's stability in water. A saving tube, which is important for the rescue operation is attached to the base at a certain angle (we're taking 45^{o}) using aluminium rods.

The Brushless DC motor is used to stop the tube which is being mounted to the aluminium rod, DC motor is controlled by an Electronic Speed Controller (ESC) SimonK.

We have designed our device in such a way that it can move back and forth. The ESP8266 microcontroller is programmed via the Arduino IDE, it controls the BLDC motor and is connected to the Blynk platform for remote controlling and monitoring. A 11.1 Volts 1000mAh LiPo battery is used to power the BLDC motor.

To keep track of its location, the LSR is attached with an ESP Camera module and a GPS module. This paper provides a in depth overview of the LSR, including its design, assembly, and operation, and also its potential as a life-saving tool in different water bodies.

II. LITERATURE REVIEW

Development of An Integrated Control System for Rescue Boat. Progress in Engineering Application and Technology.December 2020. This research paper focuses on an automated as well as a manual control rover to perform rescue operations. The rover in the given research paper is equipped with ultrasonic sensors to sense obstacles in its pathway and avoid them to carry the rescued people safely. If controlled manually the rover is equipped with LEDs which will blink according to the closeness of the obstacle and the person driving can avoid the obstacles manually, if the obstacle is on the left side of the boat the sensors on left side will be triggered and the left side LED will light up. Additionally, a GPS tracker is used in the given prototype which will help people access the location of the rover for better control. An ultrasonic sensor HC-SR04 is used in the rover whose range is from 2 cm up to 2000 cm to detect surrounding information.[1]

Surveillance and Rescue Boat using Satellite Communication. Sathyabama Institute of Science and Technology Chennai. April 2020. The project's primary goal is to monitor the lakes or ponds, take pictures and videos of the surrounding area, and transmit the data—that is, the picture, the video, and the geographical coordinates—to the closest base station. The floating body of the boat is made up of thermacol. The boat is attached to two DC motors that act as propellers for the motion of the boat in the water. A microcontroller is fixed on top of the boat

for the control of motion. The Ublox GPS Module and the ESP 32 Camera, are the two parts used in the project for location and photos. The closest base station receives the images and videos sent by the ESP 32 Camera. The camera has an integrated Wi-Fi module that is used to link devices to the internet.[2]

Flight Trajectory Simulation of Robotic Throwing Shuttlecock. IEEE. August 2018. The project focuses on design and control of throwing mechanism to launch shuttlecock through the rings at a certain height. The process involves two areas: first is to select initial throwing parameters like initial velocity and angle. And to understand the aerodynamics of shuttlecock. The impact of this initial parameters is studied through kinematics simulation analysis. Also, ADAMS (Automated Dynamic Analysis of Mechanical Systems) technology is used to make prototype and study different cases.[3]

Performance of Rescue Boat Operation when Operated in Waves. The 5th International Conference on Marine Technology. 2021. The research paper evaluates the speed and efficiency of three rescue boat models featuring deadrise angles of 30, 20, and 15 degrees. Through rigorous testing, it aims to assess their performance in emergency scenarios. Results offer valuable insights into the optimal design parameters for enhancing rescue boat effectiveness, ensuring swift response times and efficient operations during critical situations. By analyzing the relationship between deadrise angle and boat performance, the study contributes to advancements in maritime safety and emergency response protocols, potentially leading to the development of more capable and reliable rescue vessels for saving lives at sea.[4]

Rescue Boat Controlled by Android. International Research Journal of Engineering and Technology. June2017. The Research paper states that, the mini rescue boat controlled by an Android smartphone which is designed to help victims of flash floods get first aid quickly and avoid the threat to their lives. The boat is equipped with a servo motor, DC motor, and a motor driver, and is controlled using Bluetooth HC-05. The project also utilizes the Internet of Things (IoT) in its software.[5]

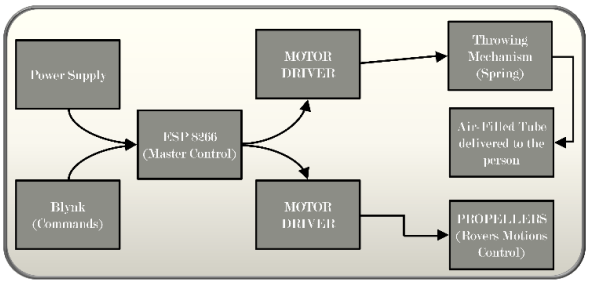
III. METHGODOLOGY

LSR began with the design and assembly of a rectangular container to serve as the base, containing electronic components and providing stability in water. Aluminum rods were attached at a 45-degree angle to the base to hold the floating tube, facilitating its deployment into the water. The floating tube was connected to a servo motor, which controlled the release mechanism of tube, allowing the tube to be deployed when needed.

To perform to and fro motions, a Brushless DC motor was placed on the base and connected to an Electronic Speed Controller (ESC) SimonK to manage the motor's speed and direction. The ESP8266 microcontroller was used to control the BLDC motor, with the programming done through the Arduino IDE. The ESP8266 was connected to the Ubidots platform for remote control and monitoring. An 11.1V 1000mAh LiPo battery was used to provide power to the BLDC motor. ESP Cam module along with GPS module was used for tracking of the rover.

Several issues were faced in making of LSR. Firstly, a huge floating tube was used as a base which created problems for overall design of rover. So, it was replaced with the rectangular container. Secondly, the support for floating tube was not been finalized as it should help tube to deploy smoothly into the water. So, Aluminum rods were chosen for support as it was light-weight and had a smooth surface. Third problem was regarding selection of motor. The rover required a powerful motor for its movement into the water. So, a 1000kV BLDC motor was chosen.

The 11.1V Li-ion Battery is selected due to its feature of rechargeability. It is a 1000mAh (milli Ampere per hour) battery.
Torque Calculation for motors:
Rpm=11100(Rotations per min)
Power = 150W
Torque = 1.31kgcm



IV. TESTINGS

This prototype is tested on various factors like durability, its strength, weight of the prototype. The base is tested to be lightweight and strong to provide

the foundation of the project, hence for this we tested a inflatable tub but due to its unstable nature and uneven and soft surface it wasn't durable. To counter this problem the prototype's tub is replaced by a plastic tray as it was more stable and rigid and provided proper support.

The frame of the project is meant to give support to the components along with the tube to save the person, for this aluminum rods are used as they are both lightweight and rigid as well as durable which are ideal requirements for the frame.

The tube is held with a servo motor and its rotation allows the tube to be restrained or released according to the conditions.

V. RESULT AND DISCUSSION

This prototype is really helpful to increase the survival rates of people facing water emergencies by providing them the necessary help needed before actual help arrives. This project will reduce the number of casualties faced yearly that is approximately 236000 worldwide to a huge extent. The model is designed to release a tube to the person in distress and is powered by a brushless dc motor which will provide the rover with faster speed to reach the person in less amount of time. The project is remote controlled and can be controlled manually from a distance so it's safe for both the person in distress and the person providing the assistance. The camera and GPS module will help to track down the person as well as the rover in case of limited visibility.

To conclude this project will help to increase the safety around places like pools and beaches and other water bodies and can provide timely rescue for people in case of any accidents. The prototype can further be modified by more research and development in its base structure which will increase its capabilities and scale of life saving to a huge rate.

VI. FEATURES

This prototype is equipped with a brushless dc motor and a big fan to provide more force to the rover to be pushed forward.

The prototype of this model consists of floating cylinders (The plastic bottles) to help increase the buoyancy of the model and making it more stable while in water.

The releasing mechanism is made up of simple servo motor holding the tube back by obstructing it.

The frame is made as an incline so that the tube will slide down to be delivered to person in distress.

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