A Review Paper On Underwater Vehicle For Deep Water Inspection

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Abstract- *With increasing demand in underwater exploration many industries require underwater intervention, in such cases underwater vehicle comes under limelight. This paper introduces a Remotely Operated Vehicle (ROV) which is basically an underwater vehicle used for underwater intervention in many industries. The Remotely Operated Vehicle (ROV) proposed in this project is an observational class ROV equipped with Raspberry pi 4 and onboard video camera for getting the live video feed. The main goal is to capture underwater video and read data from sensors by communication in real time via ethernet protocol, the motion control is done by transmitter and receiver on ground. The ROV in this project moves with four Brushless motors mounted on a design ensuring good buoyancy. ROV can be used for both deep waters as well for shallow water applications.*

Keywords- Underwater intervention, observational class ROV, Raspberry pi4, Ethernet protocol, Brushless motor.

I. INTRODUCTION

Remotely operated vehicles also known as ROVs are tethered underwater vehicles which are used for underwater exploration. Remotely operated vehicles were first used and funded by the US navy in the 1960-80's for deep-sea exploration and to recover submerged objects from the ocean floor. These vehicles were adequate to help deep-sea exploration, later advancement in technologies helped the ROVs to work upon on different industries. Remotely operated vehicle in today's world, are in great trend for oceanic research and other underwater activities. The technology used in some years ago did not meet the needs of the industries due to loss advancement in technology. Nowadays there is many ROVs which are more advanced and can be used for small, medium class ROV have power of around 50 hp and large size can handle more pressure as compared to others and are used for oceanic trench research. This project is an observation class unmanned underwater vehicle whose priority is to collect real time data elementary between vehicle and the operator for a successful mission. The ROV system in this project is based on a definite choice for covering a certain task categorized by its own size, depth, capability and as well as proper stability.

II. PROPOSED METHODOLOGY

A. Electronic System

Remotely operated vehicle's key element for managing every other component is raspberry pi 4b+ model powered by a 5v power bank of 2.4A. Raspberry pi cam module is connected to the camera module port for video feed. The video output of the rasp-pi cam is given over internet later to the display. The raspberry pi module will be connected to the surface through ethernet cable for live video feed and representation of various parameters like temperature, depth, etc. A 11.1 V 1000mAh Lithium Polymer Battery Pack is used for powering the 2200KV Brushless Motor. For controlling the thrusters, we use Fs-i6(Flyskyi6) transmitter and receiver. BME280 gives the temperature, humidity as well pressure reading. MPU6050 is a 3-axis axis Acceleration + Gyro Breakout (MPU-6050) is a great motion processing module.

B. Software System

Since we are using raspberry pi module, we would be using Raspi-OS for its functioning. For configuring the camera module, we would require terminals of Raspi - OS to get live feed of the underwater scenario through ethernet by enabling SSH and VNC. We are using python3.x ide or the terminal for accessing the sensor reading and computation. Adafruit or importing matplotlib for converting the sensor reading into visual reading. Raspberry Pi OS is being used to program the Raspberry pi module by using python language for its working according to the necessity BME280 (pressure, temperature and humidity sensor) Will be connected to it the representation the magnitude of the sensor will through Adafruit software.

III. BLOCK DIAGRAM

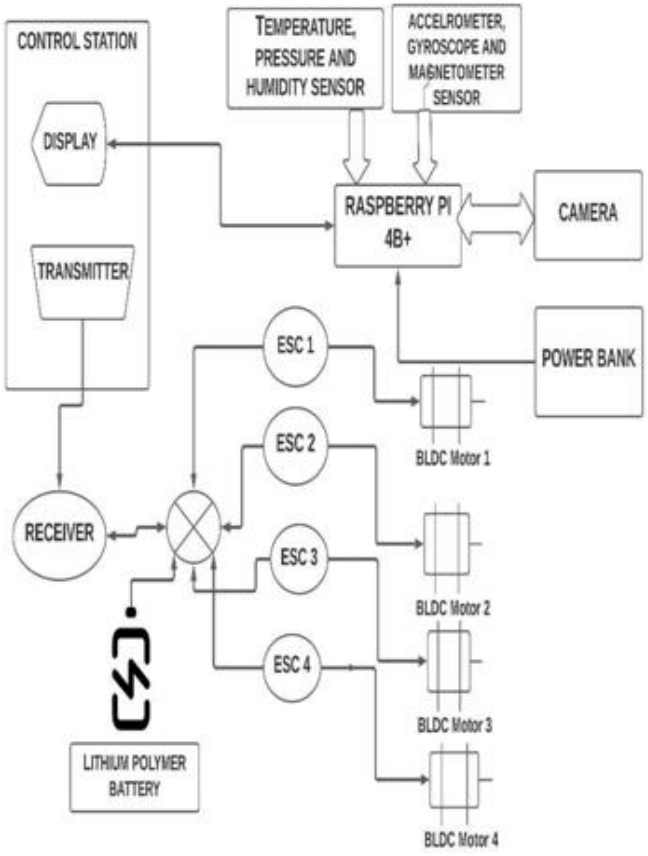

Fig.1 Block diagram Of Proposed System

IV. BASIC OPERATION

The Remotely Operated Vehicle is operated and controlled by Raspberry Pi module and a separate transmitter and receiver is used for controlling the movement of the vehicle underwater. The raspberry pi module connected with the BME280 and MPU6050 sensor modules collect the temperature, pressure and humidity and rotational velocity, inclination of the vehicle underwater respectively and send it to the ground by using ethernet cable which is also connected to the raspberry pi. For fetching the video of the underwater scenario raspberry pi cam is connected to the camera port of the raspberry pi module wherein the required software configuration for the raspberry pi cam provides a video feed to ground through internet. The raspberry pi and the ground are connected to the same network which enables the video to be seen over internet using a software called VNC viewer for controlling the vehicle from the ground four thrusters is mounted on the body of the vehicle with proper orientation providing good stability to the vehicle. Thrusters are BLDC motors, they are connected to Electronic Speed Controller (ESC), they help in motor speed control. Since motor speed control is necessary during the deployment of the vehicle transmitter and receivers are used. They are used by the operator on ground and control different movement of the vehicle. Fly-sky FS-i6 transmitter and receiver are used wherein the transmitter has 6 channels and the receiver has 10 channels.

V. CONCLUSION

This paper proposes a study of remotely operated underwater vehicles that will be used to do surveillance and more to keep track of any movements, blockers under the water where humans personally access the place easily to monitor. ROV will give us insights about any blockers or will be able to locate the faults within mini structures This underwater vehicle can be handled with minimum care and effectively reduce the manpower and give quick results.

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