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Under Water Vehicle for Rescue-Remotely Operated Underwater Vehicle for Rescue Without Human Occupant

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Abstract **--Till now the rescue team has to suffer a lot in the harsh oceanic environment to find and save human life. They are taking very high risk to accomplish their mission, since 30 seconds is the average time a child can struggle at the surface before drowning, for adults it's about 60 seconds, so strictly time bound rescue activities are desired. For a life guard or water rescuer every second counts when it comes to rescuing a panicking victim as they rush through the heavy waters to a drowning person they mentally urge to hang on. Scuba divers are assisting the rescue team to handle this situation, and the mission is time consuming, expensive, not much effective and more risky. Now we are proposing an underwater remote controlled vehicle without human occupant for human detection and rescue. Human presence is detected and the location is shared to the rescue team and assisting their operations through live video, by making use of this live video we can also use our ROV for Pipe line leakage inspection, study of marine life and as a helping aid for fisher men.**

Keywords--- Flight controller, Marine study, ROV, Underwater commissioning, Underwater rescue.

I INTRODUCTION

The project is entitled the "UNDER WATER VEHICLE FOR RESCUE". The main objectives include time bound and accurate rescue activity with aid of a ROV. The accuracy of operation is implemented by real time monitoring through live video streaming. The live video streaming enables our system for pipeline leakage detection and for marine life study. ROVs are simply vehicles which operates without human occupant. These can be operated by radio control, or through a cable or line connecting the vehicle to the operator's location. An added feature of our project includes an airbag set up, which can be triggered by the user under system failure and can lift up to 70 Kg. In our proposed project we are focusing on ROV the basic advantage of an ROV is its flexibility, unlike a diver the vehicle can operate under water for long hours. The possibility to install additional sensors of or appliances increases its functionality. The self-stabilization of flight controllers allow the operator to operate in high comfort despite of complexity of conditions. The communication between the operator and the vehicle is secured by means of a tether. The control instructions from the user and the return data from the vehicle to the operator, such as live video are transmitted wirelessly using radio waves. The various phases our project includes: Structural design of ROV, setting up of flight controller, GPS, telemetry module and air bag.

II LITERATURE SURVEY

In paper [1] it is a surface vehicle using PIR sensor.PIR sensor will detect the human presence and the information is displayed over LCD display. It has two parts transmitter(ATMEGA 328) and receiver side.It consists of a DC motor to move the robot left, right, forward and backward with the help of a obstacle sensor.The paper [2] includes both the features of USBL and SONAR in order to improve the presence and it includes buddy slave, buddy observer and buddy guide.The proposed algorithm significantly increase safety in scenarios where underwater vehicle has to maneuver in close vicinity to human diver who emits air bubbles that can deteriorate tracking performance. In addition to the tracking filter development, special attention is devoted to adaptation of the region of interest within the sonar image by using tracking filter covariance transformation for the purpose of improving detection and avoiding false sonar measurements.

In paper [3] some algorithmic techniques are used for detection of man-made objects on sea floor. It also includes robotic assistance to detect and then track the divers. It reduces noise effect by utilising thresholding algorithm and is more immune to multiple target reflections. The paper [4] is an ROV with HD camera, which is similar to our concept, but here we are seeking for underwater vehicle with airbag.In a murky water search, the standard camera on the underwater drone will work similar to a human eye; they will have a hard time navigating through the water. This is where the navigational sonar systems come into play. From the surface, the ROV pilot navigates through the low visibility water solely using the sonar's heads up display (HUD); similar to how a pilot would rely on their plane's instruments when they fly through a fog.

III METHODOLOGY

The basic block diagram of system is as shown in figure below, the device mainly consists of a remote control, ROV and an air bag system. The remote control is associated with a telemetry receiver and a RF transmitter. The telemetry receiver will capture the live videos transmitted from the ROV and is helpful in observing underwater situation. The instructions to drive the ROV are transmitted from the transmitter section mounted over here. Under water vehicle is associated with transceiver unit which will transmit the live videos towards the user end and receives the control signals fed from

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the remote control. The remote control is also associated with a provision for providing trigger for exploding air bag. Flight controller is main controlling element whose inputs are provided by receiver unit in the ROV.

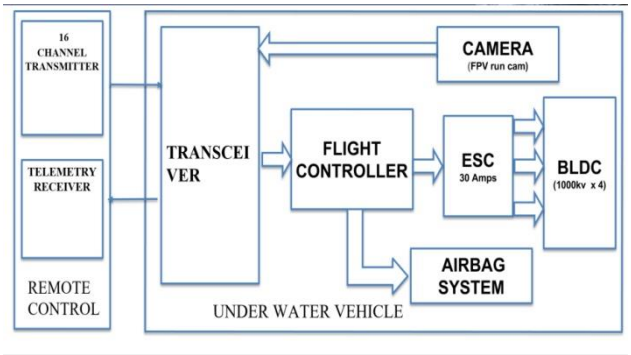

Fig 1: Block diagram

Here the transmitter has 16 channels and out of these 4 channels are used for controlling , others can beused for future advancements .These controls are Throttle, Pitch, Roll, Yaw .In this 16 channel transmitter, 4control signals and one auxiliary input for triggering the air bag is used. The RF receiver section is withinROV and accepts the input or control signals fed from the user through the transmitter (remote controlstick) and informs the flight controller to take necessary action. There are 5 outputs from APM, 4 outputswill drive the motors and one is attached to airbag. Live video is captured using camera module within theROV and is transmitted continuously using video transmitters installed over there and the videos can beseen using goggles (ESANE goggles).Li-Po (3 s) batteries are used to power the ROV. Here we prefer rugged aluminium CNC frames in order to have high durability. In order to occupy thedifferent hardware inside vehicle a rectangular box of glass is used.In the quad copter, the four motor areplaced at the edges of the arms of the frame. Under any emergency condition we have included an air bagset up which is triggered by the RF transmitter .Air bag explodes when triggered and bring ROV above water surface under system failures if any and it will lift weights up to 70 kg. The basic set up includes athick stainless cylinder in which provision for filling air and releasing the air is provided .The compressedair enters the cylinder through inlet valve and air is given out into a bladder with the aid of servo. The setup is highly sealed using M seal.The flight controller sends information to the motors via their electronic speed control circuits. Basically, the movement on the remote control sticks sends signals to the central flight controller. This central flightcontroller sends this information to the Electronic Speed Controllers (ESCs) of each motor which in turndirects its motors to increase or decrease speed. Remote Control Stick Movement → Central Flight Controller → ESCs→ Motors and Propellers→ Quadcopter Movement. In the case of emergency or drowning person hold the device external triggering for air bag is given and the servo attached to the outlet valve of air cylinder opens the valve and fills the bladder with air.

A. ADVANTAGES

- Compact in size.
- Wide range of access (upto 4 Km).
- Portable.
- Airbag setup under emergency.
- User friendly and easy to control.
- Easy to troubleshoot.

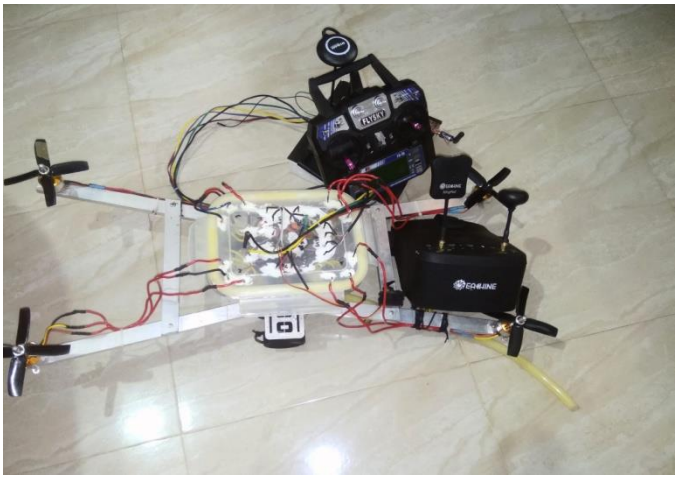

Fig 2: Final prototype of the proposed system

B. DISADVANTAGES

- No set up to carry the person directly to shore.
- The glass container should be well maintained.

IV ACKNOWLEDGEMENT

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V CONCLUSION

We have now developed an underwater ROV with time bound rescue mission which is highly effective and less risky .It is also cost effective and reliable .The main thought behind proposal is lack of a proper rescuing system which is not able to lift up the person .The future scope of our product relies on increasing the time of flight and positioning system improvements

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