



Under Water Surveillance and Rescue Drone with Camera

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ABSTRACT: *Highly developed drone technology enables the use of drones in a wide variety of areas. However, those drones are mainly used in the unmanned aerial vehicles. We believe that underwater drones will become a big research topic and find a market in the near future. We developed an underwater drone with a wide angle camera acting as the “eye” of the drone, an arm which acts as a helping hand of the drone, and also implemented a triggering mechanism for emergency purpose. The designs are based on the open source hardware and will be shared as an open-source for contributing to the innovation of manufacturing including drone. The function of the wide angle camera is to update the live video footage to the surface control unit. The underwater drone was designed by extending the Cam module, arm, frame, and the printed circuit board designed by own team. As for the application of the underwater drone, we focused on to perform the Rescue Operation to save the person who is shrinking under the water, investigating Damages under the Ship Bottom, searching Loosed items, Under Water Search operations up to 45min, fish species in a natural lake to help protect the original environment. Experimental results show that the function of the underwater drone achieved at diving in the lake.*

Keywords: *Marine robotics, ArduinoNano, Sensor node, NRF24L01 module, video camera, Bldcmotors etc...*

I. INTRODUCTION

Ocean covers around 71% of the planet and 44% of the World’s population is living along coastline. Oceans is the main sources of many natural resources including oil, mineral such as nickel, cobalt, even salt and sand.

Now a day’s, main problem in Seas and Lakes is people are falling / grabbing in to water by the force generated by the water, Damages under the Ship Bottom generated by the sea, Loosed items Under Water, etc... They are many types of rescue systems are available in the world which are operated on the surface of the water areas only but not work under water perfectly. The profficial divers also stay up to max 20Min under the water it is due to the lack of sufficient Oxygen levels under water. Now a day the UAV vehicles are highly developed drone technologies enables the use of drones in a wide variety of areas such as in aerial photography for appreciating the beauty of nature, in natural disasters where direct human intervention is impossible, or in agriculture for spraying pesticides to exterminate noxious insects. Furthermore, Amazon is preparing to use drones for delivering packages to customers. In a word, drone technology brings innovation and opens new markets. However, these drones are limited to the unmanned aerial vehicles. We believe that underwater drones, which are autonomous robots capable of moving and operating in the water, will become a big research topic and find a market in the near future.

A camera acting as an “eye” is an essential component of a drone. A grabbing Arm is used to help to push / pull objects and classifying the objects. For example to perform the Rescue Operation to save the person who is shrinking under the water, investigating Damages under the Ship Bottom, searching Loosed items, Under Water Search operations up to 45min it may help to investigate and observes fish species

in a lake, check the aging process of the walls of a dam, and so on.

We developed an underwater drone that combines the hottest keywords in today's drone technology: "Wide angle camera", "underwater drone", "Rescue", "Surveillance", "Inspection", "deep learning", and "open-source hardware". Our model is designed based on open-source hardware, is equipped with a function of wide angle camera, and has the ability of transmitting live video footage. The body was designed using a free software application for creating solid 3D computer-aided design objects (Open CAD). The printed-circuit board was designed with frizzling. The underwater drone was equipped with wide angle camera lenses. The goal of this research was to use the underwater drone for investigating and observing the lakes, seas, and so on.

II. OBJECTIVE

The main aim of underwater surveillance and rescue drone with camera is to save the persons who are shrinking under the water, investigate the damages under the bottom of the ships, searching for the missing pieces and also used for the research operations under the water.

III. LITERATURE SURVEY

Here we have taken some of the existing systems for Underwater drones. Lin Meng, Takuma Hirayama. They proposed a underwater drone for investigating fish species in a natural lake to help protect the original environment. Fish recognition is based on deep learning, which is the biggest topic in the artificial intelligence research field [1].

In [2], Innovative Water Quality and Ecology Monitoring Using Underwater Unmanned Vehicles by Rui L. Pedroso de Lima, Floris C. Boogaard. In [3], New concepts for smart ROV to increase efficiency and productivity by Choi. In [4], Simulation of Autonomous Underwater Vehicles (AUVs) Swarm Diffusion Enrico Petritoli, Marco Cagnetti and Fabio Leccese. In [5], Problem identification for underwater remotely operated vehicle (rov): A case study," Procedia Engineering, vol. 41, pp. 554 – 560, 2012, international Symposium on Robotics and Intelligent Sensors by Azis, M. Aras, M. Rashid, M. Othman, and S. Abdullah.

Another reference we have considered is Beneath Water Vehicles for bury Disciplinary Measurements by Xuri Yu, Tommy Dickey, James, Bellingham, Derek Manov, and Knut Streitlien. An underwater remotely operated vehicle (ROV) could be a mobile golem designed for aquatic work environments. Device is typically distributed through copper or fibre optic cables. a person's operator sits during a shore-

based station, boat or submarine bubble whereas observation a show that shows what the golem sees. This paper describes the look and implementation of Underwater Wireless Rover by work the cable with a wireless measure. it'd facilitate to avoid some quality problems, like movement limitations thanks to the cable's length, and therefore the risk of cable enlargement in rocks or unreal instrumentality. And there lies an excellent form of its applications. it may be used for obtaining the live video or still footage of the underwater life and every one the underwater activities to find out regarding the underwater life. It makes the duty for diverse, rescuers and gem collectors easier because the rover offers the images, live video and every one the opposite relevant details necessary for having a correct information regarding the underwater parts [6].

Another one is 'ZYRA' by Prof.Sharma.P.B, Prof .Sinha.R.K. It's associate degree autonomous underwater vehicle. It presents the look and development of a standard littoral autonomous underwater vehicle referred to as "ZYRA". Its half dozen degree of freedom for performing arts the subsequent tasks underwater: the event has been divided into five sections specifically mechanical style and fabrication, embedded and power systems, management and software system, image process, and underwater acoustics. a completely useful model is tested during a self-created arena with totally different tasks opened up during a shallow water surroundings. 2 totally different experimental results are: results of the navigational instrument module and variety of no-hit outcomes per total variety of trials for every task [7].

IV. IMPLEMENTATION

In our project we are using Arduino Nano which is interfacing with video camera, BLDC Motor acts like Thrusters and Servo motor as grab arm for rescue operations. Lights and batteries are also connected to the Arduino Nano board.

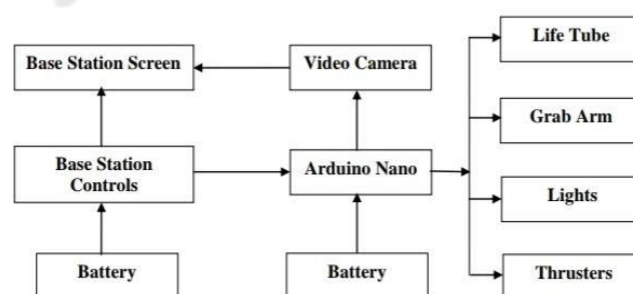


Figure 1: Block Diagram

This project model has use of NRF module for transmitting control signals from controller to drone. By using these

signals we can control the operations of underwater drone, such as movement, holding...

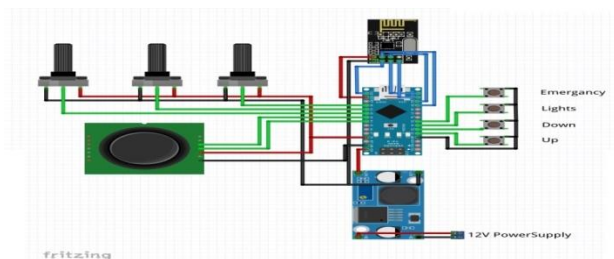


Figure.2: Circuit Diagram of Underwater Drone Controller

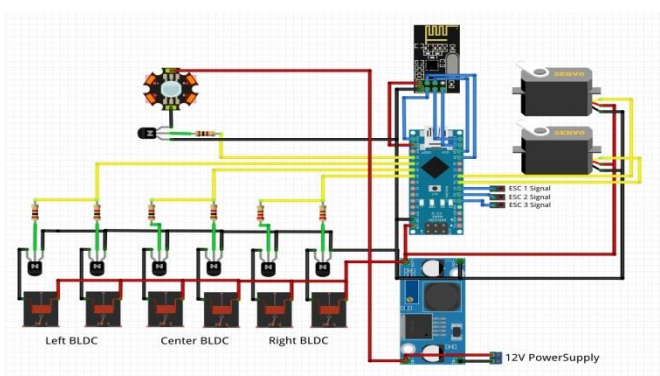


Figure.3: Circuit Diagram of Underwater Drone

V. RESULT

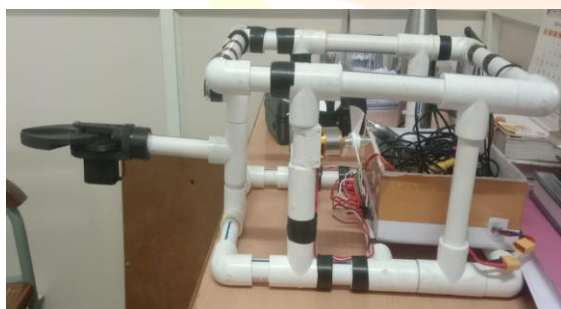


Figure.4: Side view of proposed prototype



Figure.5: Underwater drone control

CONCLUSION

The development of underwater surveillance and rescue systems is an important step in ensuring the safety of swimmers and divers. By using advanced technologies such as cameras, and robots, these systems can detect and track underwater objects, monitor water conditions, and alert rescue teams of potential dangers. With the right technology, these systems can help save lives and reduce the risk of drowning.

FUTURE SCOPE

There are many possible future implementations for an underwater surveillance and rescue drone with a camera. Here are a few examples: Improved navigation and control, Enhanced imaging capabilities, Increased durability and endurance, Integration with other technologies, Multi-drone networks, AI and machine learning.

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