PC BASED REMOTE OPERATED UNDERWATER VEHICLE FOR MARINE SURVEILLANCE

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ABSTRACT

Underwater robot is the advanced method for executing the works of humans in sea. It will be an appealing alternative for the present human surveillance system. Maritime industry’s most important concern is safety. At present the ships exterior damage is surveilled manually by humans. The proposed system aims to provide details of underwater robot technology and its applications. So main objective should be capable of moving the robot in any direction, hence, we have provided six motors to move in any directions by human required. We also provided underwater camera for surveillance the ship.

Key words: Mobile robots, Propulsion system, underwater vehicles, Autonomous underwater vehicles (AUVs), Remotely operated vehicle (ROV).


1. INTRODUCTION

OCEANS are the main resource of the energy and chemical balance which sustains mankind whose future is very much dependent on the living and non-living resources in the oceans. Ocean’s activities are also critically relevant to climate changes. Therefore, various studies have been conducted for ocean exploration and intervention. Underwater vehicles have been a popular and effective means for ocean exploration and intervention as they make it possible to go far beneath the ocean surface, now a days there are so many robots are working for several applications.

Basically the robots are developed with the advancement technology which is available on the basis of current trends. There are three types of underwater vehicles. 1) Manned submersible vehicles, which can carry out complicated tasks because of human intelligence. However, they have short endurance due to human physical and psychological limitations, and are costly to operate the endeavour done to ensure human safety.
2) Remotely operated vehicles (ROV): They are unmanned, tethered vehicles with umbilical cables to transfer power, sensor data and control commands between the operators on the surface and the ROV. They are usually launched from surface ships, which can also carry out complicated tasks via operation by human pilots on the surface ships. Even though their operations are often limited by operator fatigue, they are free from the safety concern of on-board human operators and have almost unlimited endurance in the ocean, compared to manned submersibles. However, the dragging force on the tether, time delay, and operator fatigue make ROV difficult to operate. 3) Autonomous underwater vehicles (AUVs) or underwater robots: They are unmanned, tether-free, powered by onboard energy sources, equipped with various navigation sensors such as inertial measurement unit (IMU), sonar sensor, laser ranger, and pressure sensor, and controlled by onboard computers for given missions. They are more mobile and could have much wider reachable scope than ROV. In this article, the robot will control under the water using wired systems. Hence, the robot will be operated under the water to surveillance ship hull and propeller of the ship. The video output can be taken by the pc through wireless underwater camera. The experimental results demonstrate that the motion characteristics of this type of robot are acceptable, and the design is worthy of further research.

1.1. Advantages
- High reliability.
- Good performance.
- Less expensive.
- Lower power consumption.
- No humans get harmed in the mission the robots do.
- We can save money by making robots than sending humans.
- Robot is less likely to get hurt or die on the mission.
- Go underwater longer and deeper than humans.
- Deployment costs are much lower since these vehicles do not have any bulky complex support equipment requirements.
- Long term economic benefits owing to dramatic improvement in data quality
- Better understand water and environment.

1.2. Applications
- Protect the resources from pollution and efficient utilize them for human welfare.
- Used to watch under the ship for surveillance propeller and ship hull.
- Communication and navigation network nodes.
- Design of control methods for next-generation autonomous underwater vehicles.
- Image evaluation and object recognition with modular and intelligent underwater cameras.
- Development of systems for user support in remote controlled underwater vehicles employing virtual immersion methods.
- Development of biologically inspired and energy efficient methods of transport for underwater vehicles, such as oscillating systems.
Design of methods for autonomous manipulation and mission planning of robot arms in underwater applications, particularly with state of art technology, such as “visual serving”.

2. HARDWARE REQUIRED FOR REMOTELY OPERATED UNDERWATER VEHICLE
The required components are

- Microcontroller
- DC Motor
- RS232
- MAX232 µc
- Wireless camera
- Relay with driver Circuit
- Robot Model

3. LITERATURE REVIEW
The Indian Underwater Robotics Society or IURS (registered as Intelligent Unmanned Robotics Society) is India's first and only non-profit research organization NGO for the advancement of low-cost robotics and intelligent systems research in developing countries. IURS also imparts education in it is focus areas to improve understanding of and representation in intelligent systems research within developing countries. IURS has held the distinction of being the first Indian team to design India's first operational AUV to compete at the AUVSI's International Autonomous Underwater Vehicle Competition. IURS is also the first and only Indian research and education NGO to operate in the field of robotics and intelligent systems. Ever since its inception in 2004, IURS has made many contributions towards furthering robotics education and research in India through involvement with government, universities and local and international organizations. In recent years, robotic underwater vehicles have become more common in a variety of industrial and civil sectors. They are used extensively by the scientific community to study the ocean. For example, underwater robots have been used to discover or study a number of deep sea animals and plants in their natural environment. Now, a new class of underwater robot has emerged that mimics designs found in nature. These 'bio mimetic' vehicles can achieve higher degrees of efficiency in propulsion and maneuverability by copying successful designs in nature. The EU-funded FILOSE project (Robotic fish locomotion and sensing) is addressing a key bottleneck for underwater robotics, namely the problem of understanding how fish sense the underwater environment. A fish swimming in its natural environment is able to sense the flow of water around it and react to changes in flow patterns. FILOSE project partners, led by Tallinn University of Technology's Centre for Bio robotics, believe that once they understand how a fish works, they can potentially apply that knowledge to the development of better underwater robots. The project has also established new hydrodynamics research facilities and trained personnel who continue the work begun under FILOSE. Taken together, the results promise to lead to new underwater technologies that could help the oil and gas industry, underwater humanitarian demining, environmental monitoring, search and rescue operations, anti-terrorist activities, harbor surveillance, coastal security and fisheries management, and more. All will feel the impact of more efficient and better-performing underwater robots. An Open ROV Mexico, They’d each built their own remote-operated underwater vehicle with kits from Open ROV, which is trying to make underwater exploration and research accessible by open sourcing its design and selling kits for $849. Some 250 of the first Open ROV model
have been sold. Next, Open ROV users plan to search for sunken meteorites in glaciers and old mahogany in Canada and next for Open ROV, the company, it has raised $1.3 million led by True Ventures, in order for the team of three to further refine and distribute its design and start a video community on its own site. Open ROV has a lot in common with 3D Robotics, the drone company led by former Wired editor Chris Anderson. They are both closely associated with the Maker movement, they’re neighbours in Berkeley, Calif., and they’re both now backed by True Ventures.

4. REMOTELY OPERATED UNDERWATER VEHICLE

A remotely operated underwater vehicle, commonly referred to as an ROV, is a tethered underwater vehicle. They are common in deep water industries such as OFF SHORE HYDRO CARBON EXTRACTION. While the traditional abbreviation ”ROV” stands for remotely operated vehicle, one must distinguish it from remote control vehicle operating on land or in the air. ROVs are unoccupied, highly manoeuvrable and operated by a crew aboard a vessel. They are linked to the ship by either a neutrally buoyant or often when working in rough conditions or in deeper water a load carrying cable is used along with a tether management system (TMS). The TMS is either a garage like device which contains the ROV during lowering through the splash zone, or on larger work class ROV’s a separate assembly which sits on top of the ROV. The purpose of the TMS is to lengthen and shorten the tether so the effect of cable drag where there are underwater currents is minimized. The umbilical cable is an armoured cable that contains a group of electrical conductors and fiber optics that carry electrical power, video and data signals back and forth between the operator and the TMS. Where used, the TMS then relays the signals and power for the ROV down the tether cable. Once at the ROV, the electrical power is split and distributed between different components of the ROV. However, in high power applications, most of the electrical power is used to drive a high powered electrical motor which drives a hydraulic pump. The hydraulic pump is then used for propulsion and to power equipment such as torque tools and manipulator arms where electrical motors would be too difficult to implement subsea. Most ROV’s are equipped with at least a video camera and lights. Additional equipment is commonly added to expand the vehicle’s capabilities. These may include a still camera, a manipulator or cutting arm, water samplers, and instruments that measure water clarity, water temperature, water density, sound velocity, light penetration and temperature.

Figure 1 Block diagram of Remote Operated Underwater Vehicle
An autonomous underwater vehicle (AUV) is a robot which travels underwater without requiring input from an operator. AUVs constitute part of a larger group of undersea systems known as unmanned underwater vehicle a classification that includes non-autonomous remotely operated underwater vehicle (ROVs) – controlled and powered from the surface by an operator/pilot via an umbilical or using remote control. In military applications AUVs are more often referred to simply.

![Figure 2 PC Controlled Underwater Robot With Wireless Spy Camera](image)

5. CONCLUSION

In this article the authors introduce new idea for wireless robot control system which is used as a tool to perform a wired control on a group. To watch the hull and propeller of the ship. The wired robot control system contains 6 motors to control the robot in every direction and the video can be watched live through mobile or PC and the robot can be controlled trough PC. This system is easy to construct, low cost and it is easy way to surveillance the ship.

REFERENCE


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