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MARINE LIMPIADORA

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ABSTRACT

The goal of this project was to design and build a low cost, easy to use, portable, safe, and reliable ROV capable of being used for scientific research, while being run by students. We deployed ROV systems from the RSL in order to get a feel for how ROV's work. An in-depth survey was conducted with potential users, experienced users, and industry experts in order to understand what was required in an ROV and what to keep in mind when developing one. We developed several sketches of possible designs for our ROV and build several prototypes; getting feedback from our customer on each design. We tested resulting components of our system when appropriate before integrating the full system, ensuring a successful build. The system was used for real research missions in Lake Tahoe at the end of the year, validating the success of the ROV. Remotely operated underwater vehicles (ROVs) are remote control underwater robots driven by an individual on the surface. These robots are tethered by a series of wires that send signals between the operator and the ROV. All ROVs are equipped with a video camera, propulsion system, and lights. Other equipment is added depending on the specifications required. These include a manipulator arm, water sampler, instruments that measure clarity, light penetration, temperature, and depth. Team Aqua bot was determined to recreate such an ROV in order to fulfill a specific mission involving four separate tasks.

I INTRODUCTION

Vessels or structures that partially reside below the surface of seawater or freshwater are subjected to various levels of fouling by marine (saltwater) or aquatic (fresh water from lakes and rivers) organisms, respectively. At the base of the fouling mechanism for vessels and structures residing in sea or freshwater are biofilms formed on such structures, which constitute the glue between marine or aquatic organisms and the actual structure. The biofilms form and the fouling organisms attach to all subsurface structures, such as propellers, rudders, inlet and outlet ports, sonar housings, and protective grills, as shown in Figure 1. The more diverse or intricate a structure is, the more difficult and costly it is to remove the biofilms and the organisms. Hull and propeller performance may deteriorate over time because of biofouling and mechanical damage; thus, poor hull conditions may decrease the energy efficiency. Moreover, biofilms on the hull can affect the ship's dynamics by increasing drag and the required propulsion.

We know that with around 44% of the world's population living within 150 km of a coastline, it is evident that the marine environment plays a big role in human lives (Humans Settlements on the Coast). The ocean provides many resources to humans including oil, minerals such as salt, sand, gravel, and even nickel, iron, and cobalt can

be found. About 200 billion pounds of fish and shellfish are caught every year for human consumption (Ocean Resources). The ocean also provides a means of transportation, and a form of recreation. However our oceans have suffered from industrial run-offs, oil spills, over-fishing, and climate change. Give the importance of our oceans, the first motivation behind this project was the necessity to learn more about our oceans so we can learn to use these resources sustainably, efficiently, and intelligently because, if not, we will have to deal with the consequences. Oceans cover 71% of the planet and only 5% is explored (Oceans). Scientists have researched marine environments for decades, and marine technology has given them novel ways to explore this environment. Robotic systems have augmented scientist's tools for research. Scientists used to manually collect samples for later testing; they also had to explore the marine environment by diving and recording what they found. They were usually constrained mostly by human capacity, restricted by the inability to research and collect multiple data sets at once, the amount of time one can spend underwater, the depth that could be reached and/or the tiring nature of these missions. Conventional exploration methods are being replaced by robotic approaches, as they provide a more efficient and powerful solution to ocean exploration. These robotic systems have already given insight into previously unexplored areas. Marine robotic systems can range from tethered Remotely Operated Vehicles (ROVs), usually used in short missions (hours, days), to Autonomous Underwater Vehicles (AUVs).

When an object is denser than the surrounding water, it usually sinks while an object that is less dense will float. Similarly, when the object gains similar density to the surrounding water, it has the ability to float. The mechanism used by submarines to sink, float, and surface would be along this same principle.

The submarine body consists of two walls. The outer wall is strong and waterproofed while the inner wall is stronger and could resist immense pressures. The outer and inner walls of the submarines is also referred to as the 'outer' and 'inner' hulls while the much stronger 'inner hull' is also given the name, 'pressure hull'. The space between the two hulls is called the 'ballast tanks' and it is the space which allows the submarine to move around through changing the overall density.

II LITERATURE SURVEY

[1]. Method of Aquatic Diffusion exploitation Robotic sensing element Network:

The studies regarding ocean analysis, observance of marine organic phenomenon and abiotic parts life, submarine earthquakes and for analysis are with the assistance of beneath vehicle. whereas the present comes high price and fewer effective. to resolve this downside, we tend to use raspberry pi with wonderful options like image process, video streaming and its ability to figure supported net of things. a coffee price associate degreed an economical underwater vehicle are designed and its ability to live temperature, pressure, speed, and direction sensors.

[2]. Beneath Water Vehicles for bury Disciplinary

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.

[3]. 'ZYRA'

It's associate degree autonomous underwater vehicle. It presents the look and development of a standard littoral autonomous underwater vehicle referred to as "ZYRA". It's 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. 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.

[4] Sea sailplane

It's a protracted vary Autonomous Underwater Vehicle engineered for Oceanographic analysis. Ocean gliders are small, reusable designed to glide from the surface of the water to a programmed depth and back whereas activity temperature, salinity, depth-averaged current, and alternative quantities like Water Pressure surroundings, Sink, within the paper, saw tooth mechanical phenomenon through the water. Their low fluid mechanics drag and wide pitch management vary permit glide slopes within the vary zero. They're designed for missions during a vary of many thousand kilometers and durations of the many months. Ocean gliders are commanded remotely and report their measurements in close to real time via wireless measure.

[5] Design of Autonomous beneath water Vehicle:

AUV's have created a true revolution within the field of ocean analysis. Throughout the last twenty years AUV were reworked from significant and valuable instrumentality for ocean educational analysis into a tool for determination a good vary of problems in several theoretical and sensible fields as well as business and military fields. As a result the load capability necessities, requirements for procedure capabilities, autonomous and acoustic necessities have big for such devices. Hereby low price and flexibility are important. Therefore, information of trends within the development of AUV is that the key not solely to our aggressiveness during this space and to change current analysis of the ocean, however additionally the defence of our country, confused and within the coastal zone. to spot these trends, we'd like to initial communicate the history of the AUV, verify however they need evolved and adjusted since its origination.

[6] Hybrid AUV

It is for Shallow Water Reef Navigation reef environments that are extremely unstructured build them troublesome for current robotic vehicles to navigate with efficiency, trendy analysis and business platforms have restricted autonomy among these coral reefs. It needs tethers and important external infrastructure for observance them. This analysis outlines the event of a replacement robotic vehicle for underwater observance and measurement in extremely amorphous environments and presents extraordinary results. The hybrid AUV style developed by the CSIRO robotic reef observance team realizes a compromise between sturdiness and increased performance. The vehicle could be a new era in AUV style specifically centred at providing an inexpensive analysis capability that keeps track of our surroundings through unaided navigation, cooperative artificial intelligence, sensing element

network distribution and information harvest home. A principle aim of the analysis was to construct a completely autonomous underwater vehicle for fewer than 5.5L and needs but one person/operator for operational the AUV. Primary tasks that are known to be performed autonomously by the vehicle are Video transects, Water quality observance and Plume observance. The flat thruster is capable of manufacturing in way over ±8N at efficiencies larger than hour. The 3-part motor is self-contained in this it's its own motor driver, propeller and communication hardware and uses the will Bus communication protocol to manage the motor. observance through unaided navigation, cooperative artificial intelligence, sensing element network distribution and information harvest home.

III METHODOLOGY

A. Block Diagram of Proposed System

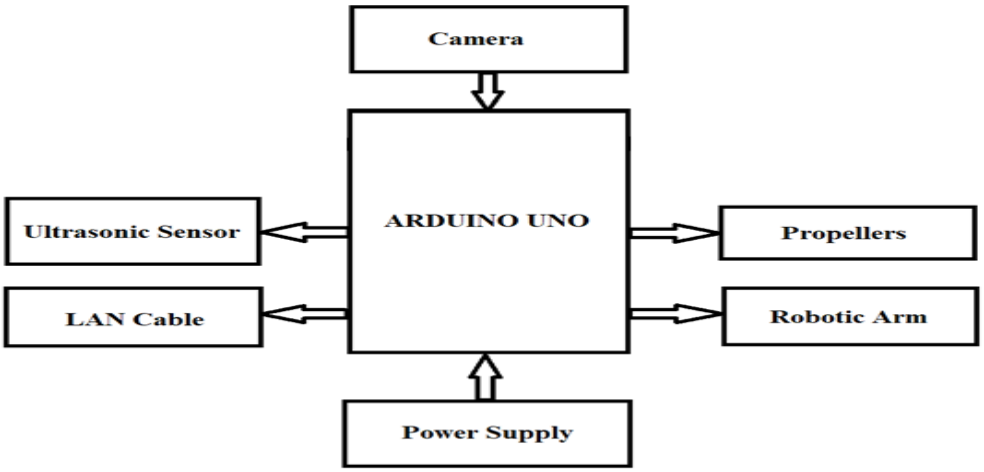

Fig.1 Block diagram of proposed system

Fig.1.Shows propellers and sensors being interfaced with the Arduino UNO board for various performance.

B. System Components

- Arduino UNO

The Arduino Uno is an open-source microcontroller board based the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010.The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.[1] The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable It can be powered by a USB cable or a barrel connector that accepts voltages between 7 and 20 volts, such as a rectangular 9-volt battery. It is similar to the Arduino Nano and Leonardo.The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production

files for some versions of the hardware are also available .Barcode Reader.

- ESP32 Wi-Fi module

ESP32 is a series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor or a single-core RISC-V microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. ESP32 is created and developed by Express Systems, a Shanghai-based Chinese company.

- Gripper

Mechanical Gripper is one of the most broadly useful effectors. In its least composite structure, it consists of two fingers which can open and near pick and place a book. Few of the simulation tasks allow you to perform describe in below list: Analysis of kinematics robotic manipulators

1. Offline programming
2. Design of different control algorithms
3. Design of the mechanical structure of robots.

- DC Motors

A DC motor is any of a class of rotary electrical motors that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by induced magnetic fields due to flowing current in the coil. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.DC motors were the first form of motors widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor, a lightweight brushed motor used for portable power tools and appliances can operate on direct current and alternating current. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.

- Robotic Arm

A robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm; the arm may be the sum total of the mechanism or may be part of a more complex robot. The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement.[1][2] The links of the manipulator can be considered to form a kinematic chain. The terminus of the kinematic chain of the manipulator is called the end effector and it is analogous to the human hand. However, the term "robotic hand" as a synonym of the robotic arm is often proscribed.

IV CONCLUSION

Fuel cells provide many advantages for different areas such as marine industry. Maritime industry has been complied with new regulations and rules by IMO for protecting environment. Therefore, new energy methods required to thrust these kinds of vehicles. In this project, ROV is thrusted by fuel cell instead of battery systems.

Therefore, aim of the study is increasing awareness of new energy source applications for marine vehicles. According to calculated total resistance and determined velocity value, fuel cell is selected for this project. Hereby, fuel cell application for ROVs could be a good alternative comparing with conventionally systems.

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