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# Underwater Drone

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**ABSTRACT**

***Underwater Drone is an IOT module which can be used for spying and spectating purpose. This mini submarine model can run on the surface of water and can dive inside water. These floating and submersing actions are achieved by small ballast tank. Water is filled inside ballast tank while diving and pumped out while floating. Water flow inside ballast tank is controlled by a DC motor pump. Propeller at the back of drone makes it to move forward and backwards. Direction is controlled by servo motor ruder. Altitude is controlled by servo motor flaps. Vertical up down is controlled by additional two vertical propellers at both ends. A small WIFI camera is used for underwater spectating.One of the major developments of technology is IOT (Internet of Things). IOT is an embedded system in which we can program our needs and execute it with help of IOT components***

## 1. INTRODUCTION

Under water drone is for spying the marine enemies and attacking them in case of combat times. In this project IOT is used to make the updated version of torpedoes used in the submarines. The underwater drone is capable of diving under the water and it can send the video data to the operator through wireless signals. The drone is also can be controlled wirelessly via transmitter and receivers.Hence it also can be represented as anti-torpedo missiles. By combining the above mentioned features a small prototype of underwater submarine drone is made.As it is small and narrow it can go into small pores under waters in marine and can be used for taking photographs of sea creatures and can be used in underwater studies.

Advanced technology has become the integral part of our life [1]. To satisfy the need of the society, almost in each work, we use the technology [2] [3]. In current era computer science is major subject [4]. It has many real life applications such as cloud computing [5], artificial intelligence [6], remote monitoring [7], Wireless sensor network [8, 9, 10], internet of things [11, 12, 13], Neural network [14, 15], FSPP [16, 17, 18], NSPP [19, 20, 21, 22, 23], TP [24, 25, 26], internet Security [27], uncertainty [28, 29, 30, 31, 32] and so on. Technology is the mode by which user can store, fetch, communicate and utilize the information [33]. So, all the organizations, industries and also every individual are using computer systems to preserve and share the information [34] . The internet security plays a major role in all computer related applications. The internet security appears in many real-life applications, e.g., home security, banking system, education sector, defense system, Railway, and so on. In this manuscript we discuss about the protection of authentication which is a part of internet security.

### 1.1 Scope for future developments

In future it can be updated with long range transmission under water and can be made as a powerful combat missile under water. Radar system can be fixed so that it can detect the other approaching threats.In future there is a lot of scope for developing the weapons by our own country.Increasing the fire power is very important as all the other countries are increasing their power day by day. In future there may be a lot more technologies can be developed like anti-submarine missiles, anti-torpedoes missile. It may ensure the naval security of our country.

### 1.3 Problem Description

The traditional torpedoes are self-propelled. They are unidirectional and travels in a straight line when fired. Hence there is a chance of missing the target or hitting on some other objects. If the target is missed the enemy gets alert and it also leads to wastage of weapons during war times. It also leads to loss in cost as the torpedo missiles are costly. During the detection of enemy submarines if we use battle ships to confirm their presence there is a chance of our battle ships attacked by the enemy submarines. In such case we can use the remotely controlled underwater drones for spying them. Hence the battle ships can stay in safer distance from the range of enemy torpedoes and can send the underwater drones into water. The drones in turn controlled by the operator wirelessly and can spectate the presence of enemy submarines and other foreign objects. If they found the foreign object is potentially harmful, they can hit it with the help of our torpedo drone and can destroy it. It can ensure the security of navy.

The problem in underwater protection is we cannot cover the entire area and cannot send huge forces hence there is a high possibility of enemy invasion in these areas. Hence new development in approach of protection is needed. And there is a large need in producing cheap and own weapons if we buy weapons from other countries, we cannot use it against them if they invade and there is a possibility that they put stay to the usage of their weapons if there is a attack with their friendly countries. This will be a great drawback in ensuring the security of nation.

## 2. PROPOSED ARCHITECTURE

The architecture contains the following components
Hardware Requirements:

- ARDUINO UNO
- ZIGBEE TRANSMITTER
- GEAR MOTOR
- SERVO MOTOR
- SUBMERSIBLE MOTOR PUMP
- 7805 VOLTAGE REGULATOR IC

Software Requirements

- ARDUINO IDE

### 2.1 Future works

This project is developed for Short range. The main future enhancement is to make it long range so that it can be operated from long distance. Satellite connection is an updated method long range connection. This make the operator to control the underwater drone from anywhere in the world.

## 3. AUTONOMOUS UNDERWATER VECHICLE

A self-administering lowered vehicle (AUV) is a robot that developments lowered without requiring commitment from an overseer. AUVs build up some bit of a greater social occasion of undersea systems known as unmanned lowered vehicles, a portrayal that joins non-self-overseeing remotely worked lowered vehicles (ROVs) – controlled and energized from the surface by a manager/pilot by methods for an umbilical or using remote control. In military applications an AUV is even more as often as possible implied as an unmanned undersea vehicle (UUV).

### 3.1 Vehicle Designs

Numerous different AUVs have been arranged throughout the last 50 or so years, yet only several associations sell vehicles in any immense numbers. There are around 10 associations that sell AUVs on the worldwide market, including Kongsberg Maritime, Hydroid (by and by an altogether had assistant of Kongsberg Maritime), Bluefin Robotics, Teledyne Gavia (as of late known as Hafmynd), International Submarine Engineering (ISE) Ltd, Atlas Electronic, and Ocean Scan.

Vehicles stretch out in size from man adaptable lightweight AUVs to colossal estimation vehicles of in excess of 10 meters length. Colossal vehicles have central focuses the extent that continuation and sensor payload limit; more diminutive vehicles advantage on a very basic level from lower collaborations (for example: reinforce vessel impression; dispatch and recovery systems).A couple of makers have benefitted by nearby government sponsorship including Bluefin and Kongsberg. The market is satisfactorily part into three regions: consistent (tallying schools and research associations), business toward the ocean (oil and gas, etc.) and military application (mine countermeasures, battle space status). A large portion of these occupations utilize a near structure and work in an excursion (torpedo-type) mode. They assemble data while following a pre-masterminded course at speeds some place in the scope of 1 and 4 bundles.

Monetarily available AUVs consolidate various plans, for instance, the little REMUS 100 AUV at first made by Woods Hole Oceanographic Institution in the US and now conveyed mechanically by Hydroid, Inc. (a totally asserted assistant of Kongsberg Maritime); the greater HUGIN 1000 and 3000 AUVs made by Kongsberg Maritime and Norwegian Defence Research Establishment; the Bluefin Robotics 12-and-21-inch-width (300 and 530 mm) vehicles and the International Submarine Engineering Ltd. Most AUVs follow the standard torpedo shape as this is seen as the best exchange off between size, usable volume, hydrodynamic capability and effortlessness of managing. There are a couple of vehicles that use a deliberate arrangement, enabling sections to be changed successfully by the heads.

The market is progressing and designs are by and by following business necessities rather than being completely developmental. Best in class plans fuse float capable AUVs for assessment and light-intervention (in a general sense for the toward the ocean essentialness applications), and cross variety AUV/ROV structures that switch between occupations as a segment of their focal objective profile. Again, the market will be driven by financial necessities and the arrangement to put aside money and exorbitant pontoon time. Today, while most AUVs are fit for independent missions, most heads remain inside extent of acoustic telemetry systems in order to keep up a close by watch on their endeavour. This isn't continually possible. For example, Canada has starting late taken movement of two AUVs (ISE Explorers) to audit the sea bass underneath the Arctic ice on their case under Article 76 of the United Nations Convention of the Law of the Sea. Also, ultra-low-power, long-expand varieties, for instance, lowered lightweight flyers are getting fit for working unattended for a significant period of time or months in littoral and huge ocean regions, irregularly moving data by satellite to shore, before returning to be gotten.

Beginning at 2008, another class of AUVs are being made, which duplicate plans found in nature. Yet most are correct now in their preliminary organizes, these biomimetic (or bionic) vehicles can achieve higher degrees of profitability in driving force and portability by copying productive structures in nature. Two such vehicles are Festo's AquaJelly (AUV) and the Evo Logics BOSS Manta Ray.

**3.2 Sensors**

AUVs pass on sensors to investigate autonomously and map features of the ocean. Ordinary sensors fuse compasses, significance sensors, sides can and various sonars, magnetometers, thermistors and conductivity tests. Some AUVs are outfitted with natural sensors including fluorometers (in any case called chlorophyll sensors), turbidity sensors, and sensors to check pH, and proportions of separated oxygen. A display at Monterey Bay, in California, in September 2006, exhibited that a 21-inch (530 mm) separation across AUV can tow a 400 feet (120 m)- long hydrophone group while keeping up a 6-tie (11 km/h) cruising speed.

**3.3 Navigaton**

Radio waves can't invade water far, so when an AUV bounces it loses its GPS signal. Along these lines, a standard way for AUVs to investigate lowered is through dead retaliation. Course can at any rate be improved by using a lowered acoustic arranging structure. While working inside a net of sea base sent check transponders this is known as LBL course. Exactly when a surface reference, for instance, an assistance transport is available, ultra-short example (USBL) or short-check (SBL) arranging is used to figure where the sub-sea vehicle is similar with the known (GPS) position of the surface craftsmanship by strategies for acoustic range and bearing estimations. To improve estimation of its position, and diminish botches in dead revenge (which create after some time), the AUV can in like manner surface and take its own GPS fix. Between position fixes and for definite moving, an Inertial Navigation System on board the AUV figures through dead revenge the AUV position, accelerating, and speed. Assessments can be made using data from an Inertial Measurement Unit, and can be improved by including a Doppler Velocity Log (DVL), which evaluates the pace of development over the sea/lake floor. Regularly, a weight sensor measures the vertical position (vehicle significance), notwithstanding the way that significance and rise can in like manner be gotten from DVL estimations. These observations are isolated to choose a last course game plan.

**3.4 Propulsion**

There is a couple of force methodology for AUVs. Some of them use a brushed or brush-less electric motor, gearbox, Lip seal, and a propeller which may be surrounded by a spout or not. These parts embedded in the AUV advancement are locked in with drive. Various vehicles use a trusted in unit to keep up the distinction. Dependent upon the need, the trusted may be outfitted with a spout for propeller sway security or to decrease uproar settlement, or it may be equipped with a prompt drive trusted to keep the viability at the most raised level and the noises in any event level. Advanced AUV trustees have a monotonous shaft fixing system to guarantee a fitting seal of the robot whether or not one of the seals misses the mark during the mission.

Lowered lightweight flyers don't genuinely propel themselves. By changing their daintiness and trim, they on and on sink and climb; air foil "wings" convert this all over development to propel development. The distinction in delicacy is typically done utilizing a siphon that can take in or push out water. The vehicle's pitch can be compelled by changing the point of convergence of mass of the vehicle. For Slocum lightweight planes this is done inside by moving the batteries, which are mounted on a screw. Taking into account their low speed and low-power devices, the essentialness required to cycle trim states is far not actually for standard AUVs, and lightweight flyers can have qualities of months and transoceanic scopes.

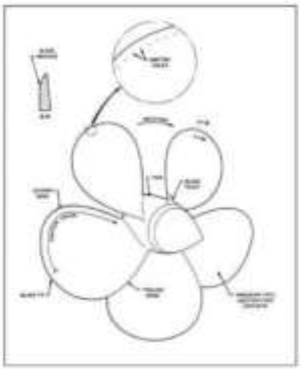

Fig.1 Standard AUV

**3.5 Power**

Most AUVs being utilized today are constrained by battery-fuelled batteries (lithium molecule, lithium polymer, nickel metal hydride, etc.), and are realized with some kind of Battery Management System. A couple of vehicles use fundamental batteries which give possibly twofold the duration—at a liberal extra cost for each pivotal. Two or three the greater vehicles are constrained by aluminium based semi-vitality parts, anyway these require huge upkeep, require expensive finishes off and produce waste thing that must be dealt with safely. A rising example is to join differing battery and power systems with super capacitors

## 4. WORKING

When water is filled in the ballast tank the drone sinks inside the water. Then the forward and reverse directions are controlled by propellers. A gear motor is used for controlling the direction and speed of the drone. The altitude adjustments are done by the flaps. Flaps turn upwards and downwards which in turn pushers the drone upwards or downwards. Flaps are controlled by servo motor. The direction control is made with the help of rudders. Rudders acts like fins and helps in changing the direction. Rudders are controlled by servo motors. The normal torpedoes movers in a straight direction but this can be movement controlled and can chase the moving targets and can attack accurately. The visuals can be seen though wireless cameras

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## 5. CONCLUSION AND FUTURE WORKS

Hence the underwater Drone can be used for both security purpose and underwater photography. Arduino and IOT can be used to create new weapons and updated system for security purpose.There is a lot more need for some advance tech in army weapons. Hence a spying and spectating submersible drone which is also capable of destructing the enemy torpedoes is developed. Hence it also can be represented as anti-torpedo missiles.By combining the above mentioned features a small prototype of underwater submarine drone is made.

Underwater Drone is an IOT module which can be used for spying and spectating purpose. This mini submarine model can run on the surface of water and can dive inside water. These floating and submersing actions are achieved by small ballast tank. Water is filled inside ballast tank while diving and pumped out while floating. Water flow inside ballast tank is controlled by a DC motor pump. Propeller at the back of drone makes it to move forward and backwards. Direction is controlled by servo motor ruder. Altitude is controlled by servo motor flaps. Vertical up down is controlled by additional two vertical propellers at both ends. A small wifi camera is used for underwater spectating. The possible future works are:

- This project is developed for Short range. The main future enhancement is to make it long range so that it can be operated from long distance.
- Satellite connection is an updated method long range connection. This make the operator to control the underwater drone from anywhere in the world.
- Advanced Sensors are planned to fix in the project so that it makes easy to detect the objects that comes while travelling.
- Obstacle detection can be made from the above sensor.
- AI and machine learning helps to automate the process that being done now as manual.

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