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Underwater Autobot

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Abstract:- **This System is based on making a vehicle that looks exactly like a water animal and can move inside the water exactly like as the water animal does. This type of project is being developed by us to overcome the problem of the naval forces serving deep inside the sea. It reduces the effort of the human and can be controlled through a single server from any place. It uses IoT approach and also a wireless approach if internet is not available and a live feed can be obtained through the project to monitor the places and it is also a cost-effective project one-time implementation project rather than spending on big submarines and Cargo ships. We can take immediate actions after seeing the type of situation. We can also use this project to monitor and examine the underwater activities and to discover new materials down the earth to search for the shipwreck and other materials that go deep inside the ocean and cannot be handled by humans. Later on, this project can be modified to make it an autonomous vehicle using the artificial intelligence so that it can decide itself to take actions. Whenever possible human can take control of it as soon as the situation comes to handle it.**

Keywords--- **IoT, Monitor, Wireless, Autonomous.**

I. INTRODUCTION

Marine autonomous systems, including submarine gliders and Autonomous Underwater Vehicles, are revolutionizing our ability to map and monitor the marine environment. Although truly autonomous systems are typically deployed from a research vessel, they are not tethered to the vessel and do not require direct human control while collecting data. They therefore provide opportunities for data acquisition in parts of the ocean previously inaccessible to vessel-based instruments, e.g. beneath ice sheets in polar regions, and are improving the spatial and temporal resolutions of a broad spectrum of marine measurements. Marine autonomous systems also have an increasing range of applications in the defense, industry and policy sectors, such as geohazard assessment associated with oil and gas infrastructure. In addition, recent economic drivers, such as rapidly increasing vessel fuel oil costs, are making autonomous systems a potentially attractive proposition to organizations responsible for large-scale and cost-effective marine data collection program.

This contribution will focus on Autonomous Underwater Vehicles, as these platforms are most relevant to geoscience studies that are targeted at or close to the interface between the seabed and the water column. This is a critical interface, as it is a key physical habitat for benthic organisms as well as a zone of focused sediment transport and deposition. The ability to collect high-resolution data from this interface is essential, but technologically challenging (especially in deep water). The aims of this paper are to i) provide an introduction to Autonomous Underwater Vehicles and their capabilities, ii) present an overview of their applications in marine geoscience (based upon peer-reviewed scientific literature and new data collected by the authors), and iii) discuss potential future applications and technological advances.

AUTONOMOUS UNDERWATER VEHICLE

Autonomous Underwater Vehicles (AUVs) are unmanned, self-propelled vehicles that are typically deployed from a surface vessel, and can operate independently of that vessel for periods of a few hours to several days. Most are torpedo-shaped, but some have a more complex configuration allowing them to move more slowly and across complex terrain. AUVs follow a pre-programmed course and are able to navigate using i) arrays of acoustic beacons on the seafloor (Long Base Line), or ii) a combination of Ultra Short Base Line acoustic communication, GPS positioning, and inertial navigation (when below the surface — based on dead reckoning using a combination of depth sensors, inertial sensors and Doppler velocity sensors). Unlike submarine gliders, which are propelled using a buoyancy engine and have an undulating trajectory, AUVs are able to maintain a direct (linear) trajectory through the water and are therefore well suited to geoscience applications requiring constant altitude, such as seabed mapping and sub bottom profiling. Remotely Operated Vehicles (ROVs) remain tethered to the host vessel and, while this enables them to draw more power and communicate real-time data, their speed, mobility and spatial range are very limited compared with an AUV. The wholly autonomous nature of some AUVs means that the deploying vessel can be used for other tasks (sometimes geographically separate from the AUV work area) while the AUV is in the water, dramatically increasing the amount of data that can be collected for a given amount of ship-time. Depending on their pressure resistance, existing AUVs for scientific research can operate in water depths (WD) of up to 6000 m. The ability of deep-water AUVs to fly relatively close to the seabed (< 5 m altitude in areas of low relief) means they are potentially capable of collecting seafloor mapping, profiling and imaging data of far higher spatial resolution (up to two orders of magnitude) and navigational accuracy than surface vessels and towed instruments, which include side scan sonar and camera systems. AUVs therefore effectively bridge the spatial resolution gap between vessel-mounted or towed systems, e.g. multibeam echo sounders (MBESs), sides can sonars (SSSs) and sub bottom profilers (SBPs), and ROV-mounted systems. In many cases, AUVs are actually used in conjunction with these systems as part of a 'nested' multi-resolution survey of the seafloor, with i) vessel-mounted MBES or 3D seismic initially providing a regional base map with a spatial resolution of 10s to 100s of meters, ii) AUV MBES providing detailed maps with a spatial resolution of 0.5–5 m, and iii) ROV imaging and sediment sampling subsequently targeting seafloor features as small as a few cm. AUVs are capable of carrying a variety of sensor payloads relevant to marine geoscience, including geophysical instruments (MBES, SBP, SSS, magnetometer), geochemical instruments (electrochemical redox sensors), seafloor-imaging tools (high-definition monochrome or color cameras) and oceanographic instruments (CTD, Acoustic Doppler Current Profilers (ADCPs)). The sensors deployed determine the vehicle altitude, as well as its speed and endurance. Higher power sensors, e.g. SSS and SBP, reduce endurance due to their increased energy requirements, while high-resolution seafloor imaging with a color camera system will require the AUV to fly slower and closer to the seabed than if it was undertaking a MBES survey. The ability of AUVs to continuously collect large volumes of data during multiple missions also introduces new challenges in terms of data analysis and storage.

AUVs cannot operate everywhere, and certain factors need to be taken into account during mission planning. AUVs used in marine geoscience typically move at speeds of up to 1.5–2.0 m/s− 1, and can be influenced by tidal (or other) currents approaching or exceeding these velocities (negative impacts include 'crabbing' of the vehicle and navigational drift, both of which can significantly affect data quality). AUVs may also be less well suited for deployment in areas of high military, shipping or fishing activity, due to acoustic interference, collision risk, and net entanglement. Areas of high water-column turbidity, e.g. phytoplankton blooms or areas of high fluvial run-off, may hinder camera-based seafloor imaging. Although relatively 'quiet' compared to research vessels, AUVs may disturb marine fauna in sensitive regions, e.g. Marine Protected Areas, especially when running acoustically loud geophysical sensors. Although many of these external factors also affect research vessels, AUVs are generally less well suited to tidally dominated shallow-water settings that have high levels of anthropogenic infrastructure and activity.

II. LITERATURE REVIEW

In the past 20 years, the AUV design has been modified appreciably as per our need. It includes torpedoshapes, laminar flow bodies, streamlined rectangular styles, multihull design etc. The basic need of AUV is forhydro graphic purposes. The laminar flow body achieves low drag by maintaining laminar flow over most of itslength by virtue of its bulbous shape. Most early AUVs were designed with a cruising speed of around two metersper second. It is probably true to say that most have fallen short of achieving the combination of design speed andrange. This has occurred for a variety of reasons. For instance, increased drag associated with antennae, lifting lugsand sensor protrusions, among other things, may have been glossed over, and the build is often heavier thananticipated which is invariably overcome by carrying less energy (batteries). In addition, the propulsion efficiencymay be less than hoped for due to poorly designed or matched propellers, and the battery energy density can be lessthan expected due to cold temperatures, high current drain or incomplete manufacturer's data. Many of these pasterrors (often due to optimism) can be easily corrected in a new analysis, but the effect of the shape and vehicleappendages on the hydrodynamic drag is harder to asses and has a significant impact on the performance of anAUV.Most early AUVs were designed to compromise with speed as they need long endurance where the averagecruising speed of the vessel was of around 1.5 to 2 meter per second. Then designers always faced problem to get abetter combination of endurance and speed. It was due to more drag appendages, heavier weight than estimation,lifting lugs and sensor protrusion, less propulsion efficiency due to poorly designed or matched propellers, reducedbattery performance due to

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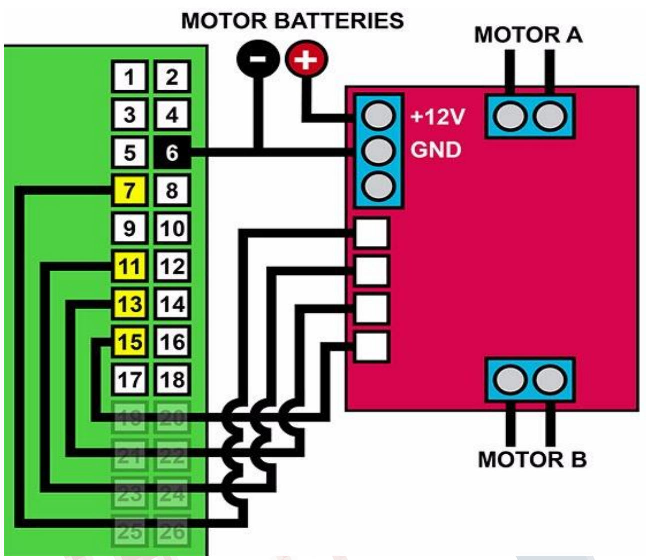
cold temperature, high current drain or incomplete manufacturer's data. Today the advancement has been brought mainly in the following areas:

- Autonomy
- Energy
- Navigation & communication
- Sensors
- Biomimetic AUV

III. IMPLEMENTATION




```
# import curses and GPIO
import curses
import RPi.GPIO as GPIO

#set GPIO numbering mode and define output pins
GPIO.setmode(GPIO.BOARD)
GPIO.setup(7,GPIO.OUT)
GPIO.setup(11,GPIO.OUT)
GPIO.setup(13,GPIO.OUT)
GPIO.setup(15,GPIO.OUT)

# Get the curses window, turn off echoing of keyboard to screen, turn on
# instant (no waiting) key response, and use special values for cursor keys
screen = curses.initscr()
curses.noecho()
curses.cbreak()
screen.keypad(True)
try:
    while True:
        char = screen.getch()
        if char == ord('q'):
            break
elif char == curses.KEY_UP:
GPIO.output(7,False)
GPIO.output(11,True)
GPIO.output(13,False)
GPIO.output(15,True)
elif char == curses.KEY_DOWN:
GPIO.output(7,True)
GPIO.output(11,False)
GPIO.output(13,True)
GPIO.output(15,False)
elif char == curses.KEY_RIGHT:
GPIO.output(7,True)
GPIO.output(11,False)
GPIO.output(13,False)
GPIO.output(15,True)
elif char == curses.KEY_LEFT:
GPIO.output(7,False)
GPIO.output(11,True)
GPIO.output(13,True)
GPIO.output(15,False)
elif char == 10:
GPIO.output(7,False)
GPIO.output(11,False)
GPIO.output(13,False)
GPIO.output(15,False)

finally:
  #Close down curses properly, inc turn echo back on!
curses.nocbreak(); screen.keypad(0); curses.echo()
curses.endwin()
GPIO.cleanup()
```

III. CONCLUSION

AUV has traced a remarkable path in the advancement of technology and its performance. In recent years AUV has utilized many technologies from different fields. No doubt in coming days AUV technology is going to commercialize the market and its production. The only trend that can be seen now is the two paths that the marketplace has established. The first is the development of small, low cost AUVs. It is envisioned that these systems can eventually be used in groups of cooperating vehicles. The second type of AUVs are much more advance compact with high endurance capability and mission specific and better propulsive performance. These are not low cost systems but they are able to undertake tasks that, if done in other ways, would be far more expensive to accomplish. This has been led to look into the Bio Inspired AUVs. It will be interesting to watch the evolution of these two trends in AUV development. And still the advancement is consistent and continuous by the tremendous effort of researchers, scientists and engineers. Apart from technologies, autonomy is probably the most important issue to be addressed but others, such as those described above, certainly must be addressed. It is clear that the limit to the capability of any AUV is the amount of energy it has onboard until there is no alternative source of energy like solar. There have been many discussions that suggest that biomimetics are the future of and new incarnation of AUVs. So, we have to observe the nature, get inspired and model it artificially. The increase in endurance will be substantial. There is a need to find out the alternative way of underwater propulsion. In this regard variable buoyancy concept is a boon. It's the time to extend the constraints of undersea glider, which could be done by the way we have already suggested. AUV systems are at a transition point. They are moving from the Science and Technology communities into the commercial marketplace.

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