REMOTELY OPERATED VEHICLE

Faris Hakimi 1912443

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INTRODUCTION

ROVs are unmanned, agile underwater vehicles that can explore the depths of the ocean while being controlled from the sea's surface.

On a surface vessel, these underwater equipment is typically operated by a human using a joystick, much like a video game.

A cable tether connects the ROV to the ship, allowing electrical impulses to be transmitted between the operator and the vehicle.

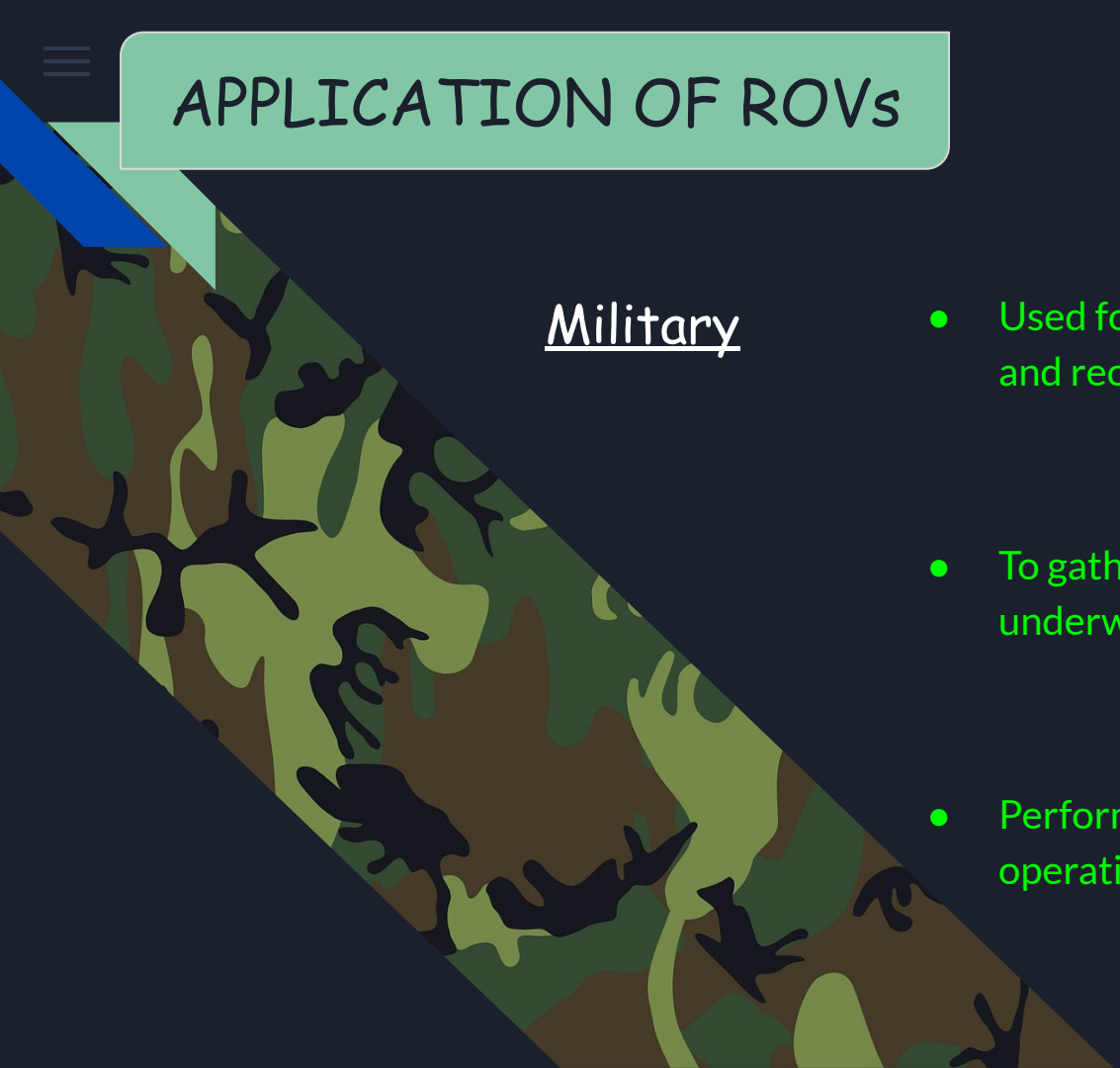
History

1. The US Navy developed it as a tool for national defence and undersea equipment recovery.

2. Business enterprises began to use the technology to help the oil and gas industry.

3. Used for a range of commercial and exploration applications, including evidence retrieval, pipeline maintenance, aquaculture, and drowning victim recovery.

APPLICATION OF ROVs



Military

- Used for underwater surveillance, mine detection, and reconnaissance.
- To gather information, locate, and destroy underwater mines.
- Perform underwater rescue and search operations.

Environmental monitoring

- To keep an eye on oceans, rivers, and lake
- Used to monitor fragile environments such as coral reefs and seagrass meadows.
- To monitor water quality and identify pollution sources

Scientific research

- Allows for the collection of water and sediment samples, as well as the determination of salinity, temperature, and other water parameters.
- For surveying the seafloor, creating 3D maps, and studying deep-sea ecosystems

Commercial industries

Crucial for pipeline inspection, underwater construction, and offshore oil and gas exploration.

Archeology

to research and document underwater archaeological sites such as shipwrecks, sunken cities, and other locations

MAIN COMPONENTS

CYLINDRICAL

Frequently used for jobs including maintenance and inspection.

BOX

It is frequently used to transport heavy equipment or carry out difficult activities since it has a sizable internal volume that may be utilised to store tools and sensors.

HYBRID

A fusion of two or more different hull designs. It enables the ROV to operate in various conditions and have a variety of capabilities.

TORPEDO

With its shape, it is useful in military services as it can move flawlessly in the ocean.

PROPULSION SYSTEM

ELECTRIC THRUSTER

Use brushless DC motors or permanent magnet synchronous motors. These motors may be contained in cavities filled with air or oil, or they could be flooded, allowing water to touch the motor and provide additional cooling and lubrication.

HYDRAULIC THRUSTER

To intervene with the vehicle, heavy-duty tooling is required.

DUCTED JETS

If the vehicle passes close to weakly bonded debris, the debris may be dragged into the rotating thrusters.

NAVIGATION & CONTROL SYSTEM

SEMI-AUTONOMOUS CONTROL

It can act autonomously to some point, where the user of the ROV might need to input some direction to it so that it can analyzes them and work on them

AUTONOMOUS CONTROL

It is known as AUV where an AUV completes its survey mission without assistance from an operator. The AUV will return to a pre-planned site when a mission is finished so that the data may be retrieved and processed

POSITIONING SYSTEM

It helps to locate the ROV by using GPS or Acoustic Positioning

STABILITY CONTROL SYSTEM

Stability of a ROV can be taken care by placing heavy weight components such as electric motors low on the vehicle and buoyant component high on the vehicle. It is also needed for maintaining the ROV's orientation

NAVIGATION SOFTWARE

Used to navigate the ROV to the designated place.

DEPTH CONTROL SYSTEM

By optimising both pressure sensors and depth gauge, the ROV can stay constant at the designated depth.

DATA COLLECTION (SENSORS)

CAMERA

- The Super Wide-i SeaCam has an impressive 150˚ HFOV in water with no vignetting.

SONAR

- BLUEVIEW REAL TIME SONAR

MAGNETOMETERS

- Geophysical surveys that measure the Earth's magnetic field are used to find different kinds of magnetic anomalies and work out the dipole moment of magnetic materials.

DATA COLLECTION (SENSORS)

ENVIRONMENTAL SENSORS

- Pressure sensor
- Temperature sensor
- Salinity sensor

LASER SCANNER

- The Insight Nano is a small, short- to medium-range underwater laser scanner
- Created for non-intrusive qualitative subsea assessment in constrained areas
- No external sensors needed

HYDROPHONES

The Naxy Hydrophone can be used for a number of subsea applications, ranging from Oceanography & Marine research to monitoring of the safety in ports and harbors.

DATA COLLECTION (ACTUATORS)

MANIPULATOR ARMS

The Schilling Robotics Atlas manipulator has been designed to lift heavy loads, while being lightweight and easy to control.

SAMPLING TOOLS

Six core samplers, each equipped with a fish tail-grip, can be stored in the Saga Core Sampler Set. The holder is available with a variety of various choices and is delivered with a lifting point. Offshore lifting and deployment certification.

DATA TRANSMISSION

ETHERNET CONVERTER

A straightforward but adaptable topside enclosure is offered by the FXTI to connect the BlueROV2 to a computer. has many extension options and includes a Fathom-X board and a USB to Ethernet converter. The BlueROV2 now comes with the FXTI.

T ETHER

Used to launch and recover TMS and ROV from deepwater application where ROV needs to be deployed. The umbilical known as a tether, which has a relatively modest diameter and neutral buoyancy, can be used as the connection cord between the ROV and TMS.

GLOBAL POSITIONING SYSTEM (GPS)

The location of the ROV relative to the topside beacon is correlated with GPS data to provide real-time latitude and longitude of the ROV

POWER MANAGEMENT

POWER GENERATOR

- Offers a constant source of power
- Fuel used: diesel and other fossil fuels

BATTERIES

- Rechargeable and capable of sustaining power for several hours of use

POWER DISTRIBUTION

- Electricity is distributed to various ROV components via a power control board

POWER MANAGEMENT

- To keep track of ROV's power consumption and make sure the power is delivered effectively
- Provide current electric usage effectively