REMOTELY OPERATED VEHICLE

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INTRODUCTION

Remotely Operated Vehicles (ROV)

"ROVs," are unmanned, nimble underwater vehicles that can be used to explore the depths of the ocean while being controlled from the surface of the sea.

On a surface vessel, usually, a human uses a joystick to operate these underwater equipment, much like how you would play a video game. The ROV is connected to the ship by a tether of wires, which allows for the transmission of electrical impulses between the operator and the vehicle.

HISTORY & APPLICATIONS

HISTORY OF ROVs

01

1960s

Created by the US Navy as a tool for national defence and equipment recovery underwater

02

1980s

Commercial enterprises started applying the technology to support the oil and gas sector

03

Now

Utilized for a variety of commercial and exploration purposes, including evidence retrieval, pipeline maintenance, aquaculture, and drowning victim recovery.

APPLICATION OF ROVs

MILITARY

- Used for underwater observation, mine countermeasures, and reconnaissance.
- To collect information, find, and destroy underwater mines.
- Conduct rescue and search efforts underwater.

SCIENTIFIC RESEARCH

- Enables the collection of water and sediment samples, the measurement of salinity, temperature, and other water parameters.
- For seabed mapping, making 3D maps, and researching deep-sea ecosystems

ENVIRONMENTAL MONITORING

- To keep an eye on oceans, rivers, and lakes.
- Used to keep an eye on vulnerable habitats like coral reefs and seagrass beds.
- To track water quality and locate pollution sources

APPLICATION OF ROVs

ARCHEOLOGY

To investigate and record underwater archaeological sites such as shipwrecks, sunken towns, and other places

COMMERCIAL INDUSTRIES

Essential for pipeline inspection, underwater construction, and offshore oil and gas exploration

MAIN COMPONENTS

COMPONENTS OF ROVs

PROPULSION SYSTEM

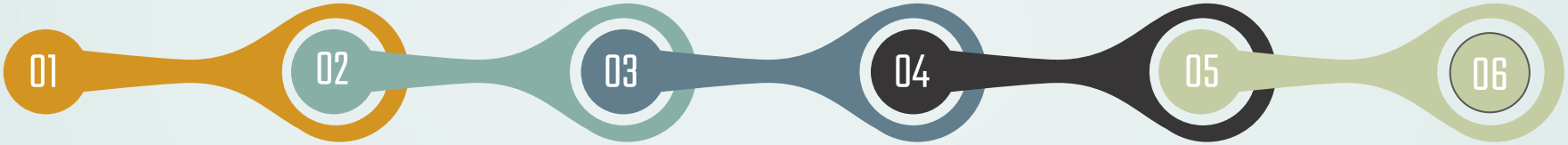
- Fin Propulsion
- Hydraulic Propulsion
- Electric Thruster
- Water Jets

DATA COLLECTION

- Camera
- Sensors
- Actuators
- Software

POWER MANAGEMENT

- Power Generator
- Batteries
- Power Distribution



FRAME & HULL DESIGN

- Cylindrical Hull
- Box Hull
- Torpedo Hull
- Hybrid Hull

NAVIGATION & CONTROL SYSTEM

- Semi-Autonomous Control
- Autonomous Control
- Positioning System
- Depth Control System
- Stability Control System

DATA TRANSMISSION

- Tether
- Ethernet
- GPS

FRAME & HULL DESIGN

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.

FRAME & HULL DESIGN

TORPEDO

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

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.

PROPULSION SYSTEM

Heavy-duty tooling is needed to intervene with the vehicle.

HYDRAULIC THRUSTER

Utilize permanent magnet synchronous motors or brushless DC motors. These motors may be enclosed in cavities filled with air or oil, or had flooded designs that let water touch the motor and add additional cooling and lubrication.

ELECTRIC THRUSTER

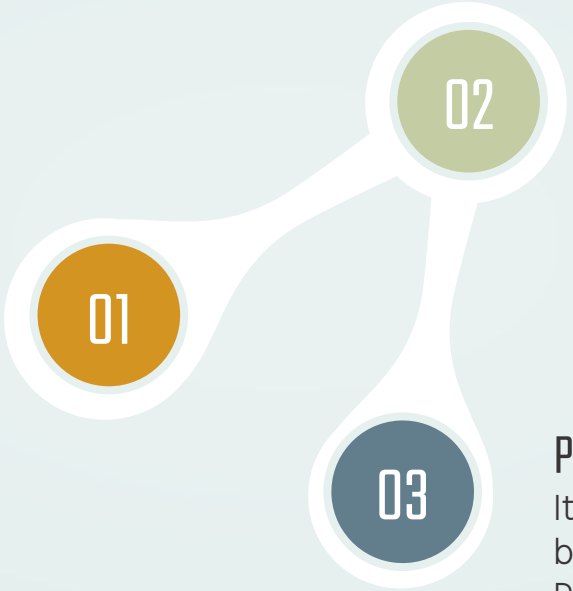
If the vehicle is driven near loosely-bound debris, the debris may be drawn into the rotating thrusters.

DUCTED JETS

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.

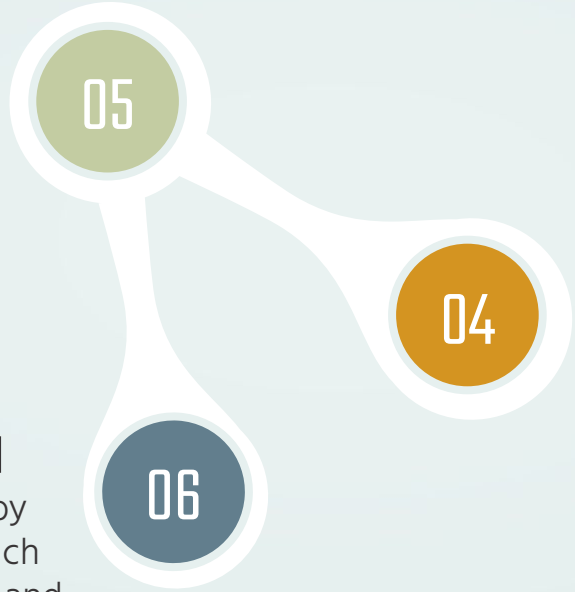
POSITIONING SYSTEM

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

NAVIGATION & CONTROL SYSTEM

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.

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

DATA COLLECTION (SENSORS)

CAMERA

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

SONAR

BLUEVIEW REAL TIME SONAR

DATA COLLECTION (SENSORS)

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.

ENVIRONMENTAL SENSORS

- Pressure Sensor
- Temperature Sensor
- Salinity Sensor

DATA COLLECTION (SENSORS)

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 without the use of any additional external sensors.

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

TETHER

Used to launch and recover the TMS and ROV from deepwater applications where the 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.

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.

DATA TRANSMISSION

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 DISTRIBUTION

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

POWER GENERATOR

Offer a constant source of power. diesel or other fossil fuels are used as fuel.

POWER MANAGEMENT

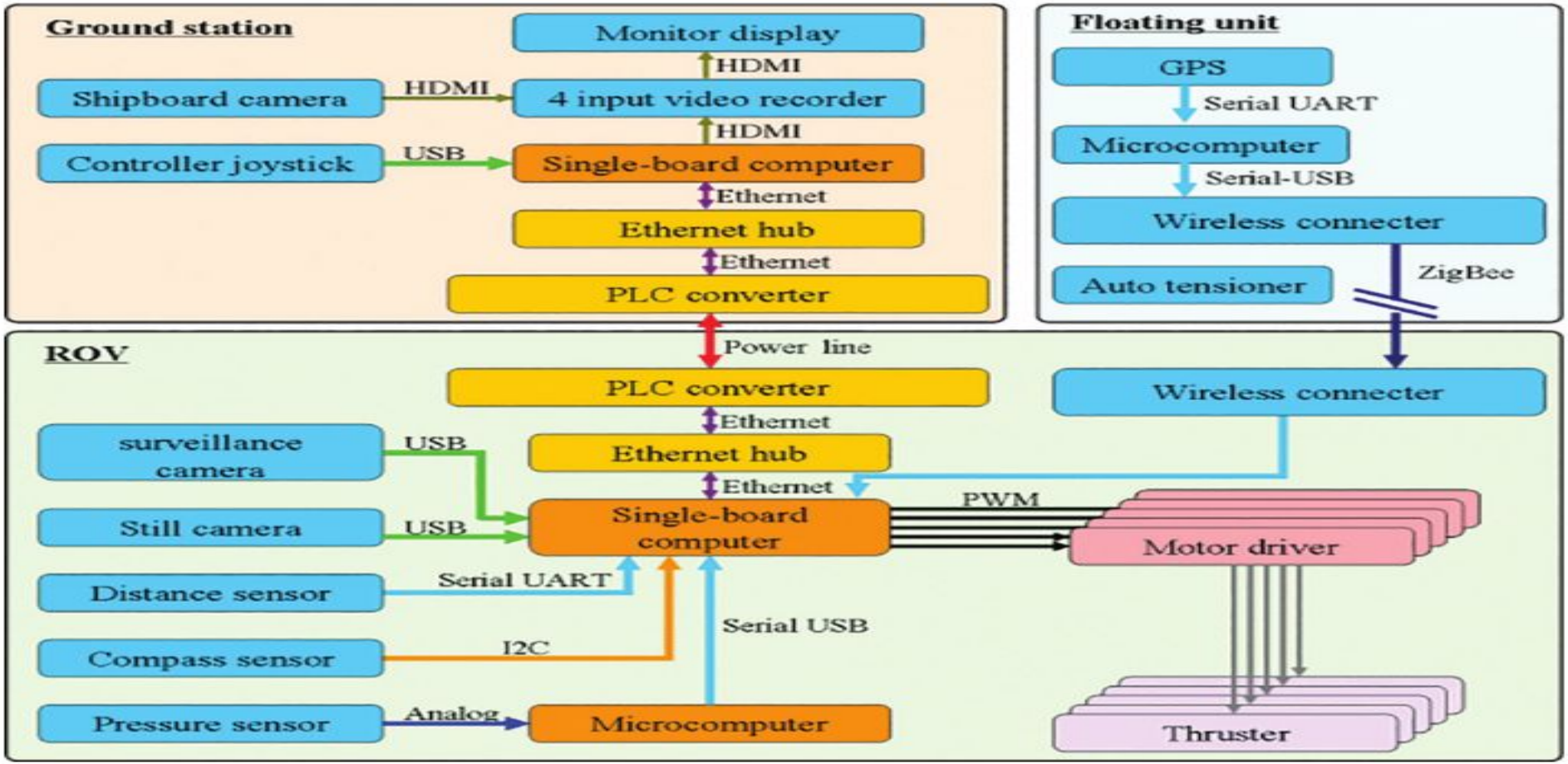
Used to keep track of the ROV's power consumption and make sure the power is delivered effectively. provide current electricity usage statistics.

BATTERIES

Rechargeable and capable of sustaining power for several hours of use

BUILDING YOUR OWN

SYSTEM ARCHITECTURE OF ROV



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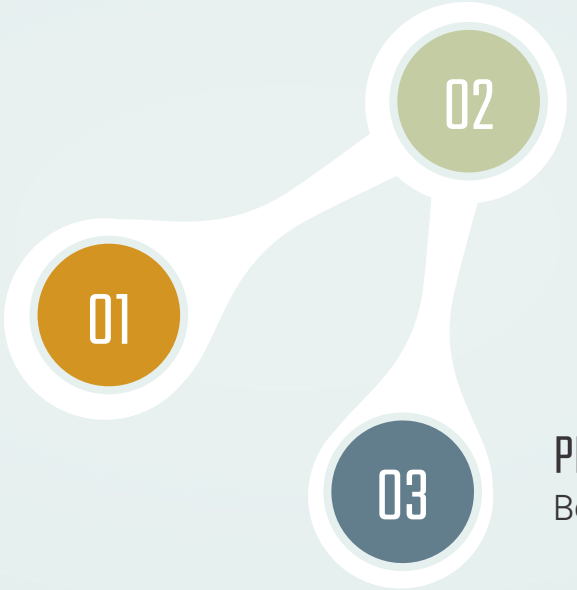
MALAYSIA MARKET

MALAYSIA MARKET

CURRENT TREND

- Offshore wind farms
- Deep-water operations
- Underwater intervention operations



POTENTIAL APPLICATION

- Commercial Industries
- Archeology
- Military
- Scientific research
- Environmental Monitoring

PRICE RANGE

Between RM 12,000 - RM 50,000

OBSTACLES

HIGH COST

LACK OF AWARENESS

REGULATORY CHALLENGES

LIMITED INFRASTRUCTURE

CONCLUSION

CONCLUSION

In conclusion, ROV had many important functions such as helping human to do the impossible mission such as gathering data and taking care the environment. However, any improvement on the current ROV will be appreciated by a lot of communities.

THANKS