REMOTELY OPERATED VEHICLE (ROV)

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History

The first tethered ROV, called POODLE, was created by Dimitri Rebikoff in 1953; however, the PUV (Programmed Underwater Vehicle) was a torpedo produced by Luppis-Whitehead Automobile in Austria in 1864.".

The U.S. Navy started developing robots to assist find and retrieve undersea weapons in the late 1960s. Commercial businesses started using the technology to help the oil and gas sector in the 1980s.

Nowadays, ROVs are utilized for a wide range of exploratory and business purposes, including evidence collection, pipeline maintenance, aquaculture, and drowning victim recovery, in addition to dam and water tank inspections.

Application

Scientist:

- In maritime archaeology, ROVs have been used for underwater research.Deepwater archaeology is the study of ancient sites in ocean levels too deep for divers to explore. Under these conditions, scientists frequently employ ROVs.
- An ROV Hercules was made for the Institute for Exploration. (IFE). It was developed mainly for the purposes of looking for, examining, and recovering things from historic shipwrecks. Hercules was used by the National Oceanic and Atmospheric Administration (NOAA) in 2004 to survey and document the Titanic debris for 11 days. It also helped a discovery of ancient artefacts in the Mediterranean Sea. It made it simpler to locate and investigate the remains of numerous ancient maritime civilizations.
- Shipwrecks and other underwater sites are investigated and researched by marine

Application

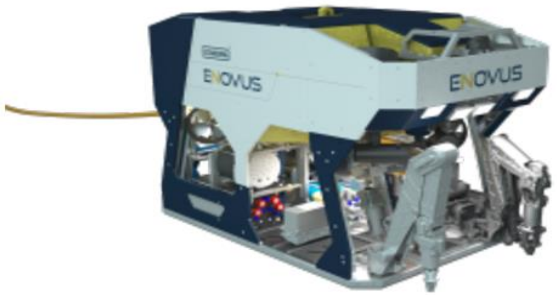
Military:

- Additionally, the US Navy played a significant role in the advancement of ROV technology. In order to locate and retrieve missing torpedoes, the Navy developed the Cable-Controlled Underwater Research Vehicle (CURV) in the early 1960s. The CURV was essentially a tethered automaton that could be operated from a surface ship and could descend as deep as 20,000 feet.

Civillians:

- ROVs were used commercially in the oil and gas industry to inspect and repair offshore drilling sites and pipelines. Meanwhile, scholarly and scientific scholars used ROVs to look into the deep-sea ecosystems, archaeology, and geology.

Main Components (Hull Design)

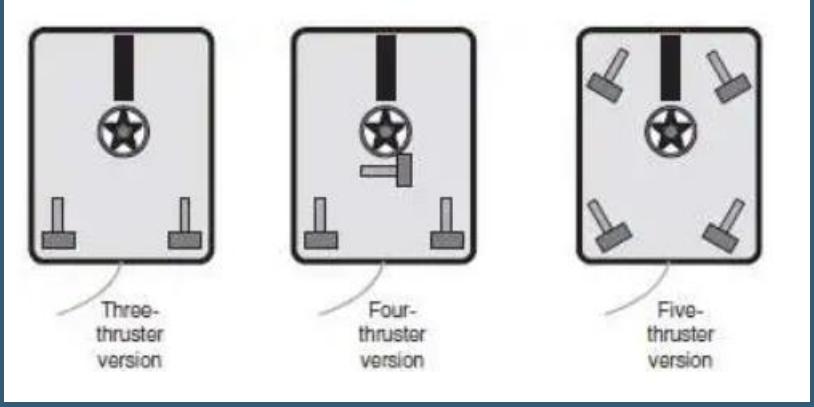
	Hull with Open frame	Frameless hull (close hull)
Structure type	 Seaeye Falcon[19]  Enovus ROV[20] ROV structure with open frame design	 SAAB Double Eagle SAROV[21]  Deep trekker DTG2[22] Frameless ROV design
Advantage	• Well known structure adopted on most ROV. • Stable 3DOF translational motions based on large metacentre. • Larger payloads and can carry object. • Easier to attach tools and equipment.	• Greater mobility/highly manoeuvre • Typically lightweight and portable • More energy efficient
Disadvantage	• These types of ROV have difficulties with motions requiring more than 3DOFs.	• Smaller payload • Not convenient for attaching tool or equipment

Main Components (Propulsion system)

- The three primary types of ROV propulsion systems are electrical, hydraulic, and ducted jet propulsion. These many sorts were created to accommodate the size of the vehicle and the anticipated nature of work. Sometimes the method of propulsion has been determined by the precise location of the labour task.

- By using an electrical motor to power hydraulic pump systems, energy must be converted from electrical to mechanical to hydraulic, which is a very wasteful process. Such an energy loss and associated expenditures must be justified by a clear necessity for high mechanical force.

- Two or more thrusters, which are part of the ROV's propulsion system, move the vehicle in a way that makes it possible to navigate to the work site. The position of the thrusters on the vehicle must be such that the moment arm of their thrust force, in relation to the vehicle's core mass, permits an appropriate level of maneuvrability and controllability.

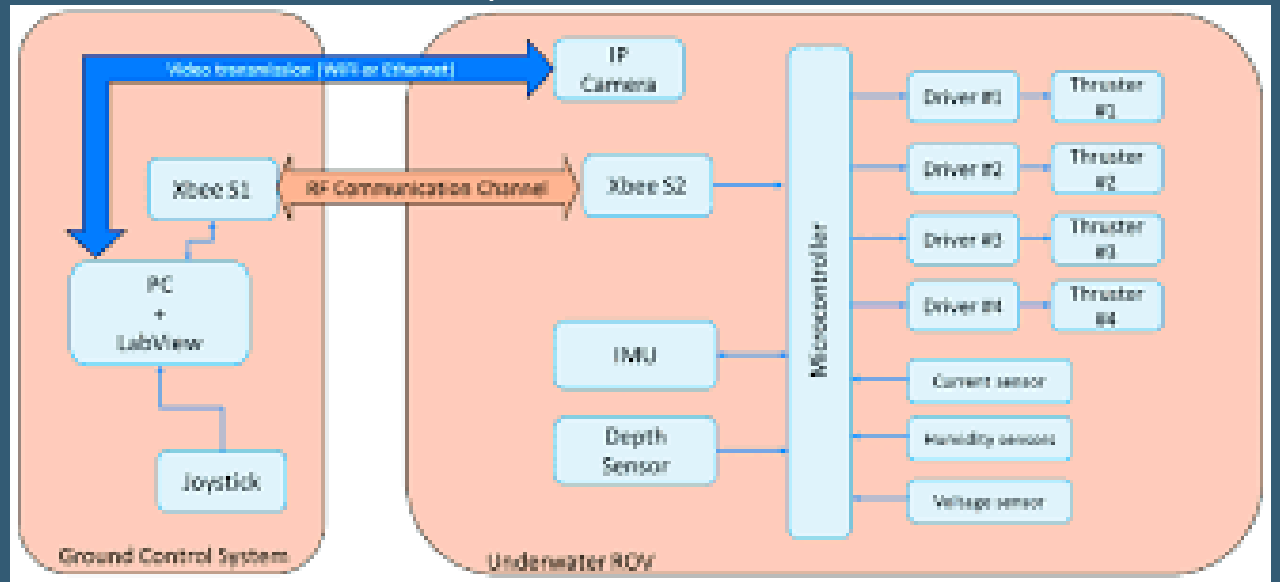


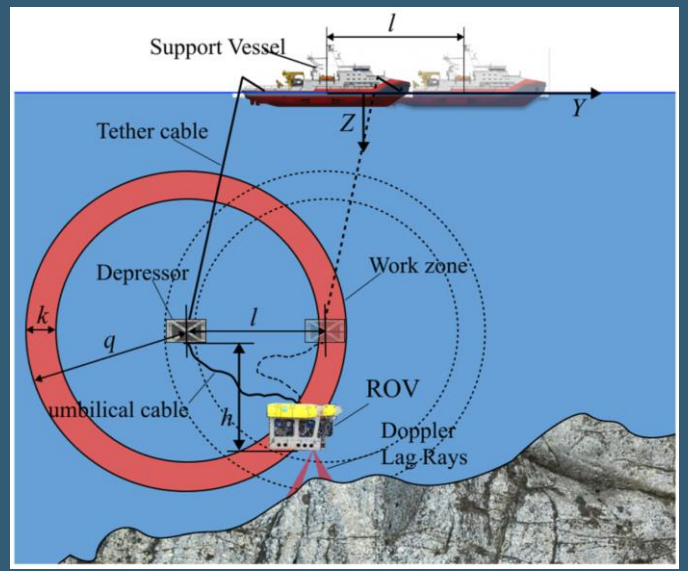
Main Components (Navigation)

- An unmanned underwater robot that is connected to a ship by a network of cables is referred to as a remotely controlled vehicle (ROV). These wires enable remote vehicle navigation by transmitting command and control signals between the operator and the ROV.

- A video camera, lights, sonar equipment, and an articulating arm could be found on a ROV. The articulating arm is utilised for raising lifting hooks onto larger things, cutting lines, and recovering tiny objects.

- While ROVs have a wide range of applications, some of the more popular hydrographic ones involve vessel hull inspections and object identification (for underwater navigation hazards). Although not meant to replace hydrographic diver studies, a ROV could be used in their place if divers are not available or if diver safety is in doubt.





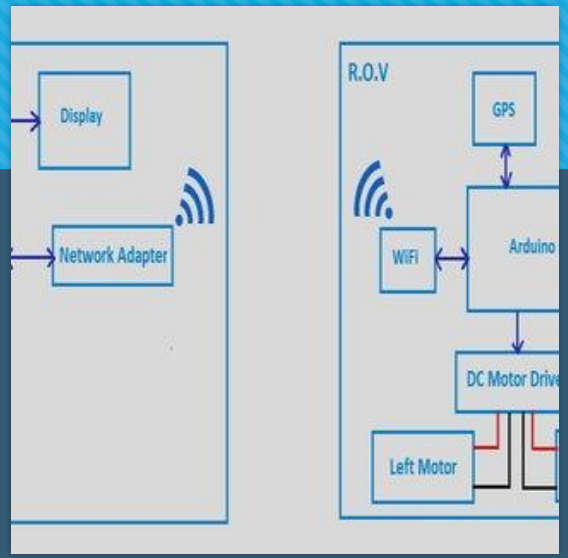
Main Components (Data Collection)

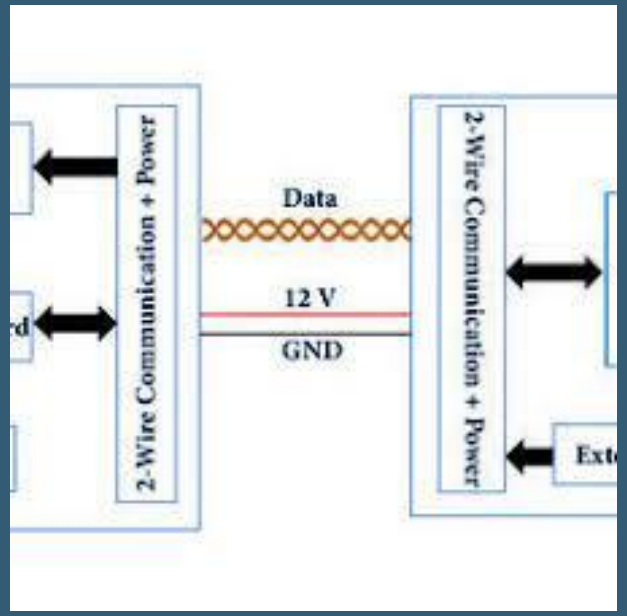
- A typical ROV is equipped with video cameras, which provide scientists on board the surface vessel with real-time surveillance, lighting, sonar equipment, and a buoyancy foam pack, which keeps the ROV light and manoeuvrable when submerged.

- ROVs can monitor conductivity, temperature, and depth using external sensors installed on the vehicle. ROVs frequently are equipped with a manipulator arm designed for gathering biological and geological samples, which are put into boxes along the sides of the ROVs.

Main Components (Data Transmission)

- Wire or wireless transmission is used to test various ROV and command platform communication solutions.
- The component establishes the ROV's direction and acceleration and receives sensor input for processing. Different communication protocols, implemented on the microcontroller and computer, are tested for the data transmission between these two subsystems.





Main Components (Power management)

- Rov needs high-voltage power source. For example, BlueROV2 used Outland Technology Power supply.
- The BlueROV2 may be powered through the tether using this high-voltage power supply system, which makes it possible for it to run continuously without using batteries. Safety was the top focus while designing it, and it has everything you need.