ROV (REMOTELY OPERATED VEHICLE)

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HISTORY

In the 1960s, the navy created the first ROVs to recover torpedoes, explosives, and mines. For missions like mine hunting and mine breaking that were too risky for sailors, ROVs were frequently deployed.

Since the 1980s, the offshore oil sector has utilised ROVs to help with offshore development, particularly as the depth of the oceans became too great for human divers to safely navigate. In addition, ROVs have gained notoriety for finding wreckage, including the Titanic shipwreck in 1985. This is some fascinating RMS Titanic video that was captured by a ROV.

As a rule, tethers are used to connect ROVs to their host vessel. The robot's communication with the host ship, including a live video feed and data transfer, is relayed by this cord in addition to delivering commands to move the robot.

In addition to having a camera and lights, many ROVs are also built with robotic grippers and arms, water sample equipment, and a number of sensors to check for leaks and test the water's temperature and humidity.

BLUEROV2

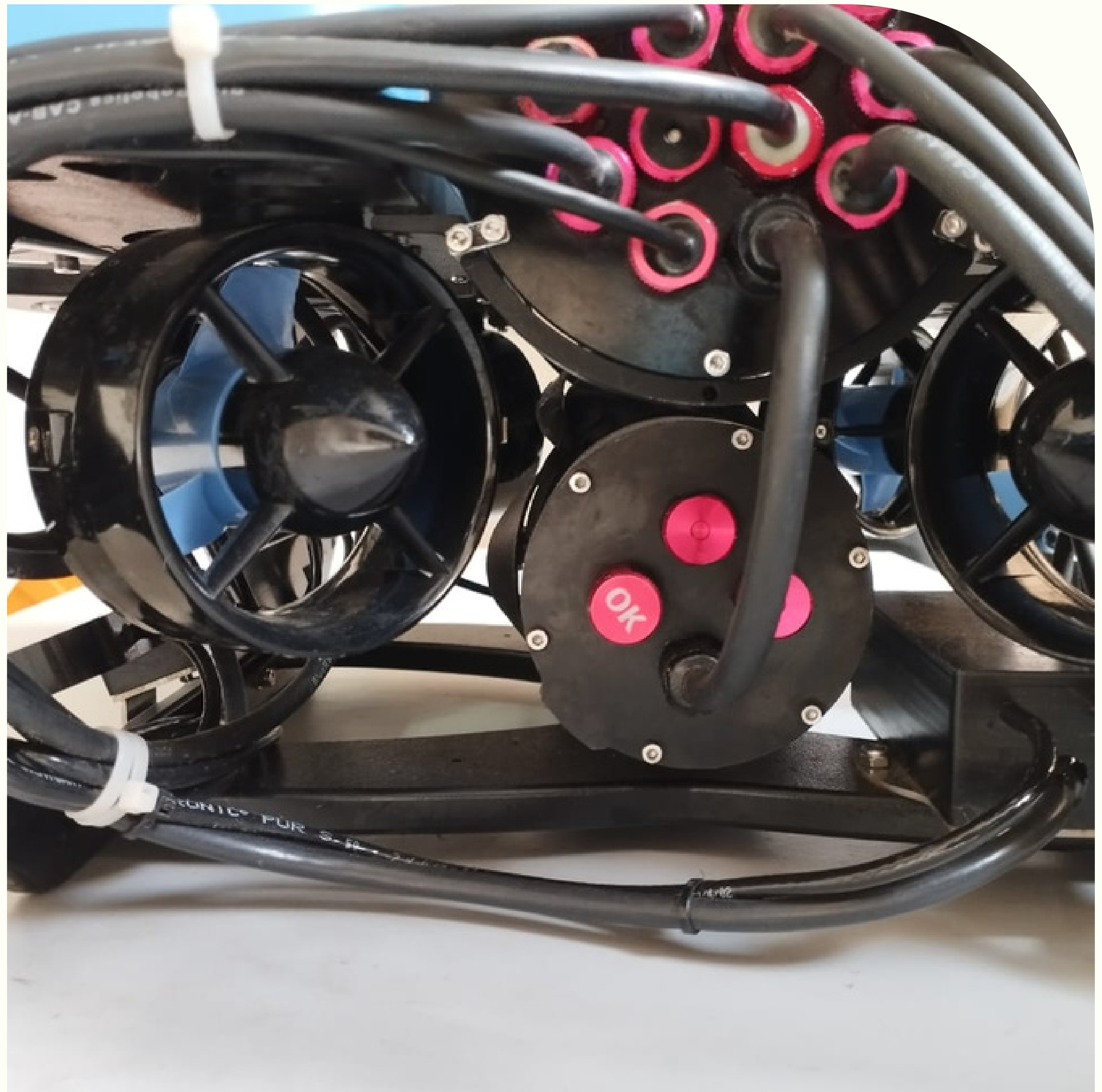
BODY DESIGN

HULL BODY DESIGN

OPEN HULL BODY DESIGN

The internal parts of the ROV, including the batteries, electronics, and thrusters, are housed in the hull, which serves as a pressure vessel. The hull is constructed of anodized aluminium and is intended to endure the extreme pressure and conditions found underwater. The hull is also outfitted with a set of vertical thrusters that give the ROV vertical control and stability, as well as four horizontal thrusters that enable the ROV to move forward, backward, left, and right. Further reducing drag and enhancing the ROV's ability to operate in the water is the streamlined hull's design. Overall, BlueROV2's hull design is an important part of the ROV's body and contributes to the device's functionality and performance in underwater applications.

ACTUATORS / LOCOMOTIONS



Six thrusters that act as Bluerov's actuators and give it movement in the water are part of its equipment. Four horizontal and two vertical thrusters are symmetrically distributed among the six thrusters.

These locomotions' and actuators' respective roles are as follows:

- Bluerov can move ahead through the water by employing its four horizontal thrusters to move in the direction it wants to go.
- Bluerov may travel backward through the water by changing the direction of its four horizontal thrusters.
- Bluerov can travel sideways through the water by pushing itself in the desired direction with its horizontal thrusters.
- Bluerov is capable of rotating while stationary by using its four horizontal thrusters to provide a turning motion.
- Bluerov can move up and down in the water column by adjusting its buoyancy and controlling its depth with the help of its two vertical thrusters.

NAVIGATION SYSTEM AND CONTROLLER

Bluerov has an advanced controller and navigation system that enable it to function well in an underwater environment.

A human operator on the surface normally controls the Bluerov controller. A tether connecting the controller and robot allows for power and communication between them. The robot is moved and operated by the operator using a joystick or another input device. The controller could also feature a screen for a display that shows the robot's video feed, sensor data, and other crucial information.

A complete and efficient underwater exploration and inspection tool is provided by Bluerov's navigation system and controller. Operators can manage the robot in the tough underwater environment safely and effectively because to the combination of precision navigation and intuitive control.

Depth sensor

The operator can determine the robot's position with relation to the seafloor by using the depth sensor to measure the robot's depth in the water column.

Inertial measurement unit (IMU)

The robot can keep steady positioning and mobility by using the IMU to measure its orientation, acceleration, and angular velocity.

Compass

The operator can steer the robot in the desired direction using the heading information provided by the compass.

GPS

Although its precision is constrained in an underwater setting, Bluerov also contains a GPS system that may give the operator location data.

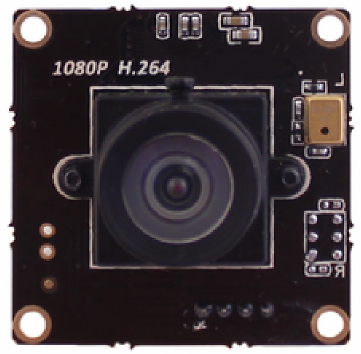
Sonar

In order to avoid obstacles and manoeuvre through intricate underwater structures, Bluerov is outfitted with sonar sensors that can produce a complete map of the underwater environment.

DATA COLLECTION

BlueROV is a remotely controlled underwater vehicle (ROV) made for a variety of uses, including marine research, inspection, and exploration. Depending on the precise data you want to gather, you might need to use different types of devices to collect data using a BlueROV.port stronger.

CAMERA



High-quality photos and films of underwater surroundings can be taken with the cameras that are mounted on BlueROVs. With the help of these cameras, you can gather visual information on marine life, geological features, or underwater structures.

SONAR

For mapping the seafloor or finding objects underwater, sonar is a useful tool. BlueROVs can be fitted with sonar sensors, which use sound waves to map the seafloor in great detail or to identify things.

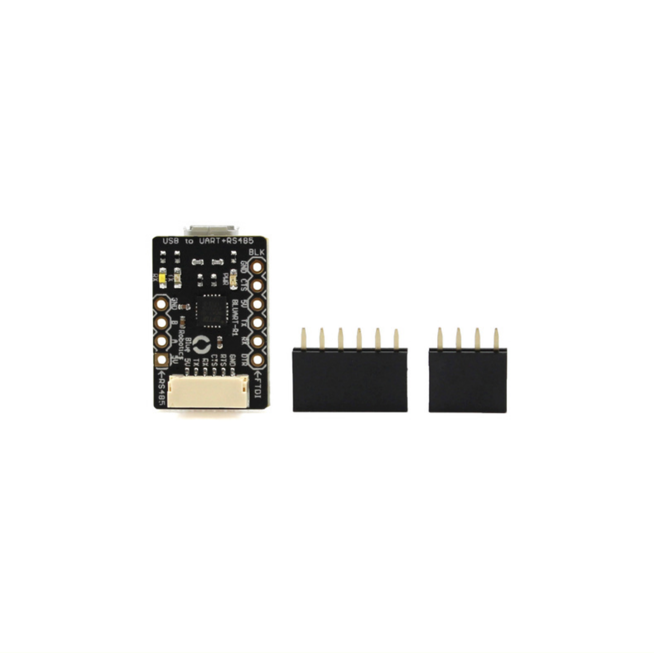
SENSORS

Several sensors, including those for temperature, salinity, dissolved oxygen, and pH levels, can be installed on BlueROVs. These sensors can be helpful for studying marine ecosystems, detecting changes in the environment, and monitoring environmental conditions.

DATA TRANSMISSION

Ethernet

A tether cable can be used to transmit data with BlueROV's Ethernet-based communication technology. Underwater robots frequently employs this reliable, quick, and efficient communication method.



RS232/RS485

RS232 and RS485 protocols, which are frequently used for serial communication between a computer and a peripheral device, are also supported by BlueROV.

FXTI

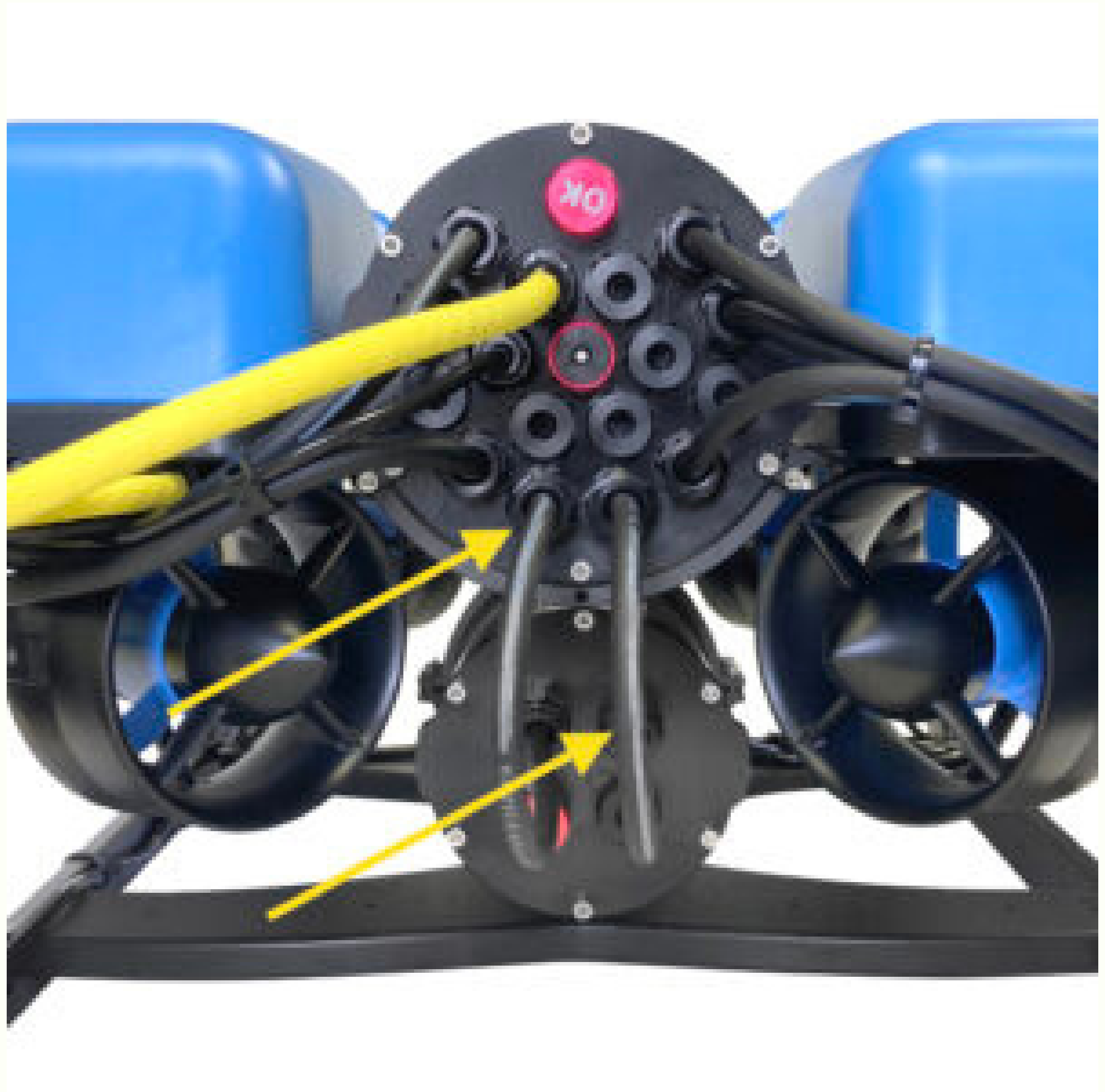
Because it can convert an Ethernet connection into a long-distance tether cable, the Fathom X Tether Interface card is a crucial part.

Another FXTI module (or FXTI box) will be present on the surface to transform the signals obtained from the ROV. To connect to a computer, it has a USB port.

QGROUNDCONTROL (QGC)

A ground control station software called QGroundControl is made to interact with a number of unmanned aerial vehicles (UAVs) and autonomous systems, including the underwater vehicle BlueROV2. QGroundControl for the BlueROV2's primary features include:

- Configure settings for motor and sensor calibration
- Control BlueROV2 through joystick control
- Provides real-time telemetry data such as GPS location, vehicle speed and sensor reading
- Watch the onboard camera of the BlueROV2 live footage. Also, you can use the software to immediately shoot pictures and record video.
- Enables quick firmware updates for the BlueROV2 to keep the vehicle's software and features up to date.



POWER SYSTEM MANAGEMENT

LITHIUM-ION BATTERY (14.8V , 18AH)

It is stored in the bottom cylinder of the body that could last for 2 hours underwater.

SEABER

BODY DESIGN

FRAMELESS HULL DESIGN

- Made from strong and durable material that could withstand underwater pressure.   eg: alloys and aluminium
- Streamlined shape to reduce drag and improve maneuverability in water
- Ensuring that the ROV has enough buoyancy while being stable and not unduly tilting or rolling.

ACTUATORS AND LOCOMOTIONS

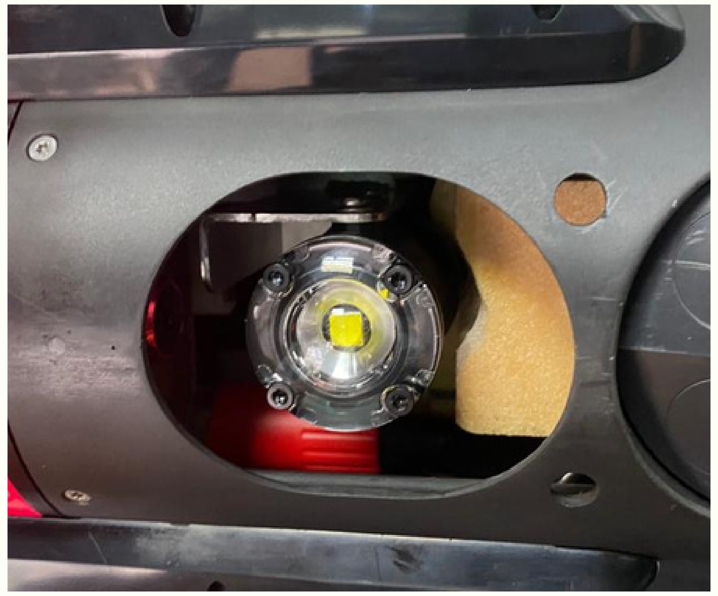
JET PROPULSION

The ROV is propelled by water jets in jet propulsion systems. Small ROVs frequently employ this kind of propulsion since it works well in shallow water.

NAVIGATION SYSTEM AND CONTROLLER

PORPOISE RECORDER

Capable of monitoring anthropogenic noise, including pile driving, ships, and marine mammals, even at high frequencies, such harbour porpoises.



DOPPLER VELOCITY LOG (DVL)

It determines the ROV's speed and direction in relation to the seafloor using the Doppler shift method, giving the ROV precise navigational information.

INX NAVIGATION SYSTEM

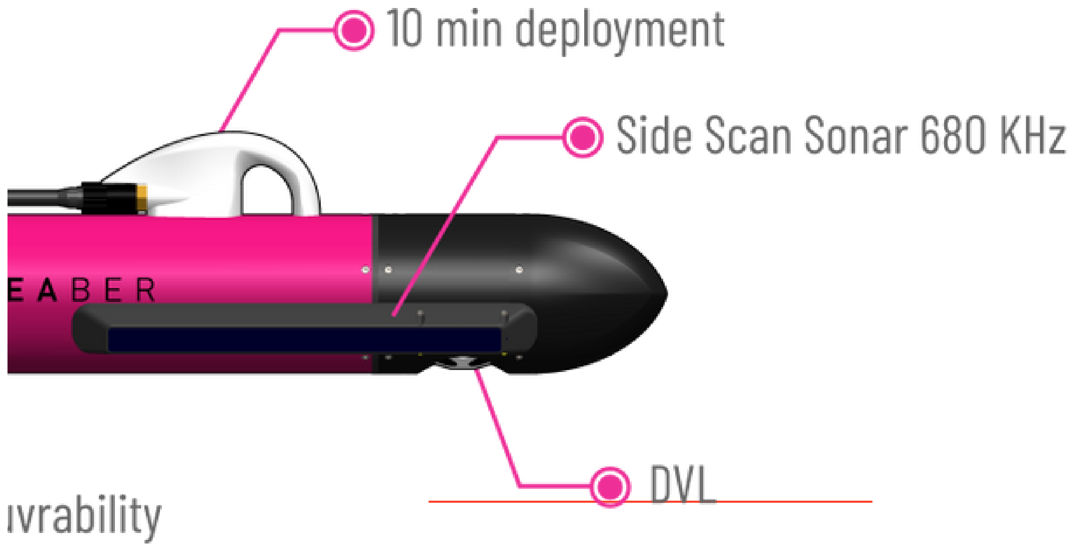
Permits it to traverse precisely without the need for outside components. This makes it perfect for noise recording and completely silent.

DATA COLLECTION

Gathering information for a seaber Gathering data using a remotely operated vehicle (ROV) often entails learning about the topography and composition of the seabed as well as the depth, temperature, salinity, and turbidity of the water in the underwater environment.

Video and till cameras

A high-definition camera system that can record both still and moving photos of the underwater environment. These photos can be used to recognise marine creatures and record how they behave in their natural habitats.



Sidescan Sonar

Even in coastal areas with waves and current, high-quality sonar images and precise navigation are possible.

SEAPLAN software

- Navigation function
- Mapping the seabed
- Scanning the depth

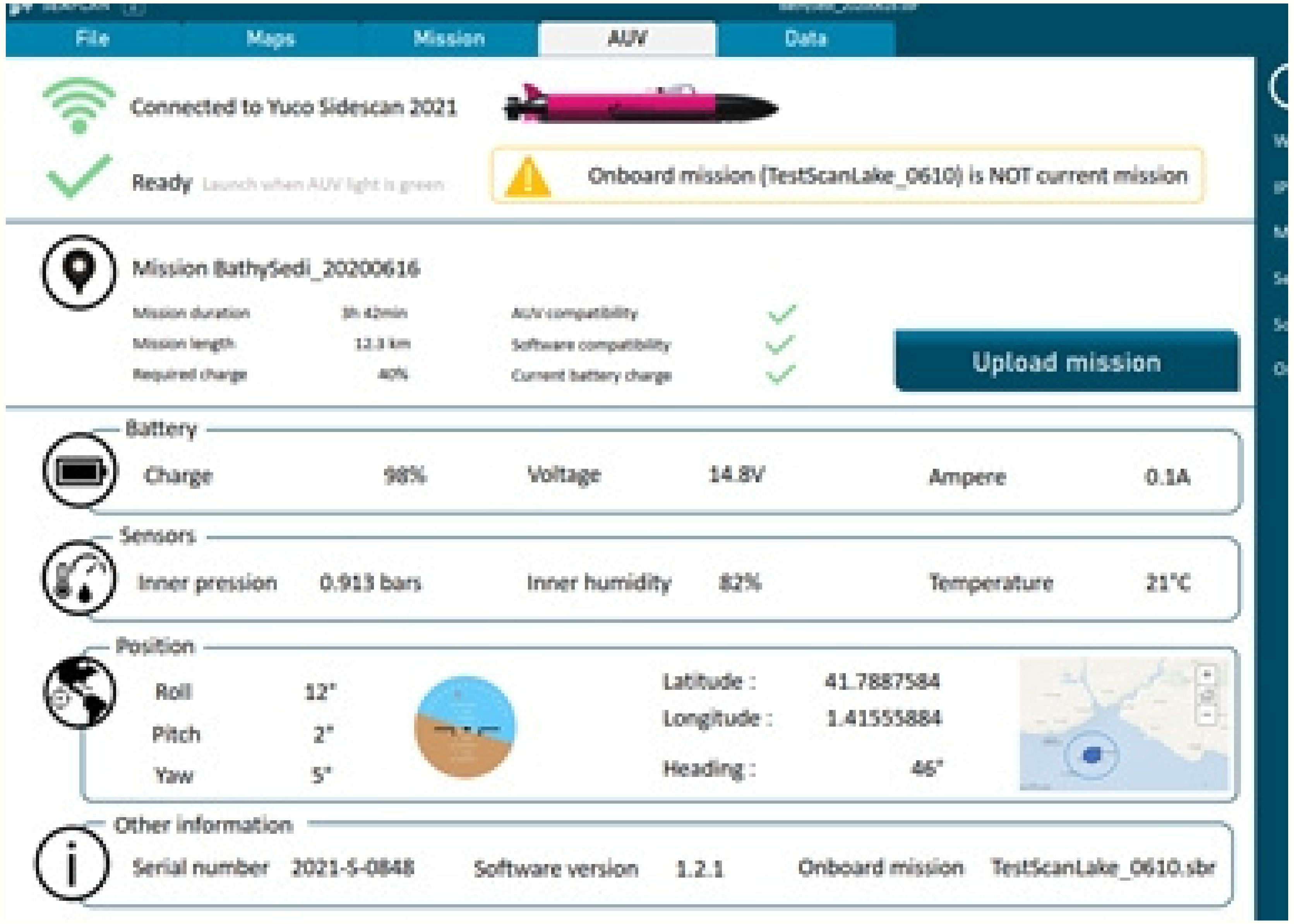
Subconn connectors

Power and serial data connection are both available. SEABER piece to be incorporated to fit in the YUCO underwater vehicle if given.step files.

DATA TRANSMISSION

Satellite communication

Data from the ROV can be sent to a distant location anywhere in the world using satellite connection. In order to do this, an AUV must be equipped with a satellite modem that can connect to an orbiting satellite. Although it can cost more than other methods of communication, this one is good for long-distance communication and can offer worldwide coverage.



POWER SYSTEM MANAGEMENT

Rechargable batteries

- Could last from 6-10 hours

Subconn connectors

- For power and data transmission

SEAPLAN software

- Could monitor the current capacity of battery to estimate how long can they go underwater.