Industry Projects Submission 1

ME 639 - Introduction to Robotics

IIT Gandhinagar

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Planys Technologies

About Planys Technologies

Planys Technologies is an Indian deep-tech startup pioneering underwater ROVs (Remotely Operated Vehicles). It provides industrial solutions for underwater inspection, monitoring, and support. It is an IIT Madras incubated company that brings technology and innovations in the domain of marine robotics. It provides customers with services by integrating ROV manufacturing with operational and structural analysis at the design level.

The company aims to provide inspection service with advanced Non-Destructive Evaluation (NDE) that is portable, affordable, and customizable for the oil and gas, shipping, and port sectors. The ROVs incorporate several features such as quick deployment with no risk to the human operators, the sonar system, the ultrasonic measurement equipment, and HD cameras which help in carrying out accurate visual inspections. (*Business Standard*, 2016)

About ROVs

ROVs are unoccupied, highly manoeuvrable underwater robots/ underwater drones operated by a pilot that can access remote depths or be used in hazardous conditions to inspect and assess submerged structures. ROVs are broadly classified into micro-ROVs, inspection-class ROVs, and work-class ROVs based on size. (*Deeptrekker*, n.d.)

ROVs are generally equipped with the following task-specific instruments:

- Inspection: Still cameras, lights, sonar imagers, echo rangers
- Monitoring: HD video systems, lights that transmit images, and regular real-time video cameras

- Sample collection: Light manipulators
- Cleaning: Brushes and pigging equipment for cleaning pipelines and checking for leaks, Non-Destructive Testing(NDT)). (*Planystech Blog*, 2019)

For underwater maneuvers, ROVs have thrusters and flotation packs to maintain attitude stability.

Generic features in Planys ROVs

All Planys ROVs are remotely operated submersible vehicles, which are built specifically for robust and calibrated visual inspection of offshore immersed structures.

These ROVs can reach 100+ meters depth and have unlimited endurance. They have a light frame, multiple onboard HD cameras, 3 powerful LED lights, silicon piezo-resistive depth sensor, pitch roll, and heading of resolution 0.05 degrees.

The bot's navigation and controllers are designed such that they can work even under wave action and ocean currents. The control station can be positioned at a safe on-shore/on-ship site. (*ROV Beluga*, 2016) (*ROV Mike*, 2016)

Specific features for each ROV

- ROV Mike:
    - 3 Full HD cameras (30fps) mounted on-board.
    - 6 powerful brushed thrusters.
    - Two 2000 lumens LED sources and one 800 lumens LED source.
    - 100m depth rating.
    - Wired Xbox 360 Joystick controller.
    - Depth Sensor with an accuracy of 0.05% FSO. (*ROV Mike*, 2016)
- ROV Beluga:
    - 2 Forward-Looking and 1 Bottom-Looking Full HD camera (50fps).
    - 8 powerful brushed thrusters.
    - 4000 Lumens Forward, 4000 Lumens Downward.
    - 200m depth rating.
    - 4-axes controller.
    - Depth Sensor with an accuracy of 0.01% FSO. (*ROV Beluga*, 2016)
- ROV Mikros
    - Ultra-low light and Pan-tilt camera
    - 20 kg forward thrusters,6 DOF control, 4kts cruise speed,1 km tether
    - 4 x 4000 Lumens high intensity LED sources
    - 200m depth rating
    - Variable frequency echo-sounder
    - Attachment options: Depth cleaning jet, spot cleaning brush, grabber. (*ROV Mikros*, 2019)

What we expect

Control/trajectory planning-based SiL(Software in Loop) and HiL(Hardware in Loop) simulations related to manipulators, thrusters and attitude of ROV.

Bibliography

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