Industry Projects Submission 1

ME 639 - Introduction to Robotics

IIT Gandhinagar

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We attest to abide by the stated collaboration policy: We understand that all sorts of collaboration are allowed, however plagiarism will not be tolerated. If we use material from some other source (or from friends), we will cite them appropriately.

Planys Technologies

Statement of Our Understanding of the Project (in 200-300 words)

Introduction:

Planys Technologies is a 6-year-old startup that manufactures Remotely Operated Vehicles(ROVs) for underwater navigation. It is the first company in India which produces Underwater ROVs. Its robots provide for Non-destructive Evaluation(NDE) in shallow-mid-depth water bodies and can be used by Industries like Oil and gas, shipping, dams and bridge maintenance, Power and Desalination industries and by Scientific researchers for underwater inspections. Planys ROVs are used and implemented in industries because of remarkable features like portability, ease of usage, high endurance, etc at a low and affordable cost.

Planys currently has several products available in the market. A few of them are ROV Mike, ROV Mikros and ROV Beluga. Not many details of ROV Mikros were found on the website. The details of their other products are mentioned below.

ROV Mike:

Mike is an electric remotely operated vehicle used for visual inspection of offshore immersed structures. It has a 6 degree of freedom control and can reach up to a depth of 100m. It has multiple onboard HD cameras and high intensity LED lights that provide clear visual aids to the pilot and surveyor.

ROV Beluga:

Bulega is an advanced ROV more powerful than Mike and can perform operations in sea state 4-5 and up to 200m depth. It has a higher thrust capacity with an improved vision and illumination system. It can perform various operations like ultrasonic thickness measurement, spot bio-fouling cleaning, cathodic protection potential measurement and various acoustic surveys. It can also be mounted with additional sensors upon requirement by the customer.

Tabular compilation of a few features is shown below:

S.No.	Feature	ROV Mike	ROV Mikros	ROV Beluga
1	Tether length	300m	1 Kms	300m
2	Speed	0.4-0.5m/s	4 KTS	-
3	Mass Payload	8-15 Kgs	-	10-15 Kgs
4	Max reachable Depth	100m	200m	200m
5	DOF control	6	6	6
6	Additional features	Multiple onboard HD cameras, High-intensity LEDs, Advanced navigation, Silicon Piezo-resistive depth sensor, Wired Xbox 360 Joystick controller	High-pressure jet cleaning, Spot cleaning, Brush, Grabber, Ultra Low light & PAN tilt camera, AI-based report generator	4 - axis joystick controller, 200kHz Altimeter, 450kHz side-scan sonar, Electric rotating brush type spot cleaning unit, 1 Dof extendable arm(23cm), Laser Ranging Unit

Funding

Planys Technologies raised almost 14 crores of funding in 2018 led by established institutes. ONGC Startup Fund was a major investor. Other names include MEMG (Ranjan Pai), Prathiti Trust (Kris Gopalakrishnan), Keiretsu Forum, etc.

Typical robotics problem that you think these devices might encounter

1. The changing buoyancy force with a changing depth causes difficulties in the control of the robot.
2. Inability of wireless communication underwater is a major challenge for the live video feedback as well as limiting the depth of the ROVs.
3. Continuous disturbances through the waves make it difficult to hold a still position for any task to perform.
4. Material selection for robot frame is another challenge - need high strength, corrosive resistance, light weight

Expected Tools to operate an ROV

1. Thrusters : to maintain attitude stability for implementation of control algorithms(Eg. During maneuvering, etc).
2. Sensors: LIDAR, SONAR, Laser, Navigation, etc.
3. Cameras and Lights, Manipulators.
4. Joystick/Remote for controlling the ROV remotely.

References

1. Planys Technologies website
2. For Problems: F.A. Azis, M.S.M. Aras, M.Z.A. Rashid, M.N. Othman, S.S. Abdullah, Problem Identification for Underwater Remotely Operated Vehicle (ROV): A Case Study, Procedia Engineering, Volume 41, 2012, Pages 554-560, ISSN 1877-7058, https://doi.org/10.1016/j.proeng.2012.07.211.
