OE5011: MARINE ROBOTICS

Course Content:

Introduction to marine robotics and robotic configurations; autonomous underwater gliders (AUGs), autonomous underwater vehicles (AUVs), and remotely operated underwater vehicles. Actuation and sensing systems; communication; manipulation; interaction; guidance, navigation and control; and mission control systems. Algorithms for simultaneous localization and mapping (SLAM), fault detection/tolerance systems; multiple coordinated vehicles; and networked vehicles. Signature detection, analysis and optimization; sensor networks for radar, sonar and navigation; design of propulsion systems; and trajectory measurements and simulations. Design and analysis of thrusters for AUGs/AUVs, motion prediction and control systems, and co-operative adaptive sampling techniques. Design of variable buoyancy systems for UVs. Design of DCDM based controllers for UVs. Remote sensing and environmental monitoring with AUGs/AUVs, underwater vehicle-manipulator systems, bio-mimetic underwater robotics, and bio-inspired robotic systems. Case studies from India, Republic of Korea, Japan and USA.

Text Books:

1. **T. Fossen** (1994), “Guidance and Control of Ocean Vehicles”, Chichester New York, USA.
2. **J. N. Newman** (1997), “Marine Hydrodynamics”, MIT Press, USA.
3. **T. Fossen** (2002), “Marine Control Systems: Guidance, Navigation and Control of Ships, Rigs and Underwater Vehicles”, Marine Cybernetics, Trondheim, Norway

Reference Books:

1. **K. D. Do and J. Pan** (2009), "Control of Ships and Underwater Vehicles: Design for Underactuated and Nonlinear Marine Systems", Advances in Industrial Control, 1st edition, Springer, Germany.
2. **G. Griffiths** (2002), "Technology and Applications of Autonomous Underwater Vehicles", Ocean Science and Technology, Vol. 2, CRC Press, USA.
3. **R. Sutton and G. Roberts** (2006), "Advances in Unmanned Marine Vehicles", IEE Control Series, Institution of Engineering and Technology, USA.

Prerequisite:

Consent of teacher