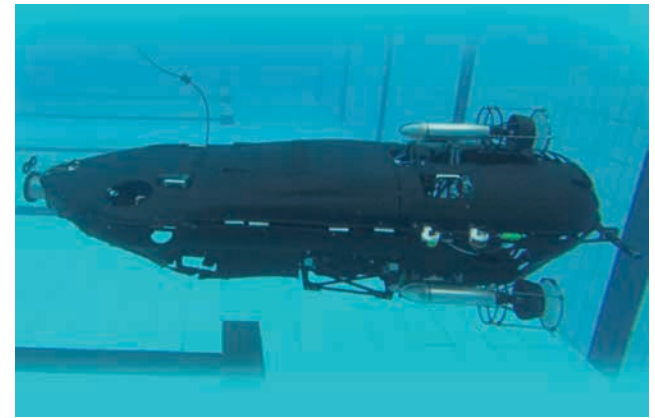


Matsya: Autonomous Underwater Vehicle



Problem Statement: Autonomous underwater vehicles (AUV) are required to achieve various tasks in inaccessible and sometimes hazardous locations where there is a compromise of human operator's safety. There are several applications of an AUV in critical domains of defence and robotics. IIT Bombay researchers address this requirement by designing and developing an in-house, low-cost AUV, aptly called Matsya (fish in Sanskrit). Their AUV can navigate obstacle-filled arenas, detect and avoid obstacles, and manipulate various objects placed underwater. The AUV can detect and shoot torpedoes at predefined targets (emulating defence applications) and locate underwater pingers using acoustic homing techniques (similar to finding an aircraft's black box). The AUV can also follow specific patterns on the arena floor (emulating oil pipes/underwater fibre optic cables).

Uniqueness of the Solution: The Matsya AUV is an indigenous modular solution

wholly designed and fabricated in India and has some excellent features. The components and complete software stack is developed in-house, making it cost-effective. The Matsya can be quickly deployed because it is highly portable and requires minimal support systems for launch and recovery. It requires no human intervention and has the capability of intelligent interpretations of sensor data, thereby resulting in autonomous operation. It has high endurance and a robust structure with a depth limit of ~50 m.

Current Status of Technology: The researchers have demonstrated the system prototype in an Operational Environment (Demonstrated in RoboSub 2019 at Transdec, San Diego, California, USA). It successfully performed tasks including shooting a torpedo, navigation, recognising patterns, and striking a buoy.

Societal Impact: The use of the Matsya AUV is free from risk to human operators because it can operate in hazardous

conditions and navigate to inaccessible locations. The product is indigenously designed and fabricated in India, and it supports the Atma Nirbhar Bharat ideology.

Patent(s): Nil

Relevant Industries: Defence, Robotics, Semiconductors, Manufacturing.

Faculty: Prof. Leena Vachhani, Systems and Control Engineering, Prof. Hemendra Arya, Aerospace Engineering.