THE NEMO

Autonomous underwater vehicles (AUVs) are gaining importance of late. They are intelligent robots that travel without any manual input. Torpedoes are the most popular among AUVs and these employ conventional rotary propellers for thrust generation and executing maneuvers. The astonishing locomotion of fish and its ability to swim swiftly in narrow spaces inspires engineers to improve the design of existing AUVs. The propulsion of fish is due to the undulatory motion of its fins. This kind of a motion is observed to be less noisy with better maneuverability than the conventional propeller based design.

In our vision we can imagine a school of fish, deep in the ocean, performing vital tasks with utmost accuracy and efficiency, taking decisions reacting to exigencies and obstacles and communicating to each other. These multi intelligent robotic fishes could be used for a variety of tasks including missions such as detecting nuclear wastes underwater search and rescue in emergency situations, tsunami detection and warning, leak detection in under water pipe lines and lot more. The robotic fish will be autonomous, which means it will be having everything it needs to run, like power, actuations and control systems on board. It will be modeled sophisticated enough that it is going to change ones idea of a robot, as a hinged machine with rigid segments.

As a launch of the mission, hydrodynamic design and modeling of a self-propelling robotic fish, whose thrust is produced by its oscillating fins and tail, has been initiated. The fish will be modeled, to resemble a real one, and will imitate the most efficient swimming modes of the real fish. Depending on the hydrodynamic model of fish, or more precisely, depending on the contribution of the body in thrust generation, proper actuator design, which is able to realize the body motion system is selected. Depending upon the factors such as weight, safety, cycle life time and most importantly, the purpose served by the fish, power generation system is selected. Batteries can be used as power source. Also there are alternatives like pneumatic, solar and hydraulic power generation systems. The most efficient blending of all discussed, will give birth to an autonomous biomimetic robotic fish, which gives motion responses very similar to a real one.

Objective:

The objective of the project NEMO is to build an unmanned autonomous robotic fish (NEMO) that can be used for underwater surveillance, search, rescue andstructural health monitoring thereby mastering the bio-inspired AUV technology.

Research Group

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