

# Propulsion Module for Generating Wave-Like Motion



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## Intellectual Property

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## Description

In recent times, efficiently navigating across bodies of water has become a necessity. Classical propulsion mechanisms rely on designs like propellers, jets and rudders. However, there are several well-documented disadvantages to these designs. Notably, they disrupt the aquatic environments in which they operate and cannot be used in shallow waters.

Another class of mechanisms are bio-mimetic, aiming to copy or take inspiration from those found in nature to construct novel forms of propulsion. These designs are, however, often costly and inefficient. This invention provides a bio-mimetic propulsion module which generates wave-like motion, whilst overcoming the aforementioned issues. It also offers an aquatic vehicle which includes this mechanism.

The technology consists of a propulsion module comprising a motor for generating rotational motion and a pair of conversion devices, each having a movable arm to convert rotational motion into oscillatory translational motion. It also consists of a drive mechanism for coupling the motor to the conversion device, as well as a flexible structure configured to be guided by the movable arms in order to generate the wave-like motion. The corresponding aquatic vehicle comprises a head module to carry a payload and a propulsion module to carry the head module.

## Advantages

This invention presents several advantages in both design and efficiency.

The modularity of the propulsion mechanism means that it is simple to control and can be adapted to many different applications. This can be achieved by minimal adjustments to the same mechanism in terms of phase shift (angular distance between the conversion devices), height of the flexible structure and speed and direction of the motor. The number of conversion devices in the set may also be increased.

The drive mechanism, which may include a drive belt, ensures maximum power transmission between the motor, conversion devices and flexible structure, and thus ensures high energy efficiency of the whole propulsion system, as well as when it is part of an aquatic vehicle.

## Applications

- Aquaculture (land and marine)
- Environmental monitoring for rivers, lakes and oceans
- Underwater inspection for harbors, dams and offshore structures
- Underwater manipulation or intervention
- Propulsion of marine vessels