

HyDrone™

Air, Ground, and Maritime Capabilities from a Single Unmanned Vehicle



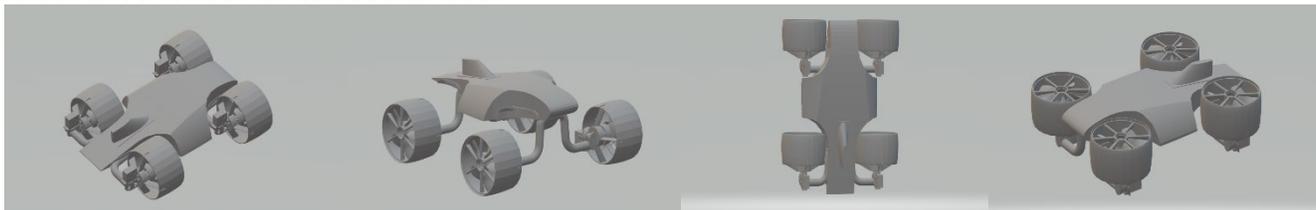
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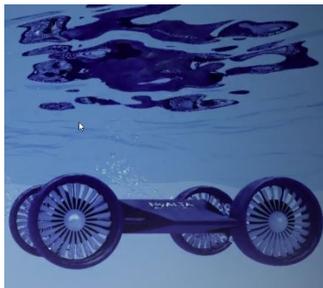


Executive Summary

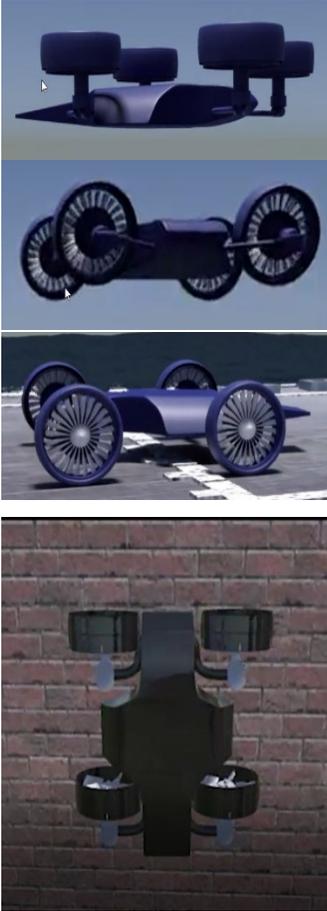
HyDrone™ is a dynamically reconfigurable hybrid Unmanned Vehicle with capabilities in air, ground, and maritime domains. Enabled by our HyAMPS™ (US Patent 10,180,083, with additional patents pending) drive system, HyDrone™ is able to orient its ducted fans horizontally or vertically for aerial and maritime use and also orthogonally to function as a direct drive wheel for terrestrial use.



This allows HyDrone™ to dynamically reconfigure as required to function in air, ground, and maritime environments.



Maritime - For maritime subsurface capabilities, the ducted fans are oriented, and their rpm adjusted to provide horizontal thrust appropriate for an aquatic environment. For sensing, observing or delivering, this capability is unmatched by any other UUV. A minor shaping of the UV's body would allow surface maritime capabilities as well with the ducted fans used as either subsurface propellers or as above-water fans in an air-boat style approach.



Aerial - HyDrone™ achieves quad-copter like performance with the ducted fans oriented vertically. Rotating the fans into a more horizontal position provides long-distance higher speed fixed wing like capabilities. The fans can be oriented at any position between vertical and horizontal to provide optimum lift/speed/range performance as needed for the phase of operation. Additionally, the fans can be oriented slightly aft to slow the vehicle and enable more rapid transition between horizontal and vertical modes.

Ground - With the fans oriented as wheels, the shrouds locked to the drive motors, and the rpm again adjusted to the environment, HyDrone™ can function as a ground UV. Transition to and from this mode would occur from either maritime or vertical aerial configurations. In the maritime configuration, HyDrone™ can drive out of the water onto the shore.

Vertical - This mode is completely unique to the HyDrone™. In this mode HyDrone™ can approach vertically to place sensors or inspect a surface. No other UAS can perform this type of mission in the air or in maritime environments.

The HyDrone™ design does not compromise performance to delivery these multi-domain capabilities. The elegant simplicity of the HyAMPS™ drive system and its applicability to all domains eliminates single-domain parasitic structure and weight. The only “compromise” is from the use of an aero body instead of a high efficiency wing in the forward flight domain— a “compromise” more than offset by capabilities in the other domains.

Comparison - The notional performance profile below provides a comparison between HyDrone™ and a representative quad copter. HyDrone™ delivers superior quad copter performance AND the speed and extended range of a fixed-wing UAV AND the efficiencies and options of a UGV. The profile represents delivery of a 15 lb. package and performing the last 5 Km safely on the ground and returning.

