

Licensing and Technology Transfer Opportunity

Title of Technology Available: Triphibious Vehicle [Triphibious vehicle -Land, Water and Air]

Brief Description of Invention:

Proposed and basic design can travel in at least two distinctive modes of transportation, be it air and water, land and water or air and land. This idea designed and developed and tested of a novel unmanned multimodal vehicle which can travel in air, land and water, also called a as a triphibian multirotors for multi operation, launch and recovery and operate in all three environment such as land air and water. This operation depends based on critical environment application without any constraint of operation environment. The prototype consists three module - unmanned aerial vehicle, unmanned ground vehicle and unmanned ground vehicle and is integrated with all the instrumentations to travel in land, air and water at the will of the customer. Instruments integrated has capability for dust proof, water proof, vibration proof to operate without any stability compromise. Ground wheel also used to cut the flow of water during moving on water surface. Baloon and Tube filled with light air used to provide buoyancy (floating capability).

Brief Background of Invention:

Multimodal vehicles (Triphibious) that travel in all 3 modes viz. land, air and water has vast application due to its reconfigurable model to suite for flying in air, floating above water and moving on the surface. Operational location can be anything with normal activity to critica activity with constraints to operate in all these three. So this idea can be fit with all scenario with minor change or no change due to its weight lifting capacity, launch and recovery capability, long range and long endurance capability without any compromise with stability.

A few approaches for multimodal vehicles were reviewed from past literature. A micro triphibian quad copter can be configured with wheels provided to traverse on land, four rotors for travelling in air and by an additional mechanism to float in water [1]. The wheels are extremely light weight and provide the necessary buoyancy when in water. The rotation of the wheels in water causes the vehicle to move forward. The design make s use of pulleys and belts to transmit power to the wheels from motors mounted centrally thus reducing weight. The triphibian quad copter could also have a special set of wheels to traverse on land which can also climb through terrains [2]. If the size of the quadcopter is small, then it can travel and recover on terrains even after a 180-degree flip. These quad copters can also be used for photography as it can land in water and is extremely water proof [3].

Even though available literature on multimodal quad copters are scarce, many patented designs on manned multimodal vehicles have been reported in the past. A vehicle for military purpose can be developed, which could be a normal four wheeled manned

Vehicle consisting of an air parachute which is deployable, and a source of propulsion for flying, like a vertical ducted fan or propeller requiring a forward speed for takeoff [4]. Wheeled vehicles provided with rotary blades that can be tilted in vertical direction [5] is beneficial as opposed to horizontal blades in a helicopter. The blades can be tilted either to obtain lift

or forward speed and can also be operated in water. A convertible passenger vehicle [6] would revolutionize transportation as it can travel in land, air and water. It could have wings attached to a propelling device which can be tilted to provide thrust in any direction with a provision for tail assembly for maneuvering in land and water.

Describe the final product:

Final Product features: (i) Integration of 3 model Parts/modules: Air Vehicle, Water Vehicle, Ground Vehicle

(ii) Easily Reconfigurable to remove any one of part/module based on need and accommodate extra payload, long endurance

(iii) Reconfigurable with Fixed Wing, Multirotors and Vertical Take off and Landing with transition option(VTOL)

(iv) Floating option or Running above water surface for Take off and landing on water.

(v) Heavy Lift Capacity, Long Range and Long Endurance, Dust Proof, Water proof, Floating balloon/tubes integration, Ground purpose wheel also used for cutting water.

(vi) Autonomous capability

(vii) Common integration mechanism for payloads depends on deployment need.

Technological Domain (Keywords): Unmanned Air Vehicle (UAV), Autonomous Water Vehicle (UWV), Autonomous Ground Vehicle (UGV), Autopilot, Triphibious, Amphibious UAV, Drone, Reconfigurable UAV, Swarm and Cooperative, Autonomous, Long Range, Long Endurance, secured communication, Instrumentation, Avionics, Unmanned Surface Vehicle etc

Proof of Concept:

Triphibious Vehicle already tested its operation in air, land and on water with single integrated vehicle. New designed already formulated. All other basic instrumentations tested with various model. Working for advance prototype and ready to market technology product based on customer needs.

Stage of Development:

Ideation/Prototype/Advanced Prototype/Ready to Market technology : Prototype/Advanced Prototype

Provide INFORMATION on Competitors who manufacture and/or sell similar products: NA

What are the unique advantages your innovation has compared to the competition?

This is professional design to support the defence and civil application for various application.

A few potential companies who might be interested in this technology:

Aerospace Drone companies, Govt Organization, Defence, Robotics Companies or Own startup.

Intellectual Property Status: Indian Patent application with number **201741027807** filed in 2017