Department of the Navy SBIR/STTR Transition Program

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Topic # N131-069
Helicopter Electric Tail Rotor Drive
LaunchPoint Technologies, Inc.

WHO

SYSCOM: ONR

Sponsoring Program: ONR Code 35 - Naval Air Warfare and Weapons

Transition Target: MQ-8 Fire Scout

TPOC:
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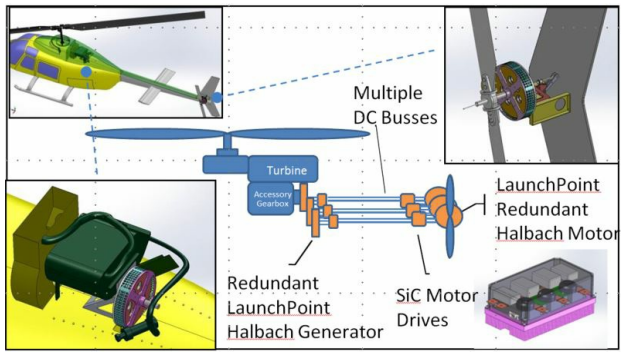
Other transition opportunities:
The system is being scaled down to enable greatly extended endurance for small electric UAVs using a hybrid propulsion system.
NASA has several distributed electric aircraft propulsion programs that will be able to take advantage of this technology.
The lightweight generators and electronics developed for this program can be integrated with heavy fuel engines to provide lightweight fuel to electric power sources.
The alternators are also suitable for aircraft generator upgrades to provide more electric power with greater efficiency on existing vehicles.



WHAT

Operational Need and Improvement: Electric propulsion gives aircraft designers new flexibility and enables design paradigms that were previously impossible which results in increased performance, capability, and reliability/survivability
LaunchPoint's electric and hybrid electric propulsion technology will enable unique VTOL capabilities and highly reliable long endurance electric aircraft propulsion
Applied to a helicopter tail rotor drive this technology provides flexible tail rotor operation to mitigate "loss of tail rotor effectiveness" and tail rotor stall conditions
Improve ballistic resistance and reliability of the tail rotor authority

Specifications Required: 80 kW peak power, 40+ kW continuous power
Input from gearbox shaft at 6000 rpm; output to tail rotor at 2550 rpm

Technology Developed: "Propulsion By Wire" architecture for highly reliable, survivable electric aircraft
Extremely lightweight, efficient, and robust alternators and electric motors, power transmission, and controls required to replace a conventional tail rotor drive shaft with electric propulsion components
Components developed are applicable to hybrid-electric propulsion of other fixed wing and VTOL aircraft and UAVs as well.

Warfighter Value: Hybrid electric propulsion technology will enable unique VTOL aircraft configurations that achieve range, endurance, efficiency, and speed of fixed wing aircraft
Helicopters equipped with an electric tail rotor have improved ballistic resistance and an increased flight envelope.

WHEN

Contract Number: N68335-15-C-0054 **Ending on:** May 10, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demonstrate power electronics	Med	Lab demonstration of high switching frequency electronics at 20 kW per inverter	4	April 2015
Demonstrate alternator	Med	Lab demo of alternator being driven by a fossil fuel engine at specified power and torque and generating 40 kW (peak) electrical power	5	January 2016
Demonstrate motor	Med	Lab demo of motor spinning a torque load at 40 kW (peak) shaft power at spedified RPM	5	April 2016
Demonstrate full system	High	Lab demo of fossil fuel engine driving alternator to DC bus to power electronics to motor driving 40 kW (peak) shaft load	5	May 2016

HOW

Projected Business Model: Custom designed high performance and customizable electric tail rotor drive capabilties
Initially custom-built low volume deliverables featuring "alpha-prototype" added performance
A strategic partner / prime contractor who wants to gain a foothold in the burgeoning electric aircraft/UAV propulsion market.

Company Objectives: Partnering with technologists developing next generation electrically propelled aircraft
Smaller vehicles (1 kW to 12 kW) approaching manufacturing readiness for production
Up to 50 - 100 kW are feasible with our present infrastructure
Partners interested in "Propulsion By Wire", electric propulsion married to fly-by-wire controls
Final product is an electric propulsion system that is FAA certified under a part 21.17(b)

Potential Commercial Applications: Extended endurance electric UAVs for commercial applications such as precision agriculture, infrastructure inspection, search and rescue, surveying and mapping; and HALE UAVs
Electric and hybrid electric general aviation aircraft and light sport aircraft; as well as potential VTOL personal air vehicles presently being developed.
This technology can enable man-portable/backpackable high powered generators.
Retrofit new alternators onto existing aircraft to provide additional electric power for advanced avionics/payloads with greater efficiency and reduced weight.

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