



DESIGN MOTOR-GENERATOR SYSTEMS

UNMANNED AIRCRAFT SYSTEM (UAS) PROPULSION



THE PROBLEM

Motor-generator (M-G) system technology is designed for equipment that operates on the ground — not the sky. This makes it too bulky, heavy, and electrically unsound to power the unmanned aircraft systems (UASs) of the future properly.

The Army wants a compact, lightweight motor-generator system with a controller to power next-gen electrified UASs.

THE OPPORTUNITY

The **Unmanned Aircraft System Propulsion (UAS Propulsion)** topic is a Direct to Phase II [SPARTN SBIR](#) opportunity, which means you can skip the proof-of-concept phase and go straight to the prototyping phase — where funding is much greater.

As many as three businesses will be selected to receive up to \$1.7 million each for a 12-month period of performance. Businesses that develop motor-generator systems are encouraged to apply.

The UAS Propulsion application window opens May 4, 2022 and closes June 1, 2022 at 11:00am CT. Learn more at aal.army/get-involved.

Examples of successful technology features could include:

- M-G system with an axial flux design that interfaces with either:
 - An engine crankshaft with dimensions of 300 mm (11.8 in) diameter by 80 mm (3.15 in) length); or
 - Shafts on a gearbox with dimensions of 127 mm (5 in) diameter by 177 mm (7 in) length by 177 mm (7 in) height
- M-G system maximum power of 7 kW to 10 kW, intermittent minimum power density of 6 kW/kg, and continuous minimum power density of 3 kW/kgf
- Generator input shaft interface design maximum speed of 20000 rpm
- M-G system minimum efficiency of 95%
- Inverter/controller weight less than or equal to 4 kg
- DC/DC converter with input/output nominal voltage of 28 VDC, operating temperature of -48° to 49° C, and cooling by air, water or oil

THE MOTOR-GENERATOR SYSTEM SHOULD PERFORM THREE KEY FUNCTIONS:



ENGINE STARTING

The motor-generator system should provide an initial surge of power that allows the unmanned aircraft system to start its engine and achieve liftoff.



POWER GENERATION

After liftoff, the motor-generator system should consistently supply power to the engine to keep the aircraft airborne and reduce the engine's consumption of fuel.



POWER BOOST

When needed, the motor-generator system should provide a burst of additional power to allow the unmanned aircraft system to temporarily fly faster or with greater force.

BACKGROUND ON OUR SPARTN PROGRAM

Special Program Awards for Required Technology Needs (SPARTN) is a new program for the Army — and for the small businesses that want to work with us — led by the Army ASA(ALT) Small Business Innovation Research (SBIR) team and bolstered by AAL models and outreach.

SPARTN blends government and industry best practices to introduce a new whole-of-Army, collaborative approach to solution innovation. The result is a way to solve Army problems faster and to accelerate the process by which successful technology is purchased by the Army.

WHAT MAKES SPARTN DIFFERENT?

- 1 Problems released through SPARTN are tied to the Army's critical needs and other focused modernization efforts
- 2 Faster contracting speed, with businesses typically notified of award 4x faster than the conventional SBIR process
- 3 Potential for millions in total value follow-on contract to build a concept or prototype related to the specific problem
- 4 Acquisition teams included early with the goal of easing transition and building new tech into recurring Army budgets
- 5 Potential for future high-value contracts via SBIR, other government funds, and private investment you secure

All topics released through SPARTN feature challenging and important problem statements from problem owners across the Army. These represent some of our biggest challenges and the ones we want to work closely with industry to solve.

To learn more about SPARTN or how to apply for a SPARTN topic, visit aal.army/SPARTN.



POINT CHALLENGE



"WE KNOW WHAT WE WANT."

We need a specific solution, tailored to meet a detailed problem statement.

TIMEFRAME	1–2 years
PARTICIPANTS	Potential for multiple businesses
FORMAT	Businesses are separately tasked to develop technology tailored to a distinct problem
EXAMPLE PROBLEM STATEMENT	"How can we create a specific radio to transmit and receive on the same frequency?"
FUNDING DETAILS	Funding and periods of performance are determined by topic requirements
SBIR PHASE DETAILS	Can invest across different tech development stages Depending on the topic, both Phase I and Direct to Phase II awards may be possible



ABOUT THE ARMY APPLICATIONS LABORATORY

We don't make things — we make things possible. The Army Applications Laboratory (AAL) is the Army's innovation unit and a partner for industry, the Army, and government organizations. We discover practices and processes to speed capability development and turn cutting-edge ideas into real, relevant solutions for Soldiers. Learn how we do it at aal.army.

