



PARANETICS PROPULSION SYSTEM

Propulsion, reimagined at the rim.

A patented, modular electric motor that lives in the rim of the fan — and the aircraft, vessels and machines it makes possible.

What makes the PPS different · September 2026



Exploded view: duct, stator rings, field projectors (green), rim rotor — concept rendering

Eight ideas in one motor

Most electric propulsion puts a motor in the hub and bolts redundancy on afterwards. The PPS starts from a different place: a patented electromagnetic module, arranged around the rim of the fan.

01

The field projector

Five angled electromagnets shape one field: the same magnetic pole at both faces.

02

Torque at the rim

No hub motor, no gearbox, no shaft in the torque path.

03

No free blade tips

Blades are fixed to a rim that turns with them.

04

Three drives in one

Three independent channels, each with its own controller and power.

05

A redundant bearing

Two bearing pairs; if one seizes, the other carries the fan.

06

Cooled by its own rotor

The spinning rim is the fan. The magnets run coolest.

07

Built from modules

Add or remove projectors to size a motor. One part, many diameters.

08

Motor and generator

Spin it and it makes power — a second market from the same hardware.

11

patents issued in the US, Australia, China and Japan

7

PPS prototypes built

2016

priority date of the field-projector patent family

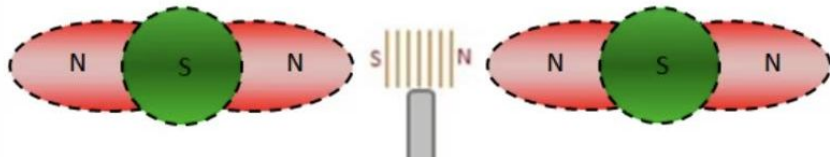
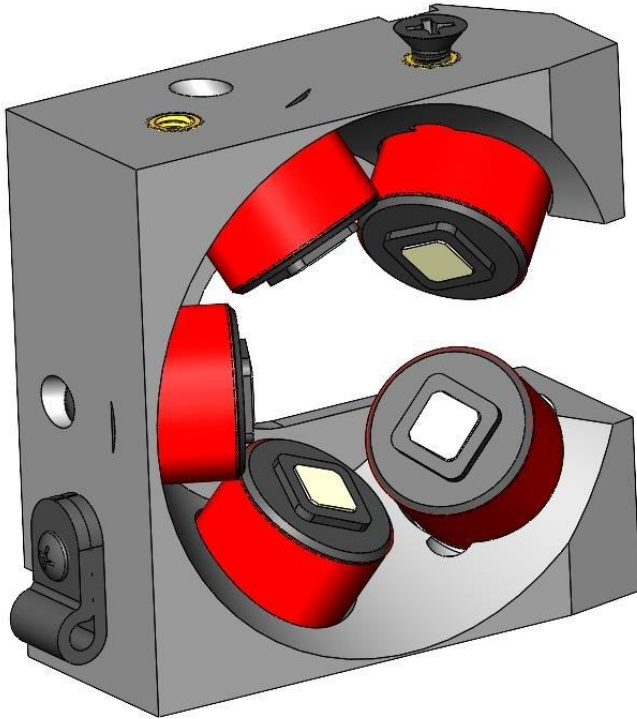
2026

exhibited at the DARPA Lift Challenge, Dayton, Ohio

The ParaNetic field projector

Five angled electromagnets converge on the path of the rotor's permanent magnets. Together they project a single shaped field that a conventional coil does not make.

- **Same pole at both faces.** An independent mapping by ARkival (2019, NIST-referenced, filed with the USPTO) found a cusp-shaped field: the same polarity at the front and the back, the opposite inside the opening, and a single null on the axis. ParaNetics calls this the “tri-pole” field.
- **Worked from both sides.** Each rotor magnet passing through the opening is acted on by both faces of the projector.
- **A self-contained module.** Each projector weighs 6.5–7 oz and needs no laminated stator stack.
- **Patented.** Priority 2016; issued in four countries.



Top: the field projector, five angled electromagnets in a glass-filled nylon frame. Bottom: ParaNetics' diagram of the projected field.

5

angled electromagnets per projector

3,080 G

peak field near the core tips (ARkival mapping) [3RD PARTY]

The motor is the rim of the fan

Projectors sit in a ring around the fan. Permanent magnets are built into the rim of the blade ring. The blade ring *is* the rotor.

- **Torque enters at the rim.** The hub carries only a bearing: no hub motor, no gearbox and no drive shaft in the torque path.
- **No free blade tips.** The blades are fixed to a rim that turns with them, so there is no gap between blade tip and duct and no tip vortex.
- **An open, flat module.** It fits a pylon, sits inside a wing, or stacks coaxially.
- **Blade-agnostic.** The integrator chooses the blade set for the mission; ParaNetics supplies the motor, controllers, mounting ring and a documented blade interface.



Cutaway: field projectors (green) around the rim of a blade ring — concept rendering.

Three drives in one fan

The projectors are wired as three packs. Each pack has its own controller, its own power input and its own sensor.

- **Redundancy is the architecture.** Nothing is duplicated to get it: no second motor, no backup controller.
- **One fault is not a lost fan.** If a channel drops out, the other two keep the fan turning with about two-thirds of the torque. Add additional current and the blades spin at the same RPM.
- **Three-phase by geometry.** The three packs are offset around the rim.

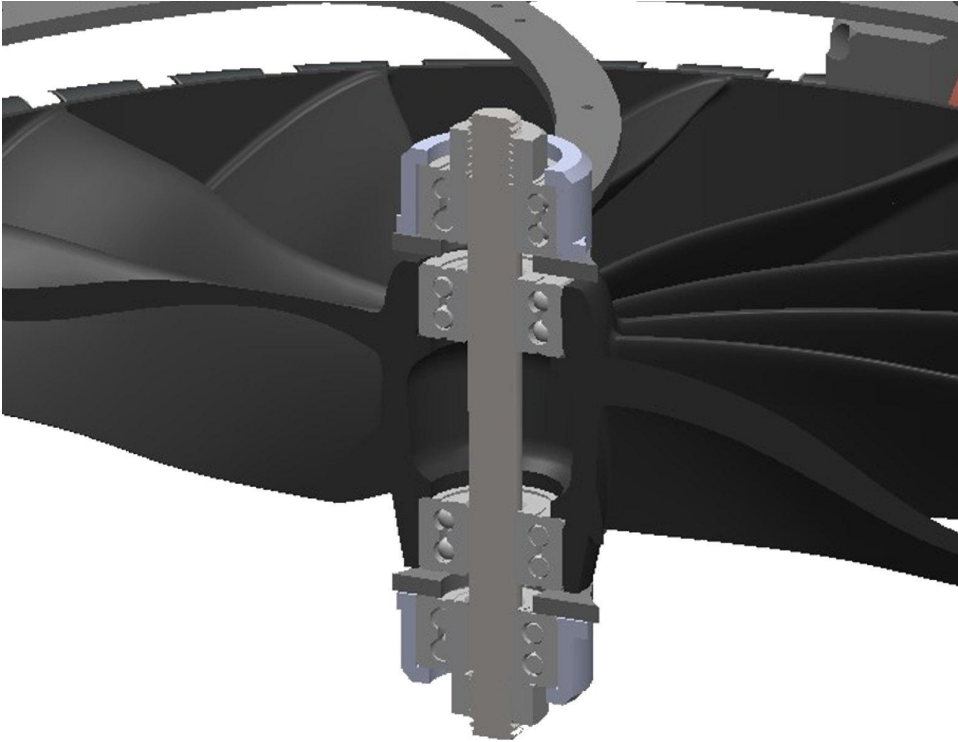


Left: the three channels in red, green and blue (concept rendering). Top right: three packs, three supplies, three controllers. Bottom right: the three-channel controller as built.

A bearing that backs itself up

In a hub motor the shaft *is* the torque path, so it has to turn. In the PPS the shaft carries no torque, and that frees it to become a spare.

- The blades ride on one bearing pair on a shaft that normally stands still.
- That shaft rides on a second bearing pair in the frame.
- **If either pair seizes, rotation moves to the other and the fan keeps turning.**



Cutaway of the hub: two bearing pairs, one inside the other.



Built into the nine-projector fan motor and shown at ParaNetics' exhibit at the DARPA Lift Challenge, National Museum of the U.S. Air Force, Dayton, Ohio, August 2026. Provisional patent application in preparation.

Cooled by its own rotor

The spinning rim moves air across the projectors whenever the motor runs. No blower, no liquid jacket, no ducting: nothing extra to add weight or to fail.

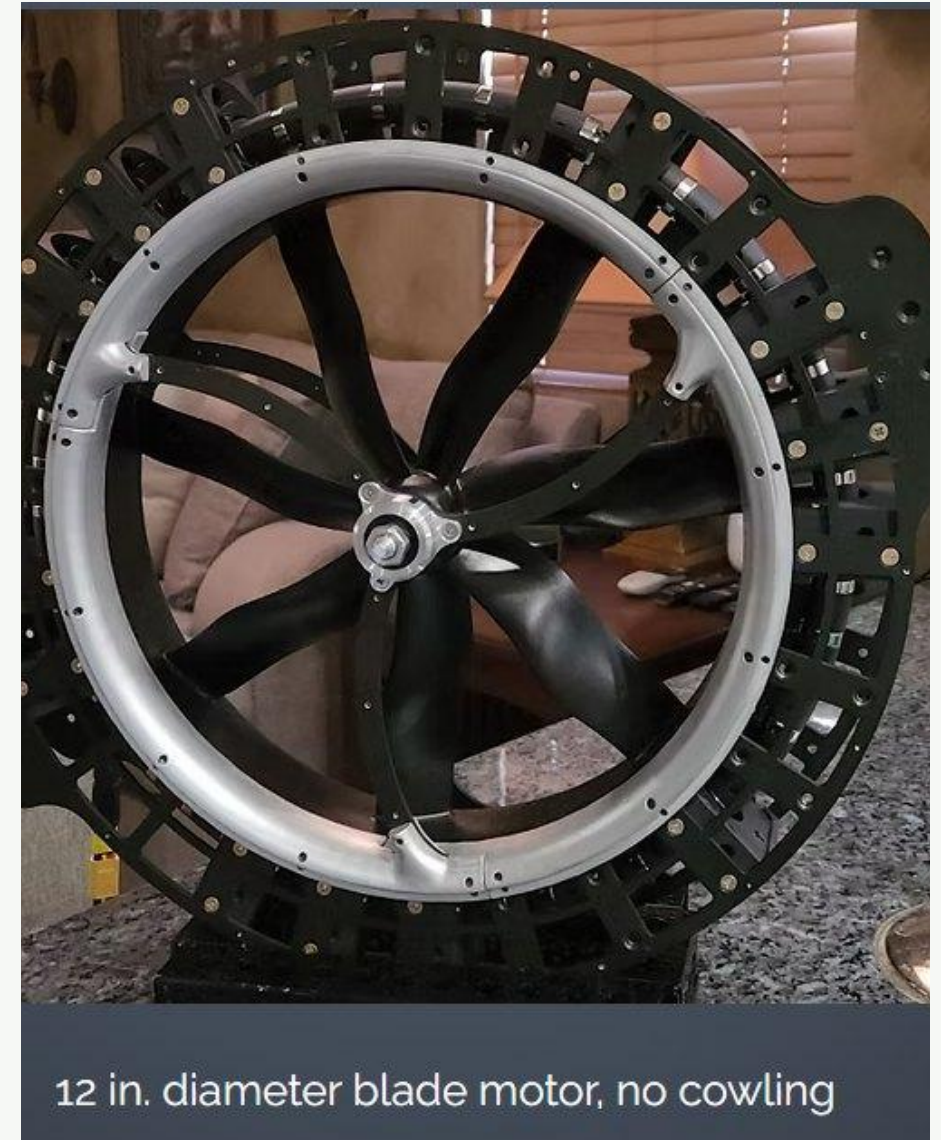
- **The magnets sit furthest from the heat.** They are the one part a motor can damage permanently by overheating. Keeping them cool keeps their strength, and the motor's torque, steady over its life.
- **Nothing hidden.** The power that cooling takes comes out of the motor itself, so it is already inside every performance figure the motor produces.

85°F

rotor magnets on the bench motor [MEASURED]

118°F

hottest coils, same run, in a 78°F room [MEASURED]



12 in. diameter blade motor, no cowling

One module, many fans



A family of fan sizes built from the same projector module (concept rendering).

- **Size by count.** A larger fan takes more projectors, not a new motor design.
- **Qualify once.** One certified module can serve several diameters, which is the certification advantage heavy-lift programs look for.
- **Built with simple processes:** printed frames and bobbins, machined rings, automated winding.

NEXT GENERATION [PLANNED]

Version 2.0 projector



- Each electromagnet sits in a steel pot core, so its field returns through steel instead of air.
- Larger electromagnets with about 35% more turns each.
- About 40% fewer parts: less machining and fewer solder joints.

New shapes for aircraft



Pylon

Heavy-lift and cargo drones, with rim fans on booms.



In-wing

A flat module buried in the wing for eVTOL and blended-wing designs.



Anti-torque & tail fans

A ducted rim fan with three drives in one, suited to helicopter tail rotors.

Defense heavy lift

ParaNetics exhibited at the DARPA Lift Challenge (August 2026) and has proposed the PPS for DARPA's heavy-lift powertrain program.

Aircraft images are concept renderings.

Electric Tail Rotors



- **The Problem:** Traditional mechanical tail rotors compromise stealth helicopters with high noise profiles, aerodynamic drag, and vulnerable mechanical parts.
- **The Solution:** ParaNetics' circumferential electric tail rotor eliminates complex gearboxes, drive shafts, and center-hub obstructions.
- **Enhanced Stealth & Control:** The system drastically reduces acoustic and thermal signatures while delivering instantaneous, continuous anti-torque thrust.
- **Core Technology:** Powered by a patented tri-pole magnetic architecture that simultaneously leverages attractive and repulsive forces in a 5-point parabolic array.
- **Superior Efficiency:** This dual-action drive maximizes mechanical output per watt, extending hybrid-electric flight range and preserving critical payload power.



One platform, licensed by field of use. ParaNetics plans to license the module to established motor and propulsion manufacturers in each sector and to keep the field-projector IP.

Hub-free fans for industry



Concept rendering: PPS cooling-tower fans.

- **Cooling towers and data-center cooling:** large fans with no gearbox to service and a drive that keeps turning after a fault.
- **Pumps and HVAC:** a sealed rim drive with an open center.
- **Rim generators:** the same hardware run in reverse for wind and water.

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APPLICATIONS · MARINE

Under water, the rim has advantages

- **No tip gap.** With blades fixed to a turning rim, there is no tip vortex, a main source of cavitation and noise in ducted propellers.
- **Hub-free.** The open center leaves room for flow, and no torque-carrying shaft needs a seal.
- **Three drives in one** for thrusters that cannot be allowed to stop.
- **Vectored thrust** in Kort-nozzle configurations.



Concept renderings: PPS marine thruster and submersible.

Uses: submersibles and ROVs, electric boats and yachts, naval and commercial vessels.

Patented in four countries

11

patents issued: US 10,937,582; US 11,476,026; US 12,354,794;
Australia (3); China (3); Japan (2)

2

applications allowed

9

applications pending



Two patent families cover the field projector (priority 2016) and the motor built from it (priority 2019). A provisional application for the redundant bearing arrangement is in preparation. Patent counsel: Buchalter.



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