

Optically Powered Unmanned Systems (OPUS)

Executive Summary

The OPUS project will focus on designing and developing a technology demonstrator to remotely power unmanned systems.

Sponsoring Agency

PRC, NRL

Project Description

Current unmanned platforms in the DoD inventory have limited range and loiter times due to a limited capacity for energy storage. Laser power beaming has the potential to deliver energy indefinitely to remote mobile electronic devices, ranging from unmanned ground and aerial platforms to orbiting satellites.

Based on the photoelectric effect, optical power from a laser can be converted to electrical power after traveling long distances.

This project will explore using a laser to remotely power an unmanned system (air or ground) over a small distance within a laboratory environment. Consideration should be given to tracking a target and maintaining continuous illumination of the target.

Functional Specs

- Evaluate and select an appropriate laser system based on wavelength and power

- Evaluate and select appropriate photovoltaics or like energy conversion devices
- Design and build the power management circuitry
- Evaluate and select an optical tracking system or design a new one (can be automatic or manual)
- Evaluate and select an unmanned platform

Performance Specs

- The system should power the unmanned platforms prime power (motor) while the platform moves
- The system should operate over a minimum distance of 10m

Constraints

- The system must operate in the eyesafe regime (Class 3b laser or below)
- The system must be portable to the West Point Club for Project's Day

Deliverables

Cadets should all circuit schematics and system diagrams.

Cadets should provide a working prototype of the system including lasers, photovoltaics, tracking system and unmanned platform.

Envisioned Uses

Unmanned platforms are capable of indefinite endurance.

Army Modernization Priorities

- 4. Network, Command, Control, Communication and Intelligence
- 6. Soldier Lethality

Cadet Skills Required:

- Optics
- Lasers
- Circuit Design
- Semiconductor Device Physics

Estimated Number of Cadets Required:

- 3-4 (3-4 EE)

Advisor Contact Information

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