

Flexible Hybrid Electronics Demonstrator for UAV Applications

A NextFlex Project | Department of Defense Manufacturing Innovation Institutes



Technology: Small Unmanned Aircraft Systems (SUAS) Using Flexible Hybrid Electronics for Expanded Multi-Mission Operation

Project Participants: The Boeing Company, Matternet, ITN Energy Systems, and Boise State University

Institutes' Role: Driven by its Technology Roadmaps, NextFlex sought proposals to demonstrate unmanned aerial systems enabled by multiple FHE capabilities including both communications and power conversion. This project was selected for NextFlex funding through a rigorous proposal review process including assessment of the manufacturing gaps being addressed and the strength of the technology demonstration. NextFlex members, companies, academia, and government, contribute to the Manufacturing Roadmaps which are updated annually.

Technology Description: The project partners developed multifunctional FHE electronic “skins” containing flexible radar systems, a 4G communication antenna, a flexible solar cell and battery stack, and indicator lighting to show the state of the flexible batteries. These sub-systems include the most advanced FHE devices built on NextFlex projects to date, including 60 GHz radar boards with >1200 vias. A NextFlex flexible microcontroller was integrated into the design to manage the solar and battery system. The project culminated in a test flight that demonstrated the functionality.

Impact: Truly autonomous drone operations will require functionality such as obstacle avoidance radar systems for safe operation. The FHE solutions demonstrated in this project provide a pathway to enabling those systems in a lightweight, compact form factor suitable for small unmanned aerial systems. The project team envisions this demonstrator will have tremendous impact for defense, with applications focused on delivery of critical supplies, and for commercial applications in autonomous delivery, such as hospital supplies and specimens.

