NASA SBIR/STTR Technologies

09-1 T3.01-9968 – A Maximum Power Tracker for Improved Thermophotovoltaic Power Generation
Contract No. NNX10RA88P

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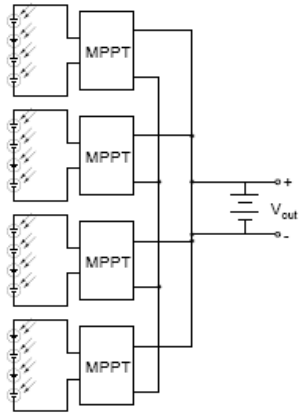
Identification and Significance of Innovation

A key factor in the efficiency of radioisotope-powered thermophotovoltaic systems is the power converter that converts cell output to produced, stable bus voltage for powering spacecraft and instruments.

Creare and the Massachusetts Institute of Technology (MIT) propose to develop an advanced multi-channel Maximum Power Point Tracker (MPPT) that is optimized for RTPV systems.

Expected TRL Range at the end of Contract: 3–4



A Multi-Channel Maximum Power Point Tracker that addresses TPV performance issues due to cell shading and non-uniform illumination

Technical Objectives

- Enhance existing multi-channel MPPT optimized for RTPV applications
  - Improve conversion efficiency
  - Fabricate and measure the conversion efficiency of the designed MPPT under benchtop and simulated RTPV conditions
  - Estimate the RTPV system improvement resulting from the incorporation of an MPPT

Work Plan

- Design and fabricate improved MPPT
- Test and characterize MPPT
- Model overall RTPV system performance improvements
- Adapt system to NASA applications and space environment.

NASA Applications

- Improved deep space power system efficiency and specific power
- Alternative to Stirling and RTG-based radioisotope power systems

Non-NASA Applications

- Improved system performance for other RTPV applications
- Portable TPV generator (20 W propane fueled)
- Thermal battery alternative
  - Thermal batteries
  - Deep sea instruments
- Remote monitoring stations

Firm Contacts

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