



# Navy SBIR/STTR Success



## Ultra-Compact Power Harvesting for Self-Powered Aircraft Sensors

Energy harvester powered wireless sensors are enabling the expansion of Health and Usage Monitoring Systems (HUMS) on rotorcraft to provide comprehensive condition monitoring, thereby enhancing safety and reducing maintenance cost.

Topic Number: N07-076

SBIR Investment:  
**\$815,641**

Phase III Revenue:  
**\$3,350,000**

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## About the Technology:

Information infrastructure has grown dramatically in recent years based on new opportunities for cost saving and performance enhancements across a wide range of systems and devices. A key part of the new information infrastructure enabling this revolution is cost effective and reliable acquisition and dissemination of information. At an asset level, this is being facilitated by the transition from hardwired sensors to energy harvester powered wireless sensors, which addresses four implementation barriers: 1) weight, 2) installation time/cost, 3) reliability, and 4) opportunity for temporary fit. For example, energy harvester powered wireless sensors are enabling the expansion of Health and Usage Monitoring Systems (HUMS) on rotorcraft to provide comprehensive condition monitoring, thereby enhancing safety and reducing maintenance cost.

## Naval Benefit

By collaborating with NAVAIR technical experts, KCF matured its technology - an ultra-compact power harvesting device enabled by single-crystal piezoelectric material. Single-crystal piezoelectric materials are a key technology in reducing the size and weight of vibration energy harvesters. The high, single-crystal piezoelectric coupling coefficient and low elastic compliance result in a four-fold improvement in device power density over conventional solutions. The compactness and high power of single-crystal piezoelectric materials particularly benefit aircraft applications where weight reductions and high reliability are critical.

## Transition

Energy harvester development is supporting not only military specific applications but also commercial applications. One such application is Condition Based Maintenance (CBM) in industrial facilities. Thanks to the energy harvesting and wireless communication, vibration sensors for characterizing the condition of machines can now be deployed at a fraction of the life cycle cost of conventional sensors. The cost of wiring in industrial facilities usually runs about \$20-40 per foot. So a 100-foot wire run for a sensor may cost \$2-4K plus the sensor. Alternately, an energy harvester powered wireless sensor costs just \$500-1000 per point. KCF recently introduced its SmartDiagnostics® product line, which was designed using innovative low power energy management technology that is fundamental to energy harvester powered devices. This provides an affordable and integrated suite of products that puts predictive maintenance within practical reach of medium and small operations.



# KCF Technologies, Inc.

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