

## Project Overview Report

1. UTC Identifying Number  
DTRT13-G-UTC28
2. Center Identifying Number  
CAIT-UTC-NC17
3. Project Title  
Piezoelectric Energy Harvesting in Airport Pavement
4. Principal Investigator & Contact Information  
Hao Wang  
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5. Rutgers/CAIT Project Manager  
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FAA Airport Pavement R & D Section  
Atlantic City International Airport  
Atlantic City, NJ 08405
7. Project Description  
Harvesting energy from pavements by piezoelectricity is a new research field with opportunities and challenges. Although the harvested energy could be at small-scale, it can be used for a wide range of applications in transportation system such as lighting, snow melting, and traffic signal control in addition to direct energy storage. This research will focus on developing new design of piezoelectric transducer for improved energy harvesting efficiency in airfield pavements. New configuration of sensor geometry using ceramic/polymer composite will be investigated using laboratory testing and theoretical analysis. The energy conversion efficiency, fatigue life, and integrity with pavement material will be considered in sensor development. The effect of pavement characteristics (layer material and stiffness) on energy harvesting potential will be evaluated. Numerical models for simulating energy harvesting performance in pavements under dynamic multi-wheel loading will be developed. The simulation results will be used for optimizing placement of sensor arrays in pavements to maximize the amount of total energy harvested. The research outcome will lead to development of smart pavements with multifunction and eventually generate renewable electrical energy from waste energy.
8. Implementation of Research Outcomes (or why not implemented)  
The research results could benefit transportation community at large by providing a green energy solution. Although the harvested energy could be at small scale, it can be used for a wide range of applications in transportation system such as lighting, snow melting, and traffic signal control in addition to direct energy storage. This kind of energy is clean and renewable energy and environment friendly.  
The FAA pavement R & D section is interested in the developed technology. It is expected that the prototype will be tested in the accelerate pavement testing section at the National Airport Pavement Testing Facility (NAPTF) after the project is completed. This may lead to the future implementation of energy harvesting in airfield pavement.
9. Impacts/Benefits of Implementation (actual, not anticipated)  
TBD
10. Dates and Budget  
Start Date: 1/1/2015  
End Date: 12/31/2016  
UTC (CAIT) Dollars: \$ 114,422  
Cost Sharing: \$ 0  
Total Dollars: \$ 114,422

11. Keywords  
Energy Harvesting, Piezoelectric, PZT, Pavement, Dynamic Multi-Wheel Loading
12. Web Links (Reports and Project Website)  
<https://cait.rutgers.edu/cait/research/piezoelectric-energy-harvesting-airport-pavement>