



Graduate Opportunities
in Safe Transportation
and Resilient Systems

GAANN- GOSTARS Fellowship Project



Adviser: Yusuf Mehta, Ph.D., P.E.

Title: Energy Harvesting from Pavements

Description: This project will revolve around identifying the state-of-the-art energy harvesting (i.e., Solar energy, piezoelectric energy harvesting, geothermal energy using Heatpipe) from pavements and their limitations and performing feasibility study concerning local (New Jersey) traffic and environmental conditions. Various laboratory tests and mathematical simulations will be performed to fully understand the feasibility of potential harvesting technologies in NJ and their limitations in the first phase. In the second phase, a hybrid energy harvesting system will be designed and installed on a local live roadway to monitor its performance. Phase II will also involve developing a tool to assist local traffic agencies in identifying the feasibility of the hybrid system when environmental and traffic conditions change (i.e., for different roadways in the state).

Impact on GOSTAR: This project will open new possibilities for GOSTARS career. They will be able to compare between the state of the art energy harvesting technologies not limited to just pavements. Practical experience in these latest technologies will keep them ahead of any other pavement-related engineers of their field. There are a number of companies who are either startups or in the market for generating electricity of piezoelectric effect from human traffic i.e. Pavegen, Innovatech, Waynergy etc. Besides, companies like the advanced cooling system work on heatpipe which can be used for geothermal energy collection. Some of the prominent solar energy companies are Panasonic, Go solar, Sunpower etc. GOSTARS will have excellent opportunities in these companies.

Impact on GAANN: As GAANN focuses on strengthening graduate research, training and scholarship, this energy harvesting from highways project is going to aid these objectives. Moreover, as autonomous vehicles are highly electrical energy driven these days, the energy harvesting on the go project is in line with the goal of an intelligent traffic system, and it will properly train the students for these newly emerged challenges.

Tentative Plan

Quarter	1	2	3	4	5	6	7	8	9
Task	Literature review	Selection and feasibility study of energy harvesting techniques, estimation of energy output & service life		Developing prototype hybrid technology for harvesting energy from NJ roadways, detailed planning for installation and monitoring			Monitor and evaluate the efficiency and power generation capacity; Develop a System Feasibility Analysis Tool for NJ Conditions		
Outcome	Develop a hybrid method of energy harvesting from roadways		Design a hybrid prototype of energy harvesting from roadways			Installation & monitoring of hybrid harvest in roadways to assess short term impact			
Deliverable	A review article in a peer-reviewed journal based on the literature review performed.		Publish in refereed conference proceedings and journal.			Publish in refereed conference proceedings and journal.			
Graduation									Spring 2025