Sustainable Energy Bike Lanes with Applications in the City of Kuala Lumpur, Malaysia

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Community Partners

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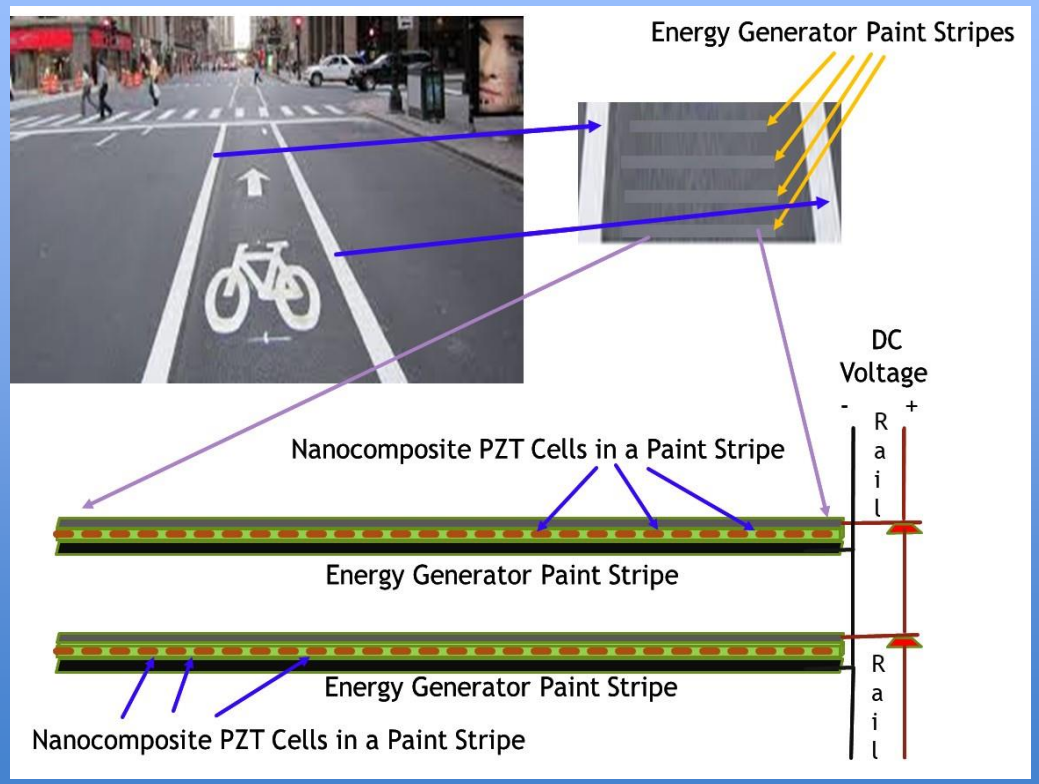
- University Tenaga Nasional
- (National Energy University)

Project Overview

Visual Schematic



Project Vision

- The research to develop energy cells using composite materials that can be placed on bike lanes to produce and store energy.

- Energy from bike lanes will be used for
  - charging bikes and mobile devices
  - process drinking water from collected rainwater.

Project Overview

Use-Inspired Research

- Kuala Lumpur city is undergoing rapid growth, and currently having about 8 million people from 1.8 million in 2017.
- Traffic congestion needs to be reduced and a small portion of commuters already using the city's 7-mile bike lanes.
- City needs to solve these: (a) green mobility targets, (b) sustainable energy and (c) green lifestyle.

Fundamental Research Contributions

- Green Mobility: energy Produced from bike lanes will also add more commuters with EV bikes by providing charging stations, thus help reduce traffic congestion.
- Sustainable energy: Bike lane will provide (a) emergency and safety lights, (b) mobile charging for bike riders and (c) encourage heathy living.
- Green lifestyle: city is promoting healthy living by increasing bike users and provide drinkable water that is processed from collected rainwater system using sustainable energy.

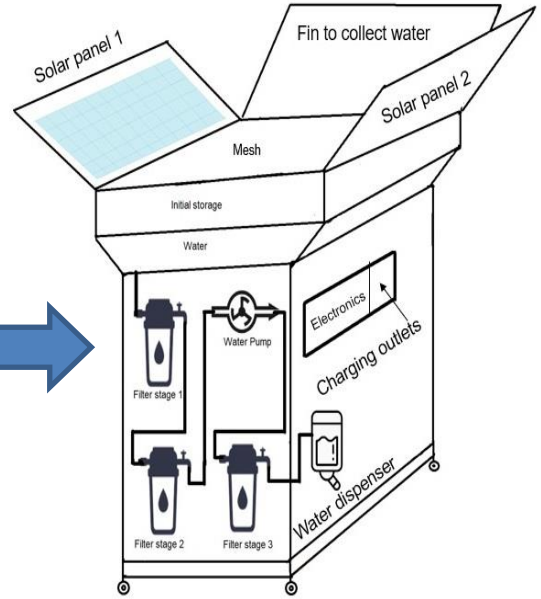
Project Update

- Developed composite cells processed on aluminum and 2 out of 5 pairs tested good for mechanical stress.
- Tests were conducted and found to have energy signals from these samples

PZT Composite Cell Growth on Al

- Bike lane kiosk design is complete and ready for fab.
- Rainwater filtration system is developed for purifying water for drinking.
- Kiosk's rainwater collection pad is designed with solar panels.

Existing solution using supply water



Designed kiosk for drinking water from collected rainwater

Project Evolution

- Kuala Lumpur City office showed interests and wanted to know if the technology can be used in city traffic roads, so we shared our interests also for future projects.

- The city is interested about this sustainable kiosk for building rooftop applications of supplying purified water from collected rainwater.

- The city wanted to know the impact on the energy system as some part of lanes can create cracks. We are looking at other solutions that can make the energy pads on bike lanes to be tolerant to surface stress. Currently, the energy pad can easily be replaced while repairing the lane surface. We are also looking for a possible solution to stress tolerant energy transfer system.

Anticipated outcomes & success measures for next year

Develop cells that can be processed on flexible conductive fabrics or porous conductors. Complete a 10ft pad that is easily portable and attach on the assigned bike lane section at UNITEN. Also, quickly complete testing and evaluate its energy density.

Complete the water kiosk and place on the 10-ft bike lane section in UNITEN. Evaluate filter life and water processing capacity.

Complete another 300ft of Bike lane in the city. Evaluate energy production behavior, collection and large capacity storing process.