Electrae- An Innovative Solution for Generating Energy from Multiple Sources Including Piezoelectrics, Photovoltaic Materials and Low Flow/Head Hydropower for Application in a Multitude of Environments

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The purpose of Electrae (An innovative solution for generating energy from a multiple sources including piezoelectrics, photovoltaic materials and low flow/head hydropower for application in a multitude of environments) is to develop a device that uses multitude of energy sources through vehicle traffic, solar panels embedded in roadway and by a low flow/head water flow. This addresses Energy Poverty, a serious global issue with pollution. Over 3 billion people across the world do not have access to electricity. Those who do have access, rely on energy sourced from fossil fuels. In the US, renewable energy is used for <10% of energy consumption. This leads to high pollution with 5,271 million metric tons of CO2 in the atmosphere. It is estimated the world will run out of fossil fuels by 2050. We need to find a cost-effective, adaptable, and renewable energy source. This project explores the possibility of using multitude sources, in one device. Multiple piezo prototypes were tested and Polyvinylidene fluoride (PVDF) with mass was selected. For turbine selection, multiple 3D printed turbines were tested for ideal output in multiple flow conditions. Solar panels were tested in cloudy and full sun conditions - all these components were combined to produce 5 to 11 W. This device can be scaled for large operations, e.g. on roadways above the bridges, roads over stormwater etc. A small-scale version is portable and can be used to generate power on small-scale - working as a nano-grid feeding into micro-grids. This can be used for calamity-impacted areas like Puerto Rico or Asia.

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