Sustainable Water Extraction via Corona Discharge-Induced Fog Condensation

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This Project aimed to improve the efficiency and viability of fog nets using corona discharge. Corona discharge is created when an electric field ionizes the surrounding air. This process allows for the water droplets in fog to be electrically charged. Once they have gained a charge, they can be attracted to a grounded collector surface, where they can be collected and used for practical purposes. High-voltage assisted fog nets aim to improve the efficiency of passive fog nets, which only collect around 10% of the available moisture in fog. The main engineering goal is to achieve a system capable of collecting 45% of the available moisture in fog. The variables for testing include the voltage application and the collector surface geometry. A passive fog net will be used as a control for comparison purposes. The methodology involves constructing a bench-scale HV-assisted fog collector powered by a 3-stage voltage multiplier. Fog density will be measured with a LiDAR system to ensure similar testing conditions. Water yield will be measured during timed trials. Once a design can collect at least 45% of the available moisture in fog, a full-scale prototype will be constructed and tested. This research aims to develop a reliable, sustainable water source for fog-prone regions. It was hypothesized that among the three proposed high-voltage fog-collection designs, the circular geometry would achieve the highest water-collection efficiency.

Awards Won: