Exploring the Use of Leaf Biomimicry and Electromagnetic Induction for Electricity Production

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This project aims to maximize electricity production from wind energy, which is limited in cities due to space constraints. The prototype, with its green wall design, uses channelling winds around buildings and leaf biomimicry to generate electricity in a reduced space using electromagnetic induction. To build the small-scale prototype, a frame was constructed, an electromagnetic field was generated, artificial leaves were installed, and a circuit was created. Circuit tests were conducted to determine the voltage and electrical power generated by the prototype. Other tests included decorative vs. 3D-printed leaves to determine which were more effective at capturing wind and converting it into electricity. As a result, the prototype generated an average final voltage of 4.0 mV at speed level 1, 4.2 mV at speed level 2, and 4.9 mV at speed level 3, indicating that the prototype can generate electricity regardless of wind speed. This indicates a direct proportionality, as a higher wind speed generates a higher voltage. In addition, the 3D printed leaves produced higher voltage at higher wind speeds, while the decorative leaves were effective at producing higher vibration at lower wind speeds. With the improvements of converting the prototype to full-scale, it will be possible to maximize the production of electricity and meet the needs of buildings. Therefore, the project can use leaf biomimicry and electromagnetic induction to capture high and low wind speeds and convert them into electricity.

Awards Won:

Missouri University of Science and Technology: $2,000 tuition scholarship (renewable for up to 4 years)