Unmanned Solar Powered Plane – Development and Applied Technologies

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Abstract

AGH Solar Plane is a science club aiming at creating an unmanned aircraft powered by photovoltaic cells placed on the wings of the model. The energy obtained during daytime flight is used to maintain the flight and to charge lithium-ion battery packs used as a power source during nighttime flight. The most important factor for the success is to achieve proper power, weight and structural strength of the photovoltaic cells. Initial attempts to use a plastic laminate and attach the panels to the wings covering using acrylic tape proved unsuccessful due to aerodynamic drag and low structural strength. The method developed by the team involves fabricating wings from composite and integrating PV cells during the lamination process to make them an integral part of the wing. By creating further models, we are working on improving the composite carbon fiber fuselage structure. So far we have created four models with different sizes and configurations – among others one with a wingspan of 3.8m with 48 photovoltaic cells or a test model with a wingspan of 1.5 m with 12 photovoltaic cells. Additionally, we are in the process of implementing a solution based on artificial intelligence and machine learning technologies (based on data aggregated by aircraft). We are developing the systems necessary to ensure full autonomy in energy management.

Keywords: aircraft; green energy; lamination; photovoltaic cells; composites