



Murdoch
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Solar Glider

ENG460 Engineering Thesis Final Report



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Abstract

This report outlines the design and construction of a solar powered, radio controlled electric glider. The design called for an electric glider that could take-off, climb and maintain continuous level flight during daylight hours on solar power alone in favourable atmospheric conditions.

The project required the successful completion of the following steps:

- Research and selection of a suitable airframe
- Selection of a propulsion system i.e. electric motor, gearbox, propeller, and speed controller
- Selection of off-the-shelf radio transmitter, receiver, and servo actuators to control the glider from the ground
- Selection of a battery for energy storage
- The design of a solar array that can be integrated into the wing surface of the glider
- Research, design, construction and testing of a small, light and efficient maximum power point tracker (MPPT) based on a boost DC to DC converter.

The selection of the airframe used and the design and construction of the various sub-systems was aided by a mathematical model. This model was based on an energy balance and a weight balance of an aircraft in level flight.

The glider is now complete and testing has shown that the glider can fly on solar power alone in ideal atmospheric conditions. However these conditions do not exist very frequently in summer in Perth, Western Australia.

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Acronyms

A/D	Analogue to Digital
AR	Aspect Ratio
BEC	Battery Eliminator Circuit
DC	Direct Current
EMF	Electromagnetic Field
EPP	Expanding Polypropylene
MAV	Micro-Air Vehicle
MPPT	Maximum Power Point Tracker
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
NASA	National Aeronautics and Space Administration
PCB	Printed Circuit Board
PSH	Peak Sunlight Hours
PWM	Pulse Width Modulation
RPM	Revolutions per Second
ZIF	Zero Insertion Socket

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