Solar-Powered Unmanned Aerial Vehicle

Requirements

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Project Partners: ME 476C Team

Overview

Task: To work with a ME team to successfully build a solar-powered unmanned aerial vehicle (Solar UAV).

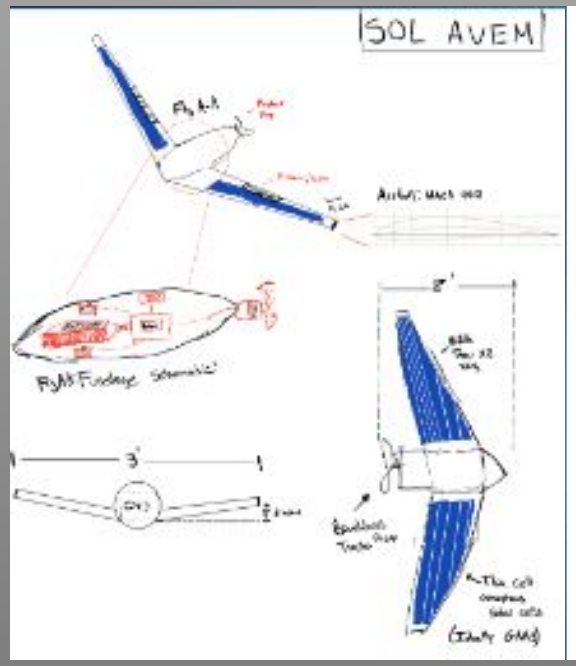

Figure 1: SOL AVEM Design

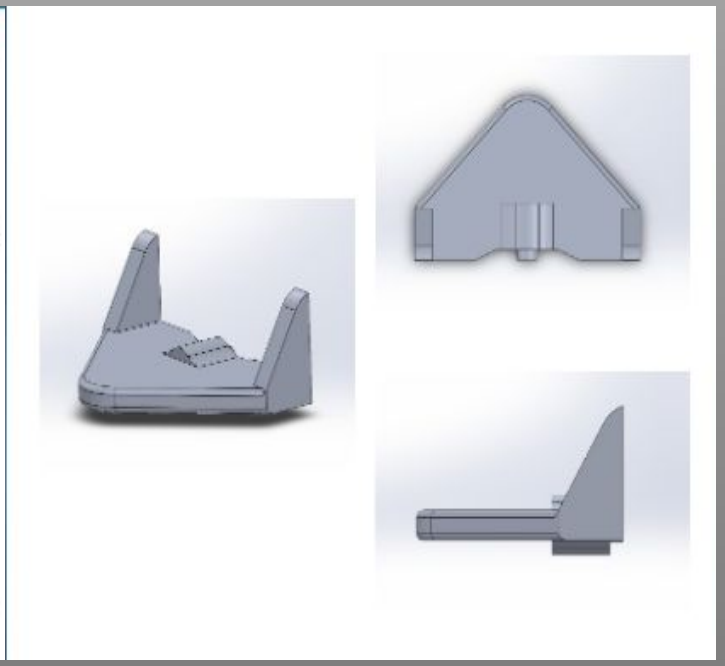

Figure 2: Flying Wing Design

Our Focus:

Drawing solar power using thin film solar cells to power the UAV's electrical components

Monitoring charge to the battery using a maximum power point tracking (MPPT) charge controller

Battery selection and configuration based on the operating load requirements

Battery's voltage through a DC/DC converter to regulate power to the electronic speed controller, which controls motor speed

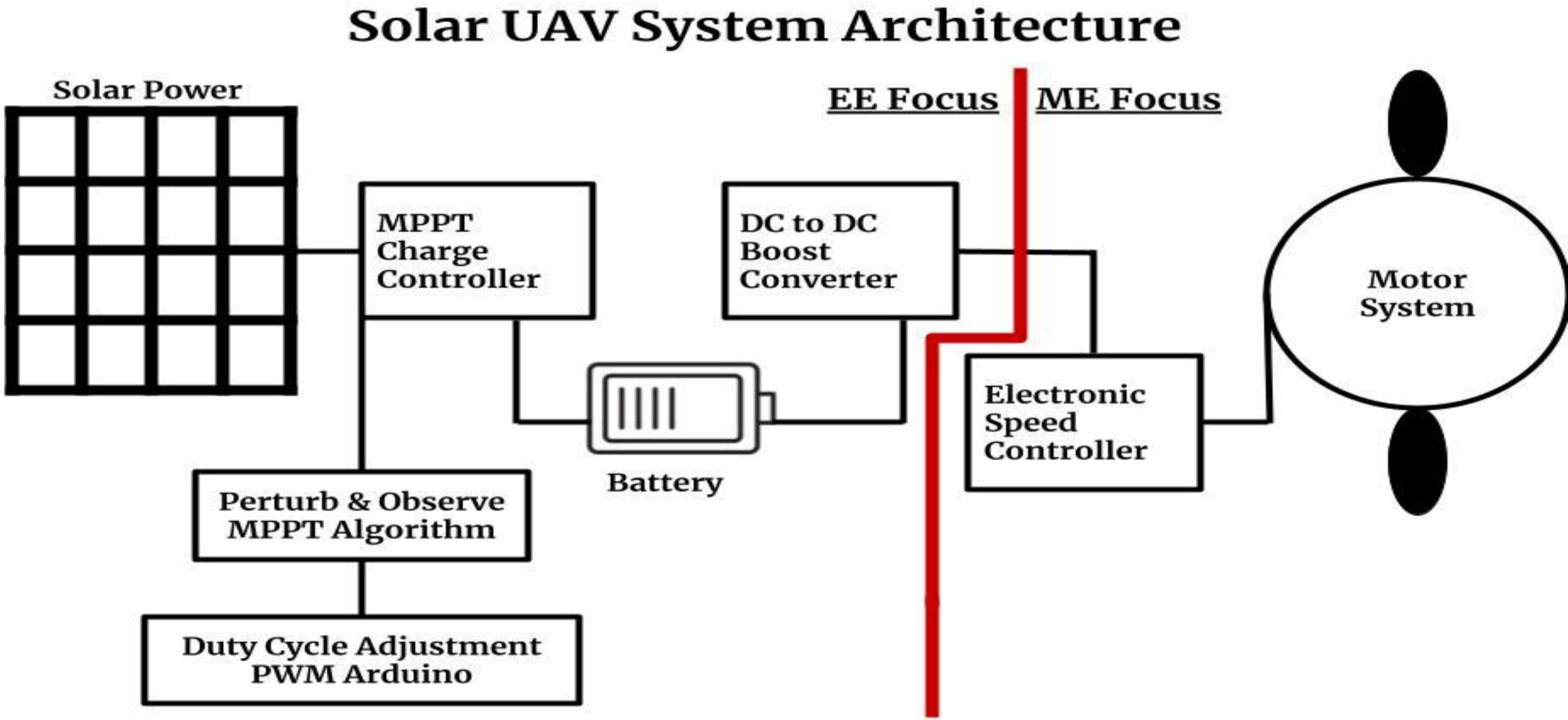

Figure 3: System Architecture

Product Requirements

Build & Appearance

Panels on Surface Area

Stable Wiring / Wire Harnesses

On Board Component Weight: > 900g

Components Fitted Inside Fuelesage

Performance

The solar array must charge a battery of sufficient capacity that permit a flight time of 1 ½ times the duration a sole onboard battery would fly it

Panel Composition

Thin Film Solar Cells

Panels on Surface Area of the Wings & Fuelesage

Must Deliver ___ Watts of Power

Series / Parallel Based on Fixed Voltage Needed

Weight of Solar Arrays must not exceed 2 lbs

Figure 4: Layout of Solar Cells on a Glider Plane

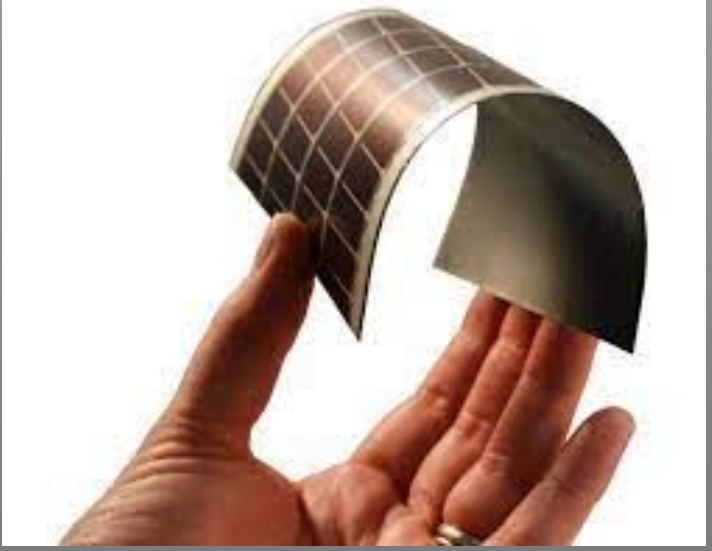

Figure 5: Thin Film Solar Panel

DC to DC Charge Controller (MPPT)

Successfully regulates solar power to the battery while adequately charging it.

Perturb & Observe method for Maximum Power Point Tracking (MPPT).

- Adjusting Duty Cycle / Voltage using Arduino

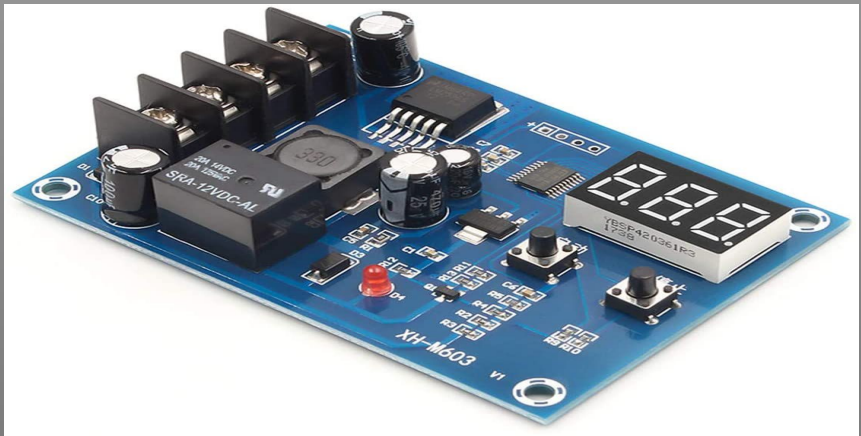

Figure 6: Off-Shelf Relay Switch Battery Charge Controller

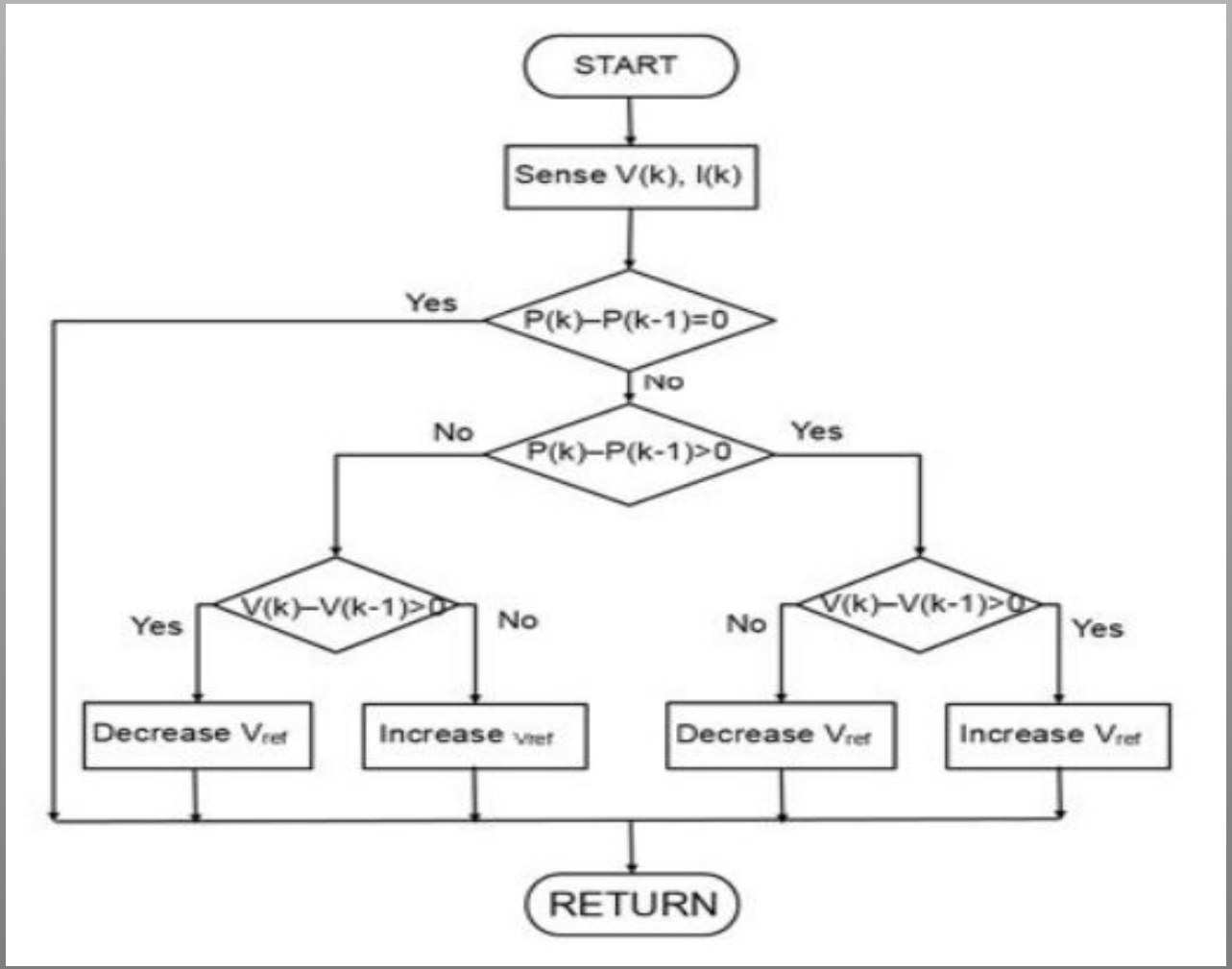

Figure 7: Perturb & Observe (P&O) Algorithm

Battery

Rechargeable Lithium Polymer (Li-Po) Battery

Provides Voltage to power Electronic Speed Controller

22.2V 3200mAh 6S 30C Smart LiPo Battery

Estimated Battery Specifications

Characteristic	Measurement
Nominal Voltage (V) & (S)	22.2 V 6S
Battery Capacity Range (mAh)	3200mAh
Weight (g)	< 600
Volume - W x L x H (mm^3)	< 25000
Max Discharge Current (C)	25-35

Power Converter

Increases voltage to the Electronic Speed Controller, so it can Power the Motor System based on the Fixed Voltage Needed

Type- Boost, which raises the voltage to the output

Should not exceed 50g

Questions ?