



Light Basin Laboratory
UNIVERSITY OF CALIFORNIA, BERKELEY



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hedrick – Meeting with Hedrick – 2011-12-01

Name(s): **Professor Karl Hedrick and Hao Chen**

Date, Time: **2011-11-24 14:00 PST**

Location: 5102 Etcheverry Hall

LBL members present: Zachary Hargreaves and Quan Nguyen

Remarks:

The primary focus of the meeting was to address common framework paradigms and the feasibility of the prototype of the Berkeley Solar Drone. In attendance with Professor Hedrick was his graduate student and RC aircraft enthusiast Hao Chen. The beginning of the discussion focused on the role power will play on the solar drone design. Hao Chen reviewed our calculations and voiced concern about the feasibility with the allotted power given the defined mass. It was mentioned that a wise rule of thumb would be to supply 30 watts of power for every pound the plane weighs. It was also mentioned that the projects referenced for the design specifications likely depended on thermals in order to achieve such a low power and long duration flight - because of this fact, it was advised not to design based off of thermal performance. However, Hedrick recommended a thermal seeking algorithm, if needed, to find extra lift.

In regards to the frame, many ideas were offered because no commercial-off-the-shelf (COTS) design fit the specifications needed for long endurance, low power flight. For the prototype, the emphasis will be on getting the vehicle with all the specifications air worthy even if the airframe isn't the optimal structure. It was advised that constructing an UAV from balsa wood would be smart due to its innate "hackability." The smartest design currently appears to be an air frame composed of a dihedral wing, v-tail, large propeller, low power (900/1000 watts), no ailerons, and a large wingspan. Hao estimated that, for his 2 meter wingspan glider, that a 2200 mAh 3-cell LiPo battery offered him an hour of flight time. It weighed 2-3 pounds. For the motor, Hao recommended a low Kv motor, or a higher Kv motor combined with a gearbox for efficiency.

Professor Hedrick and Hao Chen voiced interest in the project and believed flight was definitely feasible, but echoed the sentiment that solving the power problem to attain multiple day flight would be a challenging task to achieve given the financial constraints provided.