CARNEGIE MELLON SOLAR SPLASH

WORK BREAKDOWN

November 11, 2005

President:	Mark Rockwell
Vice-President:	Joshua Sztul
Hull:	Brian Hirsch
	Lluis Penalver-Aguila
Power Management:	Michael Kaufman
Treasurer:	Guido Bernie Perez
Secretary:	Irina Khaimovich
Public Relations:	Rashmi Sanbhadti

MISSION STATEMENT

The purpose shall be to assemble a team to represent Carnegie Mellon University in Solar Splash, The World Championship of Intercollegiate Solar Boating. The purpose of Solar Splash as stated by in the Solar Splash constitution is as follows:

> "The Solar Splash has been established to promote interest in Science and Technology, Education, and Personal Interactive Skills. Established for collegians, it gives students an opportunity to apply theory to a practical project in a team environment. The Solar Splash itself serves as an opportunity for students to compete and showcase their accomplishments."

Carnegie Mellon Solar Splash will uphold the same purpose, extending this opportunity to the Carnegie Mellon community.

GOAL

The idea is to make this project sustainable and to have a team that will continue to redesign and enter the competition every year. Thus, we will be working in unison with our advisor who will be providing us feedback while we are designing and constructing an efficient solar race boat. Additionally, we plan on displaying and presenting our final product at Meeting of the Minds. We will display our boat for both sponsors and interested students. Ideally, we will generate more interest and support for Carnegie Mellon Solar Splash and ultimately make it a consistent and competitive project.

SCHEDULE

- Bi-Monthly general body meetings on Wednesdays
- Each subgroup meets once a week to discuss research and preparing for design review:
    - Hull
        - Meetings on Wednesday
    - Motors/Drivetrain/Propellers
        - Meetings on Thursday
    - Power Management
        - Meetings on Thursday
    - Steering
        - Meetings on Wednesday
    - System Integration
        - Meetings on Tuesday
- Four Design Reviews Scheduled:
    - Design Review I: Nov. 19th, 2005
        - Hull design picked
        - Motors/Propellers/Batteries are picked
        - Theory of Solar Array
        - Steering is designed
        - System Integration: idea on how to implement
    - Design Review II: Feb. 3rd, 2006
        - Working prototypes
        - Testing of motors, drivetrain, and propellers have been done
        - Update on construction of hull
    - Design Review III: March 8th, 2006
        - Solar Array close to completion
        - All parts are all done or close to done, and starting to put parts on boat.
    - Design Review IV: April 17th, 2006
        - The boat is seaworthy and ready for final testing in water

SOLAR SPLASH WORK BREAKDOWN

HULL

Research

- Research various types of hulls and companies
    - Safety must be consideration in design
    - Hull maneuverability
    - Materials research and selection

Construction

- Hull
- Component Integration
    - Modifications to incorporate the steering
    - Solar Array
    - Motors

POWER MANAGEMENT

Research

- Solar Array
- Batteries
- Components and Wires
    - Gauges, power trackers, controllers, etc.
- Relays and Dead Man Switches

Design

- Solar Array
    - Size and specifications
- Circuits

Testing

- Laboratory, multimeter, oscilloscope, etc.
- Make sure abides by the rules

Building

- Creating the designed circuits and solar array
- Testing also occurs here

MOTORS DRIVETRAIN PROPELLERS

Motors

- Sprint vs. endurance
- AC/DC
- Motor controllers
- Weight/power balance
- Modularity

Propellers

- Propellers for endurance/ sprint
- Number of blades, pitch
- Modularity

Drivetrain

- Gearing and belts
- Torque output
- Power output
- Connectivity

Attachment

- Connecting drivetrain to boat
- Implementing steering mechanisms into motor system

SYSTEMS INTEGRATION

Ensure the following:

- Solar panels fit on hull
- Motor is compatible with hull
- Steering is compatible with hull
- Steering works with motor
- Batteries are compatible with motor
- All components on boat are balanced

PEOPLE ASSIGNMENTS

HULL led by Brian Hirsch & Lluis Penalver-Aguila

Name	Major	Year
Brian Hirsch	Mechanical	Junior
Lluis Penalver-Aguila	Mechanical	Junior
Mark Rockwell	Mechanical	Junior
Alexander May	General CIT	Freshman
Jeffrey Wang	General CIT	Freshman
Rashmi Sanbhadti	ECE & Biomed	Sophomore
Alexandra Gutschick	Mechanical	Junior
Andrew Moore	General CIT	Freshman
Joshua Sztul	Mechanical	Junior

MOTOR/DRIVETRAIN/PROPELLERS led by Mark Rockwell

Name	Major	Year
Mark Rockwell	Mechanical	Junior
Guido Perez	Business Admin.	Junior
Mark Sherry	General CIT	Freshman
Christina Johns	ECE	Sophomore
Irina Khaimovich	ECE	Sophomore
Rashmi Sanbhadti	ECE & Biomed	Sophomore
Vishesh Nandedkar	Mechanical	Junior
Alexandra Gutschick	Mechanical	Junior
Andrew Baisch	Mechanical & Biomed	Sophomore
Christopher Uhrinek	Mechanical & Biomed	Sophomore
Erika Bannon	Mechanical	Junior
Noah Lorang	Mechanical & Biomed	Sophomore
Joshua Sztul	Mechanical	Junior
Amber Imam	ECE	Sophomore
Steven Spurgeon	General CIT	Freshman
William Wedler	Mechanical	Sophomore
Andrew Choate	Mechanical	Sophomore

POWER MANAGEMENT led by Mike Kaufman

Name	Major	Year
Mark Rockwell	Mechanical	Junior
David Rice	Mechanical & EPP	Senior
Siva Srinivasan	ECE	Junior
Nathaniel Gist	ECE	Junior
Vishesh Nandedkar	Mechanical	Junior
Amber Imam	ECE	Sophomore
Christina Johns	ECE	Sophomore
Irina Khaimovich	ECE	Sophomore
Michael Kaufman	ECE	Junior
Joshua Sztul	Mechanical	Junior

STEERING led by Jarek Malinowski

Name	Major	Year
Jarema Malinowski	Mechanical & Biomed	Junior
Mark Rockwell	Mechanical	Junior
Andrew Choate	Mechanical	Sophomore
Michael Salame	Mechanical	Sophomore
Nathaniel Zaharia	General CIT	Freshman
William Wedler	Mechanical	Sophomore
Joshua Sztul	Mechanical	Junior

SYSTEM INTEGRATION led by Joshua Sztul

Name	Major	Year
Mark Rockwell	Mechanical	Junior
Joshua Sztul	Mechanical	Junior
Andrew Choate	Mechanical	Sophomore
Erika Bannon	Mechanical	Junior

HOW WE PLAN TO GET MORE MONEY

At the moment, we expect to get around $6,500 from SURG grants. This of course, means that we are left with a large part of the project without funds. However, we are taking steps to get more funding and help with the project.

We have sent out approximately 150 letters to companies both big and small that we think would help us in the project. The letters contained an explanation of our project and what we hoped to accomplish. We also included descriptions of the different elements of the project and the way that we would go about doing the project. Lastly we included a budget that detailed our different expenses.

The next plan is to follow up the letters with phone calls to the businesses asking to see if they had gotten the letter and to further speak with them about the project and see if they have any questions. We hope that with a follow up phone-call, there will be a better sense of professionalism and a better sense of contact with these possible sponsors.

We have already been contacted by Bridge Water Marine telling us that they would definitely be interested in helping us out with the project, specifically the hull. We are currently working on keeping contact with them to see the extent of their sponsorship and they type of support that they can provide, be it monetary or with supplies.

SOLAR SPLASH BUDGET

DESCRIPTION	Expense	Credit
Hull		
Marine Plywood	$700.00	
Wood	$150.00	
Epoxy Resin	$100.00	
Epoxy Hardener	$62.00	
Aluminum Plate	$30.00	
Fiberglass	$78.00	
Paint	$120.00	
Design Plans	$125.00	
Face Masks	$25.00	
Gloves	$25.00	
Miscellaneous Hardware	$150.00	
	$1565.00	
Motor, Drive Train, Propellers		
Sprint Motor	$900.00	
Endurance Motor	$550.00	
Motor Controllers	$750.00	
Propellers	$450.00	
Outboard Mount	$750.00	
Cables and Fittings	$350.00	
	$3750.00	
Solar Array		
Sprint Batteries	$420.00	
Endurance Batteries	$560.00	
Solar Panels	$2400.00	
Solar Conversion System	$400.00	
Digital Voltmeter	$70.00	
Digital Ampmeter	$40.00	
Watt Hour Meter	$35.00	
Other Gages	$115.00	
Soldering Materials	$45.00	
Miscellaneous Wiring and Circuitry	$450.00	
	$4535.00	
Steering		
Outboard Motors Steering	$180.00	
Cables and Linkages	$150.00	
Link Arms	$50.00	
Steering Wheel	$25.00	
	$405.00	
Tooling		
Circular Saw	$75.00	
Jig Saw	$50.00	
Power Sander	$35.00	
Power Drill	$185.00	
Clamps	$150.00	
Low Angle Block Plane	$55.00	
Drill Bits	$25.00	
Coping Saw	$25.00	
Japanese Back Saw	$60.00	
Chisels	$20.00	
Shavers	$20.00	
Saw Horse	$50.00	
Miscellaneous Hardware (nuts, bolts, etc)	$250.00	
	$1000.00	

SOLAR SPLASH BUDGET

DESCRIPTION	Expense	Credit
Requirements, Transportation, Travel		
Registration	$500.00	
Team Shirts	$375.00	
Rooms During Competition	$1875.00	
Bilge Pump	$45.00	
Paddle	$32.00	
Fire Extinguisher	$100.00	
Truck Rental	$1300.00	
Gas	$1200.00	
Short-Range Trailer	$500.00	
	$5927.00	
Estimated Grants		
Hull		$1000.00
Motors, Drive Train, Propellers		$1000.00
Solar Array		$3500.00
Steering and Requirements		$1000.00
		$6500.00
TOTALS	**$17182.00**	**$6500.00**
ESTIMATED NEED	**$10682.00**	