

**University of Bridgeport**  
**May HASP Status Report**  
**Submitted May 27, 2016**  
**Submitted: Bashar Alhafni: Team Leader**

**Team Activities:**

*PSIP:*

As requested, the team revised the body of the PSIP report and diagrams. The text portion of the document is completed. The graphics and diagrams are all being recreated/redrawn. The revised PSIP will be submitted no later than noon on Monday, May 30<sup>th</sup>.

*Build:*

*Mechanical Progress*

1. All material for chassis fabrication has been procured and is on-site.
2. Fabricated the bow and stern walls with heaters. Heaters tested out fine.
3. Purchased different glue and 30-minute epoxy for the remaining walls, bought flat black paint for inside of Test Bay.
4. Cut material for the port wall.
5. Worked out how drawer will fit in starboard wall.
6. Made a copy of mounting plate for layout and initial test.
7. Worked out how to assemble and rivet/bolt/screw chassis and frame.
8. Cut flanges for the base of the unit.
9. Cut floor of test bay, without mouse hole. Still working on how to place cables so the drawer can be pulled out to access the electronics bay.
10. The servo tray design (for 3D printing) has begun.
11. The detail design of the arm has begun, all 3 analog-feedback servos have been received.
12. Put 3 walls, base flanges, and test bay floor together on mounting-plate-copy for fit check. (In the attached photos, we are looking in through the starboard wall, which is not present in the photo.)

*Electrical Progress*

1. All material for the electronics has been received and is on-site.
2. Tested DROK 30V-to-5v DC-DC Converter/ Buck Regulator under various loads.
3. Built and tested the N-Channel MOSFET board that will turn on and off the 6 heaters.
4. Tested new digital temperature sensor. We will use one of these on each wall. We will still use a total of 3 analog sensors: outside temp, test bay temp, and electronics bay temp.
5. Designed and tested two amplifiers, one for each of the current sensors. Put these together with the ACS712 current sensors and tested the package; slightly modified the amplifier design for gain and DC offset.
6. Tested the above with a servo-potentiometer-pair and were able to obtain plots of current versus time. Current drawn by the servos is PWM-like, with pulses every 20 msec. Pulses are wider as servo starts and stops. We decided to use an RC filter to avoid aliasing with the Arduino analog reads.  
Tested this with current sensor and amplifier above.

7. Evaluated the heat produced by the hardware in the Electronics Bay. Average is on the order of two watts. Decided we should not have an overheating problem. A board the size of the electronics bay drawer was cut and is being used for equipment and wiring Layout.
8. A board the size of the electronics bay drawer was cut and is being used for equipment and wiring layout.
9. A point design exists for the remaining interface circuitry, but as yet it is a paper schematic. Needs to be prototyped, cleaned up, and entered into a schematic editor.

#### *Software Progress*

1. Started work on communications software. Designed preliminary report format. Reported data will be ASCII, not binary, and will be a human-readable file. Report format consistent with Preliminary PSIP.
2. Obtained software to be slightly modified for digital temperature sensors. Resolution AND accuracy improved by a factor of 8 over the analog temp sensors.
3. Now working on the software preliminary design, structure, timing, use of interrupts.

*HASP Group Meetings:* Bashar Alhafni, Maheshwari Kumar Rakkappan, Dr. Neal Lewis, Advisor Mr. Larry Reed and Dr. Jani Pallis participated on the May 13<sup>th</sup> conference call meeting.

#### **Issues:**

None.

#### **Milestones Achieved:**

In progress: Final PSIP; construction and flight software development.

#### **Current Team Leaders/Members, Demographics:**

Student Project Manager: Bashar Alhafni (Undergraduate Student – Computer Science)

Leader Flight Computer, Data: Bashar Alhafni (Undergraduate Student – Computer Science)

Arduino Gesture Programming: Rishi Warokar (Graduate Student – Computer Science)

While Rishi just graduated this semester, he is continuing to assist, we are seeking a new team member. Sam Zhang is also serving as a backup for Rishi.

Structure Lead Arjun Kumar (Graduate Student – Mechanical Engineering)

While Arjun just graduated this semester, he will be in the Bridgeport area for another month and is continuing to assist. Rochen Krishna Thashanath Sajeevan (ME graduate student) will be taking over for Arjun. Karan Kakanur Patel (ME graduate student) has also joined the team and will be responsible for 3D printing.

Thermal Control: Maheshwari Kumar Rakkappan - (Graduate Student – Mechanical Engineering)

Robot Gesture Range of Motion and Fabrication: Phillip Carroll (Undergraduate Student – Industrial Design); Team Member: Josh Hauge

Power and Communications: Xuan (Sam) Zhang (Graduate Student – Computer Science/Electrical Engineering)

Lead Faculty Advisor: Dr. Jani Macari Pallis (Mechanical and Aerospace Engineering)

Faculty Advisor Dr. Neal Lewis (Technology Management - Project Management)  
Faculty Advisor Dr. Sarosh Patel (Computer Science and Engineering)  
Education Partner: David Mestre (Discovery Museum and Planetarium: Director of Space Sciences, responsible for Challenger Center Mission Control)  
Education Partner: Lawrence Reed: (Discovery Museum and Planetarium: Electrical Engineering, Communications).



Figure 1 Three walls, base flanges, and test bay floor together on mounting-plate-copy for fit check. Looking in through the starboard wall, which is not present in the photo.



Figure 2: Figure 1 Three walls, base flanges, and test bay floor together on mounting-plate-copy for fit check. Looking in through the starboard wall, which is not present in the photo. Nichrome wire patterns are visible on the wall.

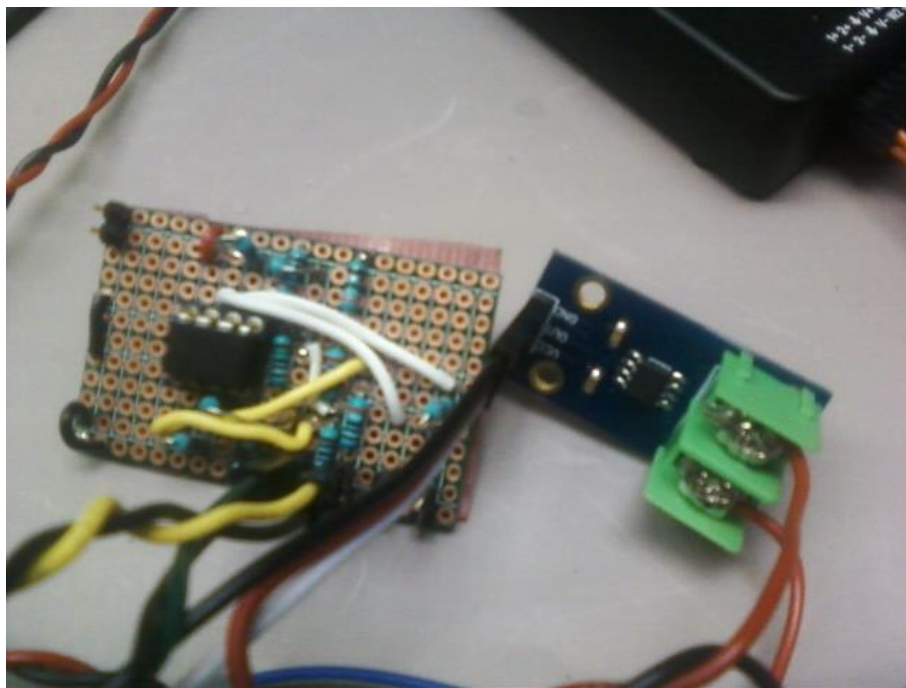


Figure 3 – Current sensor and amp for two sensors