

# Shared Vision for Week 15 - P14045

## I.) What did we say we were going to do?

### **Group Plan:**

1. B.O.M. further developing with Dr. Day (10/31/2013)
  - a. Develop a Best/Worst Case scenario for pricing
  - b. EE B.O.M. Should be finalized by tonight (aids in proof of concept)
  - c. Dr. Day will meet with us tomorrow after class (3pm)
2. Wheel System
  - a. Deeper analysis/ further development, see Alex's
3. Tray System
  - a. Flush out actuator decision
  - b. Meet with Hanzlik (10/31/2013)
4. Box System
  - a. Electrical Engineering Diagram of Connections ON Stander for the Boxing of Components
    - i. JR & Martha will meet to discuss this
    - ii. Tentative deadline 11/01/2013
  - b. Modular Controller Board Location
    - i. Group will meet and discuss possible options (10/30/2013)
  - c. ME: develop box system to encase EEs components
5. Controls System
  - a. Bluetooth
  - b. Touch Screen Overlay Development
6. Main system
  - a. Further developing code
  - b. Working model of system

### **JD :**

1. Figure out coding of control system (Dr. Hopkins or Dr. Patru).
2. Define placement of controller boards and the connection between them.
3. Finish the schematic for the mainboard electrical system, down to pins on the microcontroller.
4. Start a mock-up or test apparatus for the wheel system (largely part dependent).

**Alex:**

1. Need to have meeting with John Bonzo for Manufacturability.
2. Need faculty consultation on Sleeve stress and FEA (Probably Dr. Boedo).
3. Get Details for mount finalized based on further analysis.
4. Assist with tray system development (actuation, design).

**MV:**

1. More testing is needed for Bluetooth Connection development.
2. Professional (expert professors) input is needed in order to prove our design concepts.
3. Once final B.O.M. for electrical components is decided, purchase necessary boards and materials to commence actual testing of design.

**GR:**

1. Legal stuff needs to be determined for Lego tray.
2. EE need to have set deadlines in order to ensure the project keep moving forward, will work with them on plan working on actuator for tray system.
3. Work with EEs and MEs on packaging system.

**EC:**

1. Need technical help with actuator development - meet with Hanzlik and others if necessary.
  2. Need to return focus on the packaging.
  3. Work with EEs to determine heat dissipation requirements.
  4. Work with EEs to determine physical size of boxes as well as wiring connection points.
  5. Make contact in packaging science department for technical help with material selection.
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II.) What did we actually did do?

**Group:**

1. Designed housing for stander control board.
2. Designed packaging for the battery and motor controls.
3. Met with Dr. Hanzlik to discuss design issues
4. Further development of individual subsystems.
5. Went and saw the red stander used by one of Linda's kids - better understanding of customer

**GR:**

1. Contacted Lego and found out that we can not use Lego if we intend to make a profit on it.
2. Asked the EEs for periodical updates, which helped me understand what was going on
3. Work with EEs and MEs on packaging system.
4. Further Developed tray system
5. Created Solidworks assembly of tray, battery system and the stander as a beginning of tipping analysis
6. Determined deflection allowed in tray
7. Contacted parallax about drop standards and cad files
8. Designed housing for stander control board

**Alex:**

1. Completed basic hand calculations for the adapters
2. Completed FEA of adapters - hand calculation results appear to be confirmed
3. Got cost quotes for manufacturing of adapters from John Bonzo.
4. Got early confirmation from Dr. Boedo on my approach.
5. Analyzed sensitivity of impact time on part stress.

**JD:**

1. Developed pinout for processor change.
2. Worked on generic algorithms for use with the quadrature encoders.
3. Decided to use a single USB micro-b cable from the controls launchpad to the stander launchpad
4. Worked with ME's on packaging the electronics on the stander
5. Changed plan from using bluetooth connectivity to using an RC hobby remote

**MV:**

1. Failed to accomplish tasks.

**EC:**

1. Met with Hanzlik to discuss actuator possibilities
2. Worked with team on packaging prototypes/development
3. More importantly learned to ask Linda better questions to get a better understanding of needed specifications. went and met with Linda to collect the needed data.
4. contacted a packaging science alumna (former teammate) for her advice. she provided a couple names of professors to go and meet with.
5. got an accelerometer for testing

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### III.) What did we learn?

**JD:**

1. How RC hobby controls work.
2. Basics of robotic control, wheel system and acceleration control
  - a. Hardware and Software
3. Lots about the TIVA C launchpad and its differences from the Stellaris
4. CLOCKS CLOCKS CLOCKS CLOCKS CLOCKS
5. How terrifying it is to feel Senior Disaster coming on.

**Alex:**

1. 3D Printed material will not hold up to my worst-case scenario.
2. Calculated stress in my part is highly sensitive to impact time.
3. Cost to manufacture my parts is way too high. Looks like my design will not actually be prototyped.
4. I learned how difficult it can be to deal with a low budget.
5. I learned how to do 3D analysis in ANSYS. I had only experience with 2D analysis before.

**Greg:**

1. Determining COG of multiple systems is quick using solid works
2. Learned how to use solid works
3. Rapid prototyping with cardboard is beneficial but dimensions can vary when bending cardboard
4. When you have 3 bosses one of them will contradict the other one
5. When addressing a non-engineering oriented person the language needs to be simplified
6. How to work with different group members in the group

**EC:**

1. Different types of actuators
2. Actuators are too expensive...
3. visual aids are immensely helpful

**MV:**

1. Must come through with task list that I guaranteed I would work on.
2. Must communicate with team effectively.

3. If at any given time I am unsure of how to move forward, I should offer help to the rest of the team.
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#### IV.A) What do we need to do? **(GROUP)**

We must work as a team and answer the set of questions raised through our Subsystems work and development.

1. ME
  - a. Finish design mock ups
    - i. hinge for tray system
  - b. Finish cad files
2. EE
  - a. Complete Electrical Schematic!
  - b. Finalize component selection
  - c. Learn to Program.
3. Prep for DDR (on Dec 5 th)
  - ~~a. Eng reqs address~~
  - ~~b. Risk mitigation deployed~~
  - c. Feasibility of critical areas
    - i. 3D Print vs Actual Part
    - ii. Demonstration of Tray
    - iii. Demonstration of Battery box
  - d. BOM- Needs to be revisited
    - i. Accordion cover
    - ii. Material for box
    - iii.
  - e. Readiness to spend money
4. Develop Test Plan **Run across with ED**
  - ~~a. Rev 1 complete, addresses all reqs, equipment and procedure defined, traceable to engineering requirements~~
- ~~5. Risk assessment, mitigation plans and triggers~~
6. Prep for Gate Review
  - a. MSD II plan (Rev 1, with project-specific detail)
  - b. Reqs complete from MSD 1
  - c. Meet customer reqs and approval
  - d. Meeting notes must be captured/items for resolution

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#### IV.B) What do we need to do? - **(INDIVIDUAL)**

**Alex:**

1. Need to contact R82 (stander manufacturer) and see if I can get replacements of OEM adapters (hopefully for free!).
2. Determine what tests R82 runs for dropping.
3. Confirm FEA/hand calc results with Dr. Boedo.
4. Investigate impact times using the accelerometer Emily acquired.
5. Update/complete analysis if necessary based on #2 and #3.
6. Keep assisting with Tray/Packaging design.

**JD:**

1. Complete schematic of electrical system
2. Choose a power supply component
3. Decide new scope of project
4. test PWM output and input

**MV:**

1. Work closely with JD to accomplish all of the EE goals.

**GR:**

1. Further develop Solidworks Model
2. Further develop tipping analysis
3. BOM
4. Prep for DDR
  - a. Update Eng requirements
  - b. Update Risk assessment
5. Prep for Gate Review
  - a. Develop testing plan
6. Assist in Tray Analysis

**EC:**

1. Support/continue solidworks modeling of the packaging
2. meet with packaging folks to determine optimal material
3. Assist with the DDR and gate review prep things