

P14045 Imagine RIT Shared Visions & Individual Three Week Plans

4 Main Questions:

I.A) What do we need to do for week 13.5? (GROUP)

Things we would like to have for Imagine RIT:

1. **Multiple CP Rochester families for demonstration**
 - i. Schedule them for different time slots
 - ii. there will be a pre-meeting visit with the families before the exhibit
2. **Working standers**
 - i. We'd use the working one for demonstrations
 - ii. We'd use the one on standby as a display.
3. **Functional remote**
 - i. show public that the stander is working
4. Public usage area
 - i. **Sign-up for Gordon Field House**
 - ii. How to use stander (Picture example)
 - iii. build demonstration area
5. Potential Future Builders
 - a. Simplified BOM
 - i. One version will cover a brief cost summary so that interested guests may understand the total costs of our project (in case they may want to either buy or create their own versions).
 - ii. A second version will include the major items that were big expenses for our team.
 - b. **Poster**
 - i. Will include all MSD Required information
 - ii. Will be visually Pleasing
 - c. **Written Instructables(.com)**
 - i. One set of instructions would cover how to build/assemble.
 - ii. The other would focus on how to operate the device.
6. **Prepared Elevator Speech**
 - i. beneficial to who
 - ii. what we did/challenges we faced

iii. contribution to the project

I.) What did we say we were going to do for week 11?

Group Plan:

Sorted in order by priority.

1. Stander can be driven
 - a. Using buttons
2. Tests Completed
 - a. Usage Test
 - b. Debug Test 1
 - c. Debug Test 2
 - d. Remote Control Range Test
 - e. Remote Function Test
 - f. Connection Test
 - g. Bump Test
 - h. Weight Test
 - i. Touch Test
 - j. Current Draw Test
 - k. Straight line runs
 - l. Tire Pressure test
 - m. Acceleration Test
 - n. Speed Test
 - o. Turn Test
 - p. Usage Test 1
 - q. Usage Test 2
 - r. Table Distance
 - s. Tilt Test
 - t. Liquid Test
 - u. Measure distance from table
 - v. Stander Modifications
 - w. Assembly time

3. Mechanically Sound
 - a. Complete Battery Box
 - i. E-glass lining
 - ii. Drill and thread all holes - assemble pieces

- iii. **Mounting - internal and external (box to shelf)**
 - 1. **Motor controllers**
 - 2. **Tiva board**
 - 3. **Battery**
 - 4. **Wiring and connections**
 - 5. **Hinge**
- iv. **Prep for Painting**
- v. **Prime**
- vi. **Paint**
- b. **Complete Remote**
 - i. **Physically together**
 - ii. **All internal wiring**
 - iii. **Bluetooth/battery/tiva board/buttons mounted**
- c. **Complete Tray System**
 - i. **Line at end of tray to show closed position**
 - ii. **Rob needs to reinforce upper bracket holes with weld**
 - iii. **Prime/paint brackets**
 - iv. **Color code control connections**
- 4. All Electrical Modules working and are integrated together
 - a. **PWM** and **QEI** for **wheels** - **Actually travels in a straight line, doesn't try to catch the wheels up when stopped.**
 - b. **ADC** for speed control - Actual know implemented that you can turn to change the speed.
 - c. **UART for communication** - Can send arbitrary messages over bluetooth. And can queue up messages and not interrupt other functions. Remote/Controls: Can detect when a message is waiting to be received. Does 'respond' in call and respond. Stander, can send and receive messages, does 'call and respond'
 - d. **Bluetooth** for remote - Bluetooth can connect and tell when it has become disconnected and will try and reconnect. Can send arbitrary messages, just like over UART. (acts as a UART tunnel)
 - e. **I2C and touchscreen** - This would be literally just the cream on top, I don't expect this to be done.
 - f. Remote works with bluetooth - see above. Remote acts just like button controls module on the stander, but communicates over bluetooth as a UART tunnel
- 5. **Develop credible plan for adapting Red Stander to use both new and old systems**
- 6. **Continuation of Instructables build documentation**
 - a. Updates based on build progress and Week 8 review critique

- b. Develop test plan to verify completion and effectiveness
- c. Consult with different fabricators (potential instructables users)
 - i. CP Rochester volunteers
 - ii. Greg's Mother
 - iii. RIT Robotics club

7. Tipping Calculation revisited

8. Consumables Repair Pack

Alex:

1. Need to assist in mounting the electronics in the battery box. Now that it is welded we can see how much room we actually have.
2. Design remote to house electronics, and mount buttons to it.
3. Figure out how to mount Tiva inside project box, both for remote and controls.

JD:

1. Implement Communication system, need to work closely with Martha on this one.
2. Compartmentalize the button functionality more. So that its checking can become a function that can be called in other places
3. Implement Timer functionality in remote and buttons so that Communications will work correctly
4. Implement turning with correction. Device may not keep track of position while turning out of the presumption that the driver will be in enough control to know when they want to stop turning.
5. Fix 'catch-up' while stopped
6. Implement Button mode toggle
7. Implement ADC circuit and add speed control into the algorithm of UpdateSpeed.
8. Remote needs to be completely functional.

MV:

- 1.

GR:

1. Work on Instructables/test write up once complete
2. Work on tipping analysis
3. Assist with controls mounting
4. Assist with battery box prep
5. Assist with hinge prep
6. Assist with wiring placement

EC:

1. Apply the E glass lining and write up general instructions/the how to

- while doing it
 - 2. Finish preparing pieces for painting and then painting them
 - a. tray brackets
 - b. box pieces
 - 3. Assist with instructables write-ups - proofread everything
 - 4. Assist with wiring placement/routing as the electronics get finished and installed
-

II.) What did we actually did do?

Group:

- 1.

GR:

- 1. Worked on Instructables but did not test write up once complete
- 2. Worked on tipping analysis with Dr day
- 3. Assisted with battery box prep, by soldering wires for John/ sanding for Emily
- 4. Assisted with hinge prep, on box
- 5. Assisted with wiring placement
- 6. Worked on technical paper
- 7. Preliminary contract for end case

Alex:

- 1. Helped with completion of Battery Box. Assisted with planning/machining of mounting solutions for the electronics inside.
- 2. Got the controls box ready for the Tiva board. Plugs for buttons are epoxied in, and a mounting solution for the Tiva board is in place
- 3. got all of the physical components in place for the remote (buttons and switches mounted, internal electronics mounted)
- 4. Discussed project scope with Dr. Day and Greg to get a contract for end-case.

JD:

- 1.

MV:

- 1.

EC:

- 1. Apply the E glass lining
- 2. created spacer for battery shelf- repainted
- 3. assembled box
- 4. post-processing on the box

- a. machined down the welds
 - b. dremeled out holes/cleaned up the fiberglass
 - c. sanded down everything
 - d. filled unnecessary holes
 - e. widened necessary holes
 - f. helped with mounting electrical components in the box
-

III.) What did we learn?

JD:

- 1.

Alex:

1. I learned that it is best to work with the actual physical parts when determining the mounting solutions. That way, you can be sure the part fits correctly the first time.
2. I learned that it is important to get the desired end state from the customer in writing. That way, there is no confusion in later discussions due to the fact that customer meetings are very infrequent.

Greg:

1. The power of flux when soldering, it really helps ensuring a clean connection. When using heat shrink tubing, clearing the area around where the heat gun is blowing is a good idea. Short bursts of the heat gun will enable the tubing to melt while also avoiding damage to the plastic connectors. When reviewing the tipping analysis, taking a different approach with simpler equations will aid ensuring safety of the stander at Imagine RIT. Laying out two options for the customer helped developed the ending contract. A lot of technical papers varied, by laying out an outline, the groups technical paper will be on the right track. Having two group members keeping everyone focused made the documentation side of the project go quicker.

EC:

1. some machining processes are easier than others - order is important too
2. design with larger tolerances than you think you need
3. clamp fiberglass to the aluminum when drilling holes to avoid separation

MV:

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

Alex:

1. After battery box is painted, I need to assist in the final assembly of the components inside it.
2. I need to get the controls box finished and the button connections color-coded for easy identification.
3. I need to get the other wiring and assembly done for the remote.
4. I need to expand on my content in the Technical paper and instructables documentation
5. Do whatever I can to help get the stander functioning properly for ImagineRIT

JD:

- 1.

MV:

GR:

1. Encourage the team along to achieve what we had planned out for Imagine RIT
2. Work with Linda on times for families to visit during Imagine RIT
3. Work on Technical paper
4. Assist in Finalizing the stander for imagine RIT
5. Work on Instructables documentation for Imagine RIT, esp DIY CAD Drawings for the battery box
6. Complete the second step of the tipping analysis for the customer

EC:

1. Finish the battery box
 - a. prime
 - b. paint
 - c. bake for outgassing
 - d. epoxy in plastic components
 - e. apply silicone/caulking over ends of screws and jlb weld areas to electrically insulate
2. help JR with wiring and whatever else I can
3. support writing the technical paper - add my parts and edit everything
4. create Imagine RIT poster
5. Update the instructables page