

Tested all solar panels. 4 types of panels – trainer panels (small 2x2 panels), msd, marine panel from Alfred and destler panels. 1/8 desler panels work. Few options: fix it, purchase another panel

**How much solar panel generation do you theoretical have – for panels know you have and are working.** Approx. 280 W with all panels. With working panels – 180 to 200 W. **Calculated as min needed 200W.** When Matt did analysis, used MSD panels as the specs. After looked at calculated again figured can hit 200W. **So with that you guys have data now, right? On average, what's the difference between theoretical and actual.** Haven't added them up. **As of right now, main power = solar.** Yes, for regenerative. We don't have any other form. Typical cut off for solar is around 4. So next step: talked about getting all panels hooked up and leave them out on balcony for a day so we really know how much it generates. Need to look into how much time it will track without a laptop connected. **We have room for 8 panels theoretically.** If talking MSD size, have room for 8. **Testing all the panels you have working all in series but you can also extrapolate from data you have here to see what state your in rright now.** Main issue is how to wire all of the panels together, which we have determined. Any future projects → purchase all the same panels. Loosing the desler panels isn't detrimental to project. **Chalk up light panels into lessons learned type of thing.** Desler's panels are the ones have limited us – they are the lowest panel. Trainers are 20V all other are 18V. By this system, 20V is going to be limited by 18V. It also depends on how we wire those together. Parallel with similar panels and running those into series with bypass diode. With that the voltages get to add up... think it'll be fine. Main thing is to confirm if the panels work or not. Nice part of power tracker, we can see how much we produced total for the entire day. None of these are going to be at full voltage. All of those voltages on the specs are under ideal conditions and we'll never hit that based on the insolation in Rochester. Can see that producing 8.47 W of power on a nice sunny day. Gives us an idea of what we can expect. You did see that we have a slight spike → when connected panel up. Currently looking at single panels. Spiked up to 78 or so. (MSD panel). MSD – 5.56A. This one works very well. We're at 18.33V. Relatively sunny, about 3pm and the angle could have been maximized. We were trying to find the best angle. When we do the more full-scale test with these, they will be laid flat. We did try hooking up the trainer panels up in series and determined that this was not a good option. Did this to try to boost the voltage. And again, we did not have any bypass diodes. This was a learning experience because we didn't think about bypass didoes until then. Did connect trainer panels in parallel (4 of them) – 25W of Power. Four of them make up about same size as MSD. Bottom line – hook them all up and see what we can get over a day. Making good progress on panels. Now that we have 8020 we can actually get the panels set up in the configuration that we want. We can set panels out and get a good bit of information in a day.

**How are you measuring baseline insolation?** Previous info from government. Collected data over 30 years. Pick up the modeled month and then they put it all together. Used this data to get average insolation for various days and various months. **For purpose of this test, you're not recording that insolation? I don't really care about the insolation, just care about the power. But you need it for a basic indicator level. Not value added, I wouldn't worry about it.** Don't really matter just need however many panels we need just to meet our specification. All panels have a load requirement and they base their calculations off historical data for the area. **And I think it's a good way to do that for a longer term solution. Here you seem to be talking about the performance for each individual panel.** Right but we don't have the equipment to do that. I would take this data and test to be more of a spot check / insanity test to see if the panels were actually functional at all. And to say ok, I know our MSD panel can produce this much. Needed data to make sure this was going to function properly. **Are all of the panels**

**out being measured simultaneously?** No, mentioned 5 mins ago that now that we have the t-slot can arrange them in a way we want.

So uh, we have been working on getting the schematics up and going. We have the sensor board. Two boards to create – sensor / CPU board → interface single board computer to all sensors. Other one: power distribution board → allows us to monitor power consumption, implements wireless deadman switch so if it stops, essentially receiving signal from hand-held receiver it will stop power to the trolling motor. So, not that you can see much of that, this is the power board completed schematic. Have solid state relays for switching different loads. There's XBEE – wireless deadman switch. Will give us remote debugging control. Already been using XBEE on small scale boat so gotten use to interfacing with it. Teensy same microcontroller we're using on the small scale boat. This week, Andy and Max, can start working on board layout. We've got all yellow air wires that need to become real wires. Sensor board schematic was created a while back. Power board was created a while back and it turns out that the person who created did it did a horrible job so it had to be done. Here's the sensor board: GPS, IMU, temperature and water level sensors. Connector for ODroid. Will probably be adding footprint for Teensy microcontroller. Originally plan – single board computer running robot operating system controlling the full-scale boat. Seeing as we haven't played with robot operating system for small scale have been using Teensy. **Will it work for what you need?** Possibly so. Figured put footprint for Teensy on the board and connector on ODroid – wired in parallel. **Do you know what subsystems might be affected by using the lower power ... ?** Teensy will be able to handle remote control. As far as any other updates as far as boards... **Will you guys be outsourcing them or building them out. What's their lead time?** Week / week and a half. Going to use a company Max is familiar with. We've ordered the battery for the full-scale boat on Feb 12. Has a 6-8 week lead time. As far as any other thing we need to get... that's about it.

**As far as data collection, where are we on that? Seems that power and autonomy are at risk.** Power was a small set back. **Main focus should be getting hard data on power. So know where you are cumulatively. Sooner rather than later. Point of this was for this to be self-powered. For it to generate power was the spirit of the this project. Short order want to know cumulative power. In terms of automoy, what sorts are we having problems with?** As a whole. Difficulty of doing small scale in the pool is... It would have been nice to have another person like a CE who we could've dedicated to autonomy. We also lost a member of the team too. **Right and that's another thing.**

BOM includes line items for printed circuit board. Will need to update BOM to include shipping prices.

Accelerometer, gyro, speed and current. It's a straight-line test so it'll run for a certain amount of time. This will allow us to find some coefficients

**For the large scale, what do we have for motor controller and steering.** 3channel motor controller. **Motors beefy enough to handle strain of water.** Linear actuator should be fine. So this essentially if we scaled back autonomy would be using small-scale boat. **So you can at least remotely control the full scale and collect all the data you needed.** Yes. **Remind me the scale of the boat.** Dimensionally it should be the same. **It seems to react pretty quickly.** It was nice so we could see how it affects the hulls turning wise. What we're doing here is transferable to large-scale. **Which is good because it was risk-mitigation.**

Next steps, 8020 for frame work. Came in on Tuesday (3/8). **Do you have an estimation for when you'll have all of the data together for all of the panels.** It should be next week. So now we have more space up here. Mounting wise we can pretty much put it all together and leave it up. **Would it be feasible to give me the power update in two weeks? By the end of spring break / Monday when you get back.** Yes. Other thing that we have to think about is depending on how cold the day is... panels perform better on colder days. Temperature doesn't change it too much but does affect it slightly. **Note conditions of the day. Temp, rough amount of sun/clouds mix. Because then we can look at that and say here's the conditions of this power generation. Rev 2 do we need to purchase better panels.** Treated array as one panel. We were fine for 200 for sure. It was like .3. **It seems like power is on track then.** This was based on Desler's panel that we donated. That was over 6hrs of time, which is the CR. IF we can get another panel like MSD's then it basically takes all of the others besides MSD and combines them into one. But we want to make sure we order the boards first before we start trying to go into the remaining budget. We'll try to take the Desler panels apart because where it connects in, it was pretty rough.

Drop steel plates down at Smidgens. This will be our actuator mount. Will cut 8020 order and that will be our steering. Smidgens order will be done next week. Last thing to get machines / made is the mounting brackets for the actual boat. Want to get the actual structure to the boat and make sure everything is lined up right. Want to make sure there aren't any interferences with brackets.

Will have the last enclosure right after spring break. Use one of these with MPPT and the battery. One thing we need to revisit is enclosures. There's a small area electronics can be mounted to that. There's a lot of room in the box. If we need to we can modify it to make a second layer. The only way the MPPT doesn't fit in there is height wise. Another issue = finding a location for the boat. Worst case we tow it over on a Sunday. **As far as data collection should take data on a cloudy day. It would be good to see both because we have very volatile weather. You might be able to, it's just stuff that we should know. Again it's another next step. Get update on solar data = March 28.**

Are you fine with us scaling back to small-scale? **Wait until after get the solar data. Table that for now.**

Any other questions? **Who called this meeting? I did. Wanted something unrelated just for the customer update.** For demos we haven't necessarily been preparing a whole ton of stuff for them. **Right which is why I wanted one mid-way update.** Ready to make good progress. **Let's keep in mind that quality of those demos counts towards the grade.** We're trying to please the customer but we're also trying to give these demos. We're trying to go on two different paths. This is where we're at. Not like we're trying to prepare a presentation. **It is an event and should be treated as one. If we can plan it ahead of time, we have teams that do them at different times, where it meets everyone's needs. It doesn't have to be set in stone. If there were some upfront communication as to when it fits better. We can accommodate that, we just need advanced notice. We realize there are other constraints. This is a preliminary integrated sys demo to the customer. What yo**

**u're doing here is what we'd expect in a wk 8 review. In that sense it doesn't seem like you're out in left field. It's just a matter of communicating up front. Can we do this review week 7 instead of week 8. We've got some steering and mounting to demo. Had a heck of a time trying to find stuff. Obviously got test data → copy and paste into results so can update on EDGE. Obviously got stuff but it's here and there. Spent quite a bit of time this summer trying to update EDGE. Here's what our customer is expecting next time we're meeting. Don't need a meeting for sending battery update. Most of what's**

there is instructions. Most of that should disappear and should be replaced by content. And I'm looking at this one... updated risks and materials wanted to share, plans for next phase. So we did spend quite a bit of time trying to streamline what you need to put with the expectation with what you need to put. This way you know what to put. But yeah, I was poking around and found some of it. But all of the results, you can't find anywhere in here. Screenshots are fine. Every time I post a file, I have to use command prompt. So even if just putting up a screenshot it's fine. We've had teams put stuff on google drive folder and send a link on EDGE. Most of content of test results end up in folder hierarchy.

Demo needs to be straightened out. Expecting more a team effort for demos than what happened last time. Is it important that everyone tells him stuff.

Goes back to EDGE website. Need the bullet items on EDGE is what we're looking for. Update test results, plan, risk. Here's a high level summary of what we did. Are there risks, are there risks that have been mitigated. Risk about water barrel. What are plans for next phase? Where think will be in the next three weeks. What is that demo going to look like? What is each team member is going to do. It was more talking through it without anything as a guideline. There needs to be something here to guide. It's easier if you're using this as a tool as a process. We've spent time streamlining this so you can get to what you get. These are the elements you are addressing. You talked through this but it should be on EDGE. Do you feel that I've got that during the last review? Need to have more spaced out and more formally documented version of that. If you're jotting this down, it's a few bullets for each team member. Different teams have updates at different rates. We say every three weeks, stop because from a class prospective we need to assign grades. Most teams give a weekly update. Yes, no, why not. If there's an issue, then we'll start working on solving it. Every three weeks, stop and show what you've done. Looks like have test data and need to consolidate it all in one place. This should be stuff you've been doing any way. Saw test results. Just need to post it with explanation. I got an email from a former student... Taking notes because your future self will thank you. Take test results, what did I learn from this, and how will I proceed with this. We're not trying to make lots of extra work. This should be a matter of taking what you've got and posting it.