

HS IET Robotics  
Main

Teacher: Thank you for coming to class on time, everyone. As you know, we have our Hawaii State Championship, which is our culminating event starting tomorrow for the next two days, Friday and Saturday. I want to make sure that all of you are ready for competition. I know we've competed in several tournaments this year, and all of you have had great success, learned a lot at tournaments, trying to improve your robots and making it better for the subsequent event.

What I need from you folks to do today is to make sure that you spend a lot of time ensuring that everything is working properly, so I want to see all of you doing some testing, modifications to your robots. Make sure that your engineering design notebook is up to speed and ready for competition.

Does anybody have any questions before we start today? Any questions? As usual, we have our documentation team here. We have Megan, Jen, and Student, who are going to be filming as part of our documentation throughout the school year on all the different parts of our program. They will be filming you folks as well.

No questions? If not, make sure you get started and make sure that you guys are ready. Mr. Wood is also here this period. He's here to help you guys on any final programming challenges or issues you may have, ensuring that what you want the robot to do, it will perform exactly how you want it.

Let's get to work.

[00:02:00] Make sure you check that design rubric now. The design award qualifies you for the World Championship.

All the batteries ready to go?

Student: Pretty much.

Teacher: What voltage should it be?

Student: Probably around 105.

110 is pretty good.

Teacher: Okay.

Student, where is your guys' notebook? Let me see what you guys have so far.

Student: We still have to print out all the papers.

Teacher: Let me see that.

So what parts are you guys fixing?

Student: We're adding more to it.

Teacher: Where's the journals?

Student: Mentor looked at some of it and he ...

Teacher: Oh, he made feedback?

Student: Yeah. We're going to ...

Teacher: He checked the whole thing?

Student: Not the whole entire thing, but he did some. We're fixing it right now.

Teacher: All right, good.

Student: We have to update the calendar too.

Teacher: Where did he make his comments?

[00:04:00]

Student: On the journals. Some on the notepages.

Right here there are some misspelling, wording, and grammar stuff that I have to fix today.

Teacher: Where are you saving all of your work, Student?

Student: Into Google Drive. We have our own account, so we have a whole folder dedicated to our journals right here. We have it all documented.

Teacher: When's the latest entry you did?

Student: That one is on my hard drive, I have it uploading right now.

Teacher: Okay.

I want to see how fast this thing is now. Do you want to show me that?

Student: Sure.

Teacher: Are you going to test your robot to see how fast it is?

Student: In about 20 minutes.

Teacher: Okay. Do you want me to move this up here?

Student: I need it here.

Teacher: Oh. What are you guys working on? Student, I thought you were done already? You guys are modifying something?

Student: No.

Teacher: What are you guys working on? Oh, you are working on the panels, very good. Are you going to ask Student to help you with that? Student, are you doing the timing thing also? If it's too short ... Oh, okay. After Autonomous. What happens if you ... The shot is short? What do you do? You're slowing down.

[00:06:00]

How fast can you shoot all 30? Over a minute, under a minute, about a minute?

Under a minute?

You want to shoot it this way? Okay.

I can't hear you, Student what was that?

Student: That's way too much though, right? It looks like too much.

Teacher: Student, make sure you get the shots of them shooting the ball so we can evaluate it later. I want to know if they can do it in under a minute.

[00:08:00]

Student, are all the decals done?

Are you guys going to laminate it too?

Student: I'm not sure.

Teacher: So Student, maybe after this you can help Student focus on the printing of their decals? Is it still going to be blue, Student?

Student: Yeah.

Teacher: Okay. It's too short.

How come you guys added the rubber band? To keep the tension? Did you have problems without it?

Student: Yeah, it always got stuck halfway.

Student: It has a tendency to over-shoot sometimes.

Student: Yeah.

Teacher: Don't use that net, that net is no good already. What are you adjusting now, Student? You're increasing it, right? Are you just picking numbers?

[00:10:00]

Student: We just like to match the numbers.

Teacher: Okay. I can't hear you, what are you going to work on?

Student: We're going to work on our design presentation.

Teacher: All right. Do you have that outline in your binder?

Student: Yes.

Teacher: What are you doing right now, Student?

Student: I was grabbing stuff.

Teacher: Okay. You guys put a calendar in your binders?

Student: Yeah.

Teacher: That's good.

You're in November now.

Good.

What's you dial it in, you're going to put all 4 in right?

Student: Yeah.

Teacher: Good. How are you getting your position? Are you just manually doing it?

Student: Yeah.

[00:12:00]

Teacher: Okay. I want to see the improvement.

A 300 score would be pretty ideal for skills. Think we can get there?

Student: I think so.

Teacher: Good. What do you think, Student?

Student: It's possible.

Teacher: Okay.

Student, at some point I want to see your guys' Autonomous in the shots too, okay?

Student: All right.

Teacher: You got your shot, and you want to put in all 4 and see ... Have you ever put all 4 in Autonomous?

Student: I think once.

Teacher: You said once, so this would be the second time, right?

Student: Probably.

Teacher: Okay. Are you doing Autonomous too? Or just full-court shooting?

Student: Full-court shooting.

Teacher: Can you be in this corner for full-court shooting?

Student: Yeah.

Teacher: Because you're behind the ... Oh, so it's actually more power now. You can still do it. All right.

Let's see it. Ready? Go.

Speed up, Student.

What's wrong? What are you going to do next?

Student: I have to go faster the next test.

[00:14:00]

Teacher: You don't want to slow this down?

Student: If we slow this down, we have to keep the ...

Teacher: You want to keep the same firing rate, but feed it faster so that it shoots lower.

Student: Yeah.

Teacher: Why don't we try that? Lets get all the balls back and feed it much faster.

Also, Student is better at doing this. Student, why don't you help fire that thing? They didn't make all their shots, I want to see it all go in. 90% rate or higher. You want a bin for that?

Just don't break the net.

Student, what happened when you shot all 4? You started missing again?

You forgot to download the code, okay. Why don't we download the code, and it should be better next time.

If you feed it faster, there's a greater load on the robot, it should shoot lower right? Student, faster. Ready? Go.

Much better. But, you did miss ... How many did you miss?

[00:16:00]

Let's keep track. One more time, how many did you miss? I want 90% or higher.

The first ball went sideways, why did it do that? That be a good thing, because if there's two goals in Skills, you might actually make both of them without even turning the robot. I'm just kidding. How many are you guys trying to ... Don't we have more of these? Make sure you have your 24. What is the 90% rate? Think in your head. What is 90% of 24?

If 10% is 2.4, what is 24 - 2.4? How many do you have to make in order to get over 90%?

22. Which means you can only miss 2 shots. I want to see 2 shots go in. Are you ready? Downloading the code, Student? Let's see it. Make all 4. Not bad, 3 out of 4. Let's make it 4 out of 4.

[00:18:00] That shoots pretty fast.

Very good. This thing shoots pretty fast.

How many are we going to make this time? Not 22. You're going to make all 24. Be positive. You can start with ... Okay. Go!

[00:20:00] How many did you miss? 1, 2, 3 ... So you made 18. The beginning part it wasn't shooting ... So, don't put any in the robot when the match starts, then you start your sequence. What's wrong with the intake? How are you going to fix that? Okay, let's put that couple stands on. Are we going to see 4 out of 4 now? Okay. That was a 75% rate. You missed the first 3 or 4.

Now, we want to make sure we get ... So you didn't download it again? Okay. What are you working on? Good. How many are you going to make in Autonomous? 3 to 4? What should we shoot for? Exactly. In the final's match, when you get there? How much do you think you're going to have to make in that final's match? All of them. The ideal alliance is 359 a, b, and c. That may happen, you never know.

Did they say that? They told you that they were doing much better now? You talked to them? Oh. Almost.

Student: That one was good.

[00:22:00]

Teacher: Watch out for your .. Hey, watch out, that thing fell.

Okay. Try it again.

Student, what did you modify?

I'm sorry?

Your battery is good?

Why do you think the first one always misses?

Student: Because this launch has so much power, you need some sort of friction to absorb that power.

Teacher: You might miss the first and the last one then?

Student: It might miss the first two.

Teacher: So too much power then. Your main objective is that you want it fast, no matter what.

Do you think you'll have time in the skills challenge to shoot all 24 on one side, 24 on the other side, and go around the field to grab more?

Student: Yeah.

Teacher: Okay, cool. Is that what the ...

[00:24:00]

You think you can shoot all of it and grab from the field?

You have to get ... Right. Right.

Student: We have too much time.

Yeah.

Teacher: Wait a minute, so you're actually going to be able to shoot all 24 in like 30 seconds or less.

Student: Less.

Teacher: Wow, that's pretty good. Before you were taking almost a minute, right? Now, this is like 25 seconds maybe?

[00:26:00] 15 seconds? Let me time that. Try it again. I'm going to time this thing. I'll get my timer here. Your close shots ... Because your power is really high, when you drive it around, you're only using. You're not using all 6 motors.

That's good, so you're going to be making all of those close shots. So you thought all of that between the last tournament until now? You thought of all of those things? Very good. Before I see you guys shoot that how many in 15 seconds, I want to see how Autonomous works.

You guys are ready to go, Student?

Oh, he's checking the batteries, okay. You have to try the 4 again. In order to be successful this weekend, what are the 3 things you have to make sure work? Name one.

Student: The robot.

Teacher: Not the robot, that's everything. What are the three things you gotta make sure is working?

Autonomous, skills, and the third thing? Well, teammates, yes. Make sure that your front and four shots are working. It's a different trajectory, a different speed. Make sure they're both working.

Hang on, you're telling me you're going to do this in 15 seconds, or less?

Student: We'll find out.



[00:28:00]

Teacher: Hang on here. Hang on. I just messed this up. Here we go. In 3, 2, 1, go. Start all over again. Ready, set, go.

18 and a half seconds. That's still not bad, but you need to make all the shots. How many did you make? Well, what about this one? You didn't want to shoot that one?

You have 16 in there, so you're making roughly 60% of the shots. It's not just timing, but making sure that it goes in, right? Okay.

On a full battery it's harder? You don't want a full battery, is that what you're saying? You might want to lower the power then. Whether you shoot it in 18 and a half seconds or 25 seconds, if all of it goes in at 25, then what's 7 seconds? It's all about accuracy. You guys are already going to run out of balls during the match. It's all about how many get in the high goal, okay?

[00:30:00]

What are we working on here? Program? What are you guys changing on your program now?

Student: It's all timing. It's all intervals of which shot at what time.

Teacher: Okay. Good.

Student: Do you want me to switch the batteries now?

Teacher: How are you lowering your power? What value was it at before? Max? How much are you decreasing it by? 5%? Good. Let's try 5%.

Good.

All right. You're downloading it right now? Are other teams using 6 motor shooters?

The team that has the world record, they're doing the double catapult. I talked to Student about that. Both shots. It's a skills robot, then. They lost their tournament, because they can't do the close shot ... But for skills, they're doing good.

[00:32:00]

Looks good, almost there.

Oh, you're doing skills right now?

I gotta ask you guys this, when you came up with the PTO, the power take off, who came up with that? Who is the one engineering that power take off?

Student: We looked at previous design. We had a PTO before, but we realized we had a limited time right there. Also, the difference between the downshift and this one is that it's not the same design ...

Teacher: So the other one you couldn't, right? The one that you climbed, the wheels could be moving, but this one you disengaged the whole drive? You couldn't use this method even with the lifting one, you guys could have? All right, let's see 4 out of 4 now. What modification did you guys do, just change the timing?  
[00:34:00]

Student: Yeah.

Teacher: Okay. So far so good. So you're shorting it so that it goes more time and it goes farther?

Student: Yeah, because there's a sweet spot on the ...

Sweet spot.

Teacher: We're going to have this on our website, right? Before or after the tournament?

Student: After the tournament.

Teacher: Are you going to test 1 first?

Just test a couple.

That looks still powerful.

What are you guys going to do now? Hopefully the first one is just an anomaly, right?  
Okay. Ready?

[00:36:00] I feel like if you actually shorten the power maybe another 5% ... It looks a little better, but it looks like it needs a little bit more reduction.

Student: Yeah.

Teacher: Do you think that changing the timing ... Have you guys ever thought about just moving the robot, or no?

Student: We have it all the way forward.

Teacher: You can't go anymore forward?

Student: Yeah.

Teacher: Okay, so that's your guide. All right.

Student: The first one should have just a tad more weight.

Teacher: C team, where are we at?

Student: 3 out of 4.

Teacher: Okay. Are you going to run it right now?

Student: Yes.

Teacher: Does it aim a little bit to the left? Is that what it is? It looks like it's aligned ... Okay, the ball goes left. It's doing what, Abraham? What's happening? You guys position the robot to the right. It looks like it's not going to make it, so let's see it.

Heads up. It looks a little crooked, do you want to try it again? It's not even hitting the center of the net.

[00:38:00] One. Two. Three, just one more. Oh. That's why we work on robots.

Almost there. I want to see you shift. Shift. I see, all right. Okay.

We've got about 25 more minutes. Here we go.

One, two, two and a half, three again.

[00:40:00] Consistent 3. We want 4. We want 5 but you can't have 5. You ready to try it again. A team is ready to try it again, Student. That was pretty good, you got it in there perfectly. Try it again, I want to see.

Okay, too slow. How much did you reduce it this time? Quite a bit okay, too much.

What is too much? Quantify it. 20%? Was that 20% lower than the last one? Or from the original max? So that's too much.

It's a little bit too much what, Student? We're getting there, we just have to make some more minor tweaks. As long as you understand what you have to change, it should be good.

What are you proposing?

[00:42:00] Oh, okay, very good. It's multi-purpose. Who thought of that?

So what is the reduction at now? 15 from the max? It was 25 from the max on the last one? 5 was too much, 25 too little, 15 all right.

Let's see increased accuracy, folks.

New battery. 1, 2, 2, and 3. You're really good at making 3 out of 4. Every single time.

Student: Better than the ones before.

Teacher: That looks good. Here we go again. Keep going. Faster, Student. How many did we  
[00:44:00] make? What happened? You're not putting in correctly then, that's human error, right Student?

What's happening?

1. Probably did it too early.

Okay.

You just missed the line. What are you guys working on next? I thought I saw you guys working on a close shot, no?

Student: We were just checking the power.

Teacher: All right. Where are you at in the standoffs? All right. Can you just try to shoot it again? I want to see how the speed is, can you try that first? Try one more time. No human error this time.

[00:46:00]

It looks a lot better now.

It still recovering pretty good. It's pretty much not under shooting it. It's pretty good right now. It looks like it's going under now. Okay.

Let's see what you've got here.

Student: That was a big deal.

[00:48:00]

Teacher: Can you shoot it slower? I want to see it consistently make that slow one right now.

Student: The big game will effect up against the other one though.

Teacher: Right. I want to see you doing the 4. Consistent 4.

Good.

Okay, can you try it again?

He's going to try his Autonomous. Close shot again. It's not on. There, you got it. You're aiming the wrong way.

Student: We can down the power a little bit.

Teacher: All right, so ... What are you fine-tuning there?

Student: A little bit of everything.

Teacher: Okay, watch now he's going to shoot the ball.

Did you increase the power?

[00:50:00]

Student: I'm increasing the gain actually.

Teacher: Okay, let me see what you added there.

Oh, it's getting stuck now, I don't think that's a good idea.

Student: It's trying to climb it.

Teacher: So just take that off I guess.

All right Student, what did you adjust on that next one?

You were decreasing it? Okay.

[00:52:00]

Slower between intervals, okay, good. I don't know if that's a good idea. No, it's getting stuck. It's not frictioning on the top, it's frictioning from the side. Where did Student go?

Student: To the back.

Student: Student. I think you have to try to aim it more accurate.

It gets stuck on the standoffs even worse right now. I don't think that's a solution.

Now let's see it.

[00:54:00]

Good. Good. Oh! We're the 3 out of 4 shot team. We're good at it. 3 out of 4. So it was the net's fault?

When you have that standoff here, and that thing is pulling it in like this, it's tension is on the side of the ball like this. I think it's better that you don't have that there. I think you just have to aim it good, Student. Just try better.

Heads up.

Student, let's see it.

Too much power, yeah?

[00:56:00] How come the 4th one stays out? When you don't really need one out? It hits the shooter? Okay, all right. What are you guys going to do? Which part do you want to extend? That?

You got it.

Why is that 3rd and 4th shot going to high? Student, can you tell me why, I'm just curious. So you've got to make the gain less? Okay. Let me see what you're adjusting there.

[00:58:00] So you're writing a journal entry for today, right? Student, calendar updated? Huh? I gotta check my printer because I think something is wrong with it.

It might not be printing.

Let me go check my printer.

I'll go check to see why it's not printing. Student we're having the same issue, so hang on. How many pages are you trying to print? How many at a time? That should be good, wait ...

Try again, Student.

[01:00:00]

Did you try printing, Student? Hang on.

How many pages? I've got 3. Here you go. You might want to monitor that if it doesn't print.

[01:02:00] I have a lot of work to do. State Champs are tomorrow, so they'll be busy all afternoon.

Before the bell rings, just make sure we recap a few things here. I know you are making modifications, but again, the three things. Autonomous is the most important. Why is it the most important? It's not so much if you miss shots, but why is it important?

The 10 bonus points. Gotta make that. Gotta make your close up shots, gotta make your full-court shots. Three things. That was a little too ...

[01:04:00] Student are you able to grab this one? Let's see it. Okay, good. Just slow it down. Slowing down is good. Let's remember those three things now, the bell rang. Let's just remember, Autonomous, full-court, and the close shot.

Can you grab that ball over there for me?

You guys are going to have to go back and check on the IT folks, okay? Make sure you guys do that. Don't forget your camera and the lens cover. Oh, you got that. Louder? Yeah.

[01:06:00]

I could go whenever, is that okay? This is really tough, man. This isn't industrial grade parts, so there's a lot of tweaking. Sometimes you can work here and go to an event and it means it needs more tweaking there. There's a lot of variables, what they try do with 6 motors, the more motors for more power, that one has a little bit less ... They have a little bit more leeway to change things and it will help the shot. These are a little more sensitive because they're not as powerful. There's an optimal range, and even if you change the variable, even with a slight change, it starts to ... But, it's hard as you change one, it's not a one to one change. It may affect two variables, they're constantly trying to compensate.

Oh, you made 4? Oh! They made 4 shots! Cool. They always tell me, I made 4 shots, it's always when you weren't watching them. If I don't watch your matches, then you'll make all 4.