Speaker 1: You're listening to Further Together, the ORAU podcast. Join your hosts, Michael and Jenna as they discuss all things ORAU through interviews with our experts who provide innovative, scientific and technical solutions for our customers. They'll talk about, ORAU's storied history, how we're impacting an ever changing world and our commitment to our community. Welcome to Further Together, the ORAU podcast.

Michael: Good morning, and welcome to another episode of Further Together, the ORAU podcast. I am your host Michael Holtz with my cohost-

Jenna Harpenau: Jenna Harpenau.

Michael: Jenna, how are you this morning?

Jenna Harpenau: I'm doing well, how are you?

Michael: I'm good.

Jenna Harpenau: We've got a cool little story today about kind of the next generation of STEM careers coming up.

Michael: We do. It's really an interesting and I think life changing experience for the young researcher that I had an opportunity to interview several weeks ago. Her name is Julia Steed, she is a senior at Oak Ridge High School and she spent part of her summer working at Oak Ridge National Lab with a researcher named Katie Schuman, who's a research scientist there at ORNL doing some really interesting stuff in artificial intelligence. How do you feel about artificial intelligence?

Jenna Harpenau: It scares me. I'm going to be honest.

Michael: A little bit?

Jenna Harpenau: It scares me a little bit, yeah. I think it's super cool, but then at the same time, the creep factor is pretty high, so I don't know.

Michael: Well they were talking about computers playing games and learning.

Jenna Harpenau: Yeah.

Michael: So yeah, it can be a little interesting.

Jenna Harpenau: Yeah, I don't know. I don't know. It is cool though that we've got Oak Ridge National Lab in our backyard and so many students do get the opportunity to spend their summers with researchers and kind of figure out if what they're interested in is really a career path. I think that Julia is... she decided.

Michael: She kind of decided.

Jenna Harpenau: Yeah, this is it.

Michael: She got to spend the summer working around Summit, the big supercomputer and yeah, I think she came back stoked to be like, this is what I want to do.

Jenna Harpenau: Cool.

Michael: So here is that interview. We've brought you together today to talk about your mentor/mentee experience that you had this summer. I'm not sure who wants to go first, but I'll leave that up to you. Who wants to talk about what that experience was like? It sounds like it was pretty awesome and Julia, from what I hear from your mom anyway, you were really excited, you were kind of stoked after your experience was over. So maybe we start there and maybe just tell me what was so awesome about it and what you learned and are you going into computer science and following in Katie's footsteps and all of that?

Katie Schuman: No pressure.

Michael: Right, exactly. No pressure whatsoever.

Julia Steed: Part of it that was like, I was trying to decide between majoring in either like engineering or computer science. So this helps me pick computer science kind of. I got to see what Katie does so I could see what I would be doing if I did major in computer science.

Michael: What does Katie do? Tell me about that.

Katie Schuman: Many, many things.

Julia Steed: She does neuromorphic computing.

Michael: I love that word.

Julia Steed: It's fun to say. So like neural networks and you can elaborate.

Katie Schuman: Yeah, yeah. So one of the things, well Julia came in with... You'd had an AP computer science class, but I think you'd only done Java programming before. And so the first thing we did was kind of say, "Okay, well Java is cool, but now what we're using, we're using Python." So she started out using Python. I think that was the first thing like, "Oh, that's going to take her a couple of weeks." Then like a day later she was like, "Okay, now what next?" All right, well let's do some machine learning because computer science I think especially the AP computer science classes don't necessarily get as far into special topics and computing and things like machine learning and data science. You may not get exposed to that and even if you do it maybe very little, but it's actually really accessible. I think you started using Scikit-learn within a couple of days and then had kind of mastered Scikit-learn. By I think the middle of week two you were working with real scientific data. That was the engine data.

Julia Steed: Mm-hmm (affirmative).

Katie Schuman: We had some data from the National Transportation Research Center, combustion engine data, which I would gather that neither of us really understood what was going on in the data, but she was still able to get the best results on that data set so far. So that was pretty cool.

Michael: So there was data for something.

Katie Schuman: There was data. We actually had data from a real car engine hat again, neither of us understand. I don't understand how cars work.

Michael: Right.

Katie Schuman: But we were able to actually do something interesting with it. It's pretty cool.

Michael: That's really cool. How long were you at ORNL?

Julia Steed: About eight weeks.

Michael: Eight weeks, okay. So it sounds like you mastered things really quickly.

Katie Schuman: She did, yes.

Michael: Ready to become a scientist?

Katie Schuman: Yeah, oh no, she's definitely at the level that we would hire in a post bachelor's student at this point so.

Michael: How does it feel for you to hear that? I mean you're in high school and you've got Katie saying we would hire you at this level.

Julia Steed: Flattery.

Katie Schuman: I miss her. That's what I was going to say, I have things I need you to be doing. Do you have some free time-

Michael: I have work to do.

Katie Schuman: -maybe we could get that worked out in your schedule.

Michael: Get a work study arrangement.

Katie Schuman: Yeah. Say, does Oak Ridge High School do special topics?

Julia Steed: Yeah.

Michael: Choose your own internship. This is your first time, I assume, being at the lab. What was that experience like? Just being around, was it the Titan?

Katie Schuman: Summit.

Michael: Summit, yeah.

Julia Steed: Oh, it was cool. I got to see a lot of cool stuff like the graphite reactor and Summit too.

Michael: Stuff that like, you know is here because you hear about it all the time but you don't really, it's not like you can just go, and be like, "Oh, there's Summit and there's the graphite reactor."

Katie Schuman: We went out to... I mean we were in meetings with the people in TRC talking about the engine data and got to go into their labs and see the kind of engine blocks and the various things they were doing too. Yeah, it's a fun place to work because you forget that there's all this history and then all this big science that goes on.

Michael: Right, and not exactly your typical summer internship by any stretch.

Julia Steed: It's true.

Michael: So, Katie, I asked you this earlier before we officially started, but from your perspective, serving as a mentor, what does that mean to you? What do you get out of that process?

Katie Schuman: Yeah, it's really important to me to bring in students at all levels. Everybody from a high school student like Julia to undergrads and PhD students because we want to communicate how excited we are about the work that we get to do and kind of pass on that excitement and kind of inspire the next generation of scientists to come up and pursue our field. Then for me, selfishly, it's to have the ability to get myself excited again about the work that I'm doing because the people who come in are passionate and excited about the field of computing and kind of passing that on and the shared excitement just multiplies of, "Oh, this is really cool, but it's actually working." And I'm like, "Oh, but why isn't it working? Okay no, but we fixed it and now it's working again." Yeah. That's an exciting thing to have with a kind of mentor/ mentee relationship that you kind of miss in your everyday life if you don't have that around.

Michael: Right.

Katie Schuman: So yeah, it's really important to me to continually bring in students and have that mentor relationship and then be there as a support for them as they continue on in their careers and kind of follow people along. We like to bring interns back to do further internships. That's a hint. And keep them on for as long as we can, pass on as much as we can and support them as best we can for their future careers.

Michael: Awesome, and I take it then that you had good mentors during your education.

Katie Schuman: I had very, very good mentors. Yeah. My mentors all along the way kind of shaped my career path. I had a really great experience as an undergraduate student at the University of Tennessee where I had a professor who gave me the opportunity to do research and that kind of shaped that, "Yeah, okay. This is so cool. I'm going to have to do research as my career."

Michael: Right.

Katie Schuman: And so without that sort of experience, I would not be at Oak Ridge as a research scientist today.

Michael: That's awesome to hear. So obviously mentorship matters.

Katie Schuman: Absolutely. Yeah, it's still important today. I still rely on all of my mentors today.

Michael: You said earlier that some of the folks that you've menteed, or that you have been mentors to, some of your mentees rely on you. I mean, they're reaching back out to you to say, "Hey, I'm working on this thing."

Katie Schuman: Yeah. So we maintain connections with our interns and our students. I always say, my door, my inbox is always open so you can contact me at any point in the future about any questions you might have. For some students that's applying for college or graduate school or looking at the job market or are trying to figure out, "Okay, I'm considering industry or maybe I want to pursue a career in academia, what does that look like?" And being available to answer those questions and help deal with any kind of hurdles that they may encounter along the way. I want to make sure that my students know that I'm always here, I will continue to be here in the future to answer any questions that they may have. It doesn't just end this when they walk out the door.

Michael: Right, right. Julia, for you, during the eight weeks, what was your favorite thing you did, project you worked on?

Julia Steed: Probably getting to... We would train neural networks to play different games like asteroids and then we would change the functions for the scores to try to get them to do different behaviors. So that was cool.

Michael: That's really awesome.

Katie Schuman: It's always fun to see what behaviors emerge when you're trying to shape the training. I think we were trying to make them more aggressive in playing the game.

Julia Steed: Yeah.

Katie Schuman: Yeah, and make the network a little-

Michael: So you're training the computers to play the game more aggressively?

Julia Steed: Yep.

Michael: That's really cool. That sounds kind of awesome. A little scary.

Katie Schuman: It's always... you'd see how bad they are at playing the game, you would be less scared.

Michael: Okay. It's not like they're going to rise up.

Katie Schuman: Pretty entertaining, nonetheless. I was doing one of the games in my office yesterday and was watching to see how the network was playing and found myself laughing at it. Just like, "Oh, nobody is here to laugh with me."

Michael: Because you weren't in the office.

Katie Schuman: That was hilarious. And I'm laughing by myself in my office. Yeah, I know, I miss my students.

Michael: So will you go back? No pressure.

Julia Steed: Definitely, yeah.

Michael: Will you go to UT and study computers?

Julia Steed: Probably.

Katie Schuman: We're okay if you go to another place. You can always come back to Oak Ridge.

Michael: You know it was coming. No pressure whatsoever.

Katie Schuman: It'd be great if you just study at UT.

Michael: Now was this a project done under ORISE?

Katie Schuman: Yeah, it was through the NEXTGENS program.

Michael: Right, okay.

Katie Schuman: Yeah.

Michael: And maybe this is a question for both of you. Why a program like NEXTGENS so important?

Katie Schuman: I'm going to speak to that.

Michael: Yep, go for it.

Katie Schuman: So I'm a local. I grew up in Roane County and the NEXTGENS program gives the opportunity to all local high school students surrounding Oak Ridge area to come into the lab and kind of see what it looks like to be a scientist. Especially for fields like computer science, you may not have a picture of what that looks like in your mind and you may not have the opportunity to have computer science classes. So if I had had an opportunity like that as a high school student, that would've been amazing because then it really would have solidified earlier on this is what I want to do as a career.

Michael: Mm-hmm (affirmative).

Katie Schuman: So especially getting out to expose that opportunity to the local high school students who may have no idea what even Oak Ridge does, to get them in and have them exposed to all the cool science we get to do. I think it's an amazing, amazing program. We were so excited when they started the NEXTGENS program a couple of years ago. I had a NEXTGENS student the first year where I think there were only a couple and then this year with Julia and I hope to keep doing... And they're consistently high quality students so that's even better. But I think I would do it regardless because I really want to give people the opportunity. Because you don't necessarily expect the high school student who may not have a lot of experience with computer science, you temper your expectations of okay... But those students I've had have vastly outperformed anything that I could ever have expected students to do.

Michael: That's pretty good to hear.

Katie Schuman: So that's awesome.

Michael: Wonderful. What has the NEXTGENS program meant for you, Julia?

Julia Steed: It's been a really good way to learn about computer science and what working at the lab is like, and I got to meet Katie, obviously.

Michael: Obviously, and I know you're not officially her mentee anymore, but are you all still in touch. Do you still-

Julia Steed: Yeah.

Katie Schuman: Mm-hmm (affirmative), yes.

Julia Steed: -communicate with each other?

Katie Schuman: And I get regular updates even if you don't know it. Everything going okay?

Michael: That's fantastic. I will assume the answer is yes, but I'm going to ask this anyway. Would you recommend the NEXTGENS program-

Julia Steed: Yes.

Michael: -to friends, to fellow students?

Julia Steed: Mm-hmm (affirmative), definitely.

Michael: Okay. For I assume some of the same reasons that you gave, that you get to be in the lab and have experiences?

Julia Steed: Mm-hmm (affirmative).

Michael: Awesome. Anything that I'm not talking about, anything I've not asked that you want to-

Katie Schuman: I don't think so. I think we've covered everything.

Michael: Okay. Very cool. That's all I have. Thank you very much.

Katie Schuman: Thank you.

Julia Steed: Thank you.

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