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Outside Experience

Presenter: Ambareen Siraj

Summary

Students pursuing a degree in cybersecurity or computer science at Tennessee Tech University gain experience from their extracurriculars just as much as academics. Dr. Ambareen Siraj, professor/director of its Cybersecurity Education Research and Outreach Center (CEROC), discusses her approach to student education, her classes’ research projects, and how they reach out to teach others in the community.
Transcript

Brian Contos:
Welcome to the Cybersecurity Effectiveness Podcast, sponsored by Verodin. The Verodin Security Instrumentation Platform is the only business platform for security that helps you manage, measure, improve, and communicate security effectiveness. I'm your host, Brian Contos, and we've got a really special guest today. Joining me is Ambareen Siraj. Welcome to the show, Ambareen.

Ambareen Siraj:
Hello, how are you, Brian? Thank you for having me.

Brian Contos:
I'm very well, and thank you so much for being on our show. And before we get started, would you mind giving our listeners a little background about you and the career path that you took that led you to cybersecurity?

Ambareen Siraj:
My name is Ambareen Siraj, and I'm a professor in computer science. My field of so-called expertise is cybersecurity, and I am originally from Bangladesh. Those of you who are not familiar with where it is, it was a part of India a long, long time back, and since 1971, it's an independent country. I came to the USA 23 years back to study [for my] doctorate, because at that time we didn't have a doctoral studies opportunity there.

Ambareen Siraj:
And I did my PhD in computer science in cybersecurity. And the reason I took cybersecurity as my field of choice was because I had a class, my first class with cyber, was with a professor, Dr. Rayford Vaughn. And I just loved the content of the class. And then, that professor became my research advisor, and I did my PhD with him. And since then, this is my class, and that's what I've been doing for last 13 plus years as a professor.

Brian Contos:
Very cool. Very cool. I know there's so many things that you're involved in, and we're going to get to some of the research and outreach pieces. But let's start with your typical workday for you, because you're involved in so many different areas?

Ambareen Siraj:
I would say a lot of emails. There are a lot of email communications with my customers, if you will. We are in a business, in a sense that I'm in a university. And universities are the only business where your client is your student. Our clients are our students, and after their time with us, they become a statement of what we do here.

Ambareen Siraj:
And my typical day is a lot of student interactions, whether they're my students in my classroom, the courses that I teach, whether they're my research students that work with my research group or my academic advisees, or students that work for my center, which is the Cybersecurity Education Research and Outreach Center at Tennessee Tech, which I serve as the center director.

Ambareen Siraj:
Students and their engagement in different projects at the center, we run a lot of different projects. We may talk about some of them later as we go through this podcast, but my day is not set in stone. It depends on what needs to be taken care of that day and that time.

Brian Contos:
You're one of those rare individuals, I think, that has found a 25th hour in every day to fit it all in. Let's break it up into a couple sections. I do want to talk about education research and what you're doing with outreach. But let's start with
education. Your role, as a professor, maybe you could give me a little bit of background on what you're currently working on today and what you're working on with your students.

Ambareen Siraj:
In computer science, we have three concentrations, cybersecurity, knowledge discovery, and high-performance computing. I started our cybersecurity concentration in 2015, so it's a two, three years, four-year old program, but it has seen growth. So, right now we have 190 students in cyber and undergraduates. And, typically, one semester, I teach a cryptography course. And the next semester, I teach IT security. I also supervise the ethical hacking course. And we have a course called INSuRE, which is a project by Purdue University, and with collaboration with NSA, where our students work on research problems with different agencies and national labs.

Ambareen Siraj:
This semester I'm teaching IT security, where we teach, we talk about security, administration, and management. So, one day we do a lecture, and the next day they work on hands on experience on building an IT infrastructure. They are given an IT infrastructure that they fix and build for security. And at the end of the semester, the other class, ethical hacking class, they're let loose on that environment. And they try to break it.

Ambareen Siraj:
Then they give recommendation and testing reports to the IT security class. And then, they try to fix those. So, the two classes kind of work side by side. So that's what I'm doing on teaching. And one thing I stress to students all the time is, if you're a cybersecurity student and you're only taking courses, then you're not learning anything. And you really have to practice your skills outside of classrooms. So, we do a lot of activities to facilitate that.

Brian Contos:
Very interesting. I love how you have the traditional academic programs. But you're pulling in the private sector, sounds like the public sector, as well, working on these different initiatives, which is so valuable. As I know, you know, so valuable to the students to get that real-world perspective and hands on with what's actually happening. Are there any particular areas within this research, or on the educational side, that you're working on that just stand out as these students just absolutely loving? This is like an area of cyber, where everybody wants to be involved in this particular project, or this particular area of studies. Or is it cryptography? Is it network security? Is it... What seems to be the thing that's grabbing these students?

Ambareen Siraj:
I think, when I first see students, they want to become the agents in the TV shows that they see. They want to be the FBI detective or NCIS forensics investigators. Unfortunately, at our computer science program, we don't have a forensics program. We do have one in our physicians science school, and they take classes with that. But until they come to college, they see what society shows them. And the society tells them about all these attacks and about these TV shows. So, they really don't know what cybersecurity is, what is the science of cyber security. And in our school we are... I'm not sure if you're familiar with the NSA, DHS Centers of Academic Excellence in Cyber Defense Education concepts.

Brian Contos:
Yeah. Give us a little background on that.

Ambareen Siraj:
So, NSA and DHS, they have a joint program called Centers of Academic Excellence in Cyber Defense Education. They have some for cyber operations and some on research. We are one of around 200, it could be a little more, schools in the nation that have that designation. So, it's a very elite group. And what it really means is that the government likes our program, I guess. But basically, there are nine criteria you have to show. So, all these schools that have this designation, they have to show with their curricular mapping, if they're teaching the right topics.

Ambareen Siraj:
They have this security bible, if you will, which has all this knowledge you need, topics that experts, both public and private sector, came together and said that cybersecurity students need to know these topics. So these schools have to show that in their curriculum they are teaching a subset of these topics. And then, through eight other criteria, they have to show that they're fulfilling education requirements, research requirements, outreach requirements.
Ambareen Siraj:
Based on our history of the last 10 years, we got designated as a center since 2016. Our kids, I say kids, but these are young men and women in college, when they go through our program, they are exposed to topics that are accredited by the industry, both public and private.

Brian Contos:
Very cool, wow. They're walking out with great accreditations and some real world hands on. That just sounds fantastic. Kudos to you for putting that together on the education side.

Ambareen Siraj:
One thing I want to mention is that, I think what has the most impact on the students is what they do outside of classroom. I tell our kids that if you just take courses and don't do anything outside of courses in cybersecurity, then you're not learning anything. So we have this ecosystem in our school. We have offense interest group, defense interest group and CTF interest group. And these are kids that take leadership, and they have these groups. They meet every week after hours, pizza or without pizza, and they're doing competitions, they're doing training, senior students teaching junior students. And it's really a great community, and through community, they all learn together. And they learn every day, and they pay it forward.

Brian Contos:
That's where they get to get into all the fun stuff. That's when they get to let their imaginations go crazy. Now that sounds great. Let's talk a bit about what you're doing on the research side, because I know you're doing a lot of cutting-edge things there, as well.

Ambareen Siraj:
In our department we have around 10, 12 faculty who are doing research with students, and I'm one of them. My students, they're working on different projects. And one of them is co-work communication in network. One of them is internet heterogeneous IOT sensor communication and building a test bed for anomaly detection. And then we have students working in cyber-physical systems, especially with smart meters, how to preserve privacy in smart meter communication and prevent occupancy detection.

Brian Contos:
Oh, very cool, very cool.

Ambareen Siraj:
And then we have students working on darknet anomalies. I have students that are working on ransomware, being aware of ransomware, and having defense in depth, so that when it happens, the damage is limited. I'm not an expert on anything. When a student, a PhD student, or a Master's student approaches me, I have some general areas of interest. So, I talk to them about their interest first and whatever they're motivated to do and what falls within my, somewhat, expertise. Then we go from there.

Brian Contos:
Fantastic. Well, you've got the education side, you've got the research side. And most people would probably be done there, but you're also heavily involved in outreach somehow. So, what exactly are you doing with outreach today?

Ambareen Siraj:
Outreach, where the paying it forward comes. The students that are affiliated with my center, I always tell them three things, crowd source learning, continuous learning and paying it forward. And paying it forward and learning in the process, that's service learning. So, we do a lot of projects that students are themselves involved. And lots of them are related. Like, for example, we do the NSA and NSF funded GenCyber camp, so GenCyber.

Ambareen Siraj:
Gen-Cyber.com is a program by NSA, also funded by NSF, where universities can put together summer camps for teachers, students, to do something with K12 cybersecurity education, because it's in a very bad state right now... and to increase. And we all know we need so many people in cyber. If you don't get them from school, you're not...
going to get them in cyber. So that's what approaches like GenCyber wants to do. So, we do summer camp, we have been doing it for the last four years. Then we have something called Cyber on Wheels. So, we have a big STEM mobile, it's like a RV, a gadget RV, if you will.

Brian Contos:
Oh, I love it. I love that idea.

Ambareen Siraj:
We put our students and cybersecurity activities that we develop at the center, and we take the STEM mobile to areas in Tennessee. They're in a weird upper Appalachian region, and it's not very... economically challenged. It's very economically challenged. So, we would take them to schools that have very poor technology exposure. Cyber is a word that they wouldn't even hear otherwise. So, we put the STEM mobile there, and hundreds of kids go through the RV, talk to our students, do the activities, and we have had kids that went through those activities and now enrolled in Tennessee Tech because they were exposed to cyber.

Brian Contos:
Wow, wow. What a great success story that is. That's fantastic.

Ambareen Siraj:
We also do a lot of faculty workshops. We had a National Science Foundation project called SecKnitKit and CReST. Both were National Science Foundation projects where we built, developed computer science lesson plans for traditional computer science courses that will inject security. So, if someone is teaching database, they can spend one lecture talking about security in database.

Ambareen Siraj:
So, we love the workshops nationwide for that. We also just received a grant with National Science Foundation and partnered with Sam's Institute, where we are going to do a pilot project in five states, Indiana, New Jersey, Virginia, Texas, Tennessee, where we are going to train, expose 1,000 high school students in cybersecurity through the FAM CyberStart program.

Ambareen Siraj:
So, that just kicked off last month, and we are very excited to pull in 150 high school teachers in these five States to get them into cybersecurity competitions and modules that they can go back and take to their schools. And the last one, the last big one, I would like to mention, I mean, we do other stuff as... Oh, our kids, one of the things that I'm very proud of, do you know about the CyberPatriot program?

Brian Contos:
No, I don't.

Ambareen Siraj:
Okay. It's a program from the Air Force, and it's a great program where they try to do these clubs in high school and middle schools. And these are small clubs of kids that come together after school, and they do mini IT security training. They're given a network, virtual email, and they try to fix networks, routers, firewalls, things like that. And they learn about network defense. If you just do a Google on CyberPatriot, you'll be able to see that initiative. But it's a great initiative for K12. And our college students, they go to our local high school and middle schools to do free training for these clubs. And one thing I was saying I'm proud of, is the clubs that they've trained, a few of them scored nationally because of the exposure that they've got.

Brian Contos:
Wow, that's great. That's incredible.

Ambareen Siraj:
The last thing in outreach I would like to mention is women in cybersecurity, WiCyS. I'm not sure you heard about that, but if you Google, "Women in Cybersecurity," that link should pop up first. I was in grad school in cyber, then I became a professor. And at one point I was like, "This can't continue to happen, and I cannot be the only female in VERODIN INC
the room.” So, I wrote a National Science Foundation proposal. And one of the things in that proposal was doing an annual conference. My idea was that we could just bring a lot of same in the same room, lot of sexes, women in cyber security, and the ones that aspire to be in that field. And under one room, they could talk to each other, they could see role models, mentor, learn from each other. That would be great.

Ambareen Siraj:
That's how this WiCyS initiative started in 2014. And our sixth conference is upcoming, sixth or seventh, I forget. But it has become a nonprofit organization. We have 5,000 members. The next conference is in Denver, and we are expecting 1,500. The thing about the conference is that we control registration to the conference to make sure we have the half and half ratio. So, half our college students, who are already in cyber or want to be in cyber, we make sure we have from freshmen to PhD students, and the other half are professionals.

Ambareen Siraj:
We have people from industries, we have academia, we have government people, we have recruiters. This has become the largest security conference, regardless of gender, where you have comparable representation of students and non-students under one roof, and comparable representation of the academia research and industry under one roof. So, the organization, beyond the conference... If you go to the site, you will see we do webinars, we have virtual career fair, beyond the job fair, at the conference. We have student chapters, so in few months we have 70 women in cybersecurity, student chapter in 70 colleges, and in the nation, we have 10 affiliates. We have a speaker boro. I mean, there is just so much we are trying to do, and it's a community of volunteers, mostly.

Brian Contos:
It's amazing. And, you know, what a great resource these students have in you, not just as an educator, but on the research side, and then again, on the outreach side. It's fantastic that we have people like you in this space, because I think it's what really moves us forward and what moves for the next generation, for sure. As we wrap up here, I have a question that I'd like to ask everyone on our show. And that's, who is your favorite superhero or supervillain, and why?

Ambareen Siraj:
Okay, my answer to... I'll give you two answers for both, very quickly. My answer to superhero is very lame. I like to honor men, on par, because of the actors who play them. I love Robert Downey, Jr. and Chris Hemsworth. And my super villain, I think, I don't have a super villain, but the people I consider villains are the people who use religion for profit, who do fear mongering, who sell religion. That's my answer.

Brian Contos:
Very well stated. Hey, thank you so much for this. Thanks to our listeners for joining, and be sure to check out other Cybersecurity Effectiveness Podcasts, sponsored by Verodin.