Ali Alqaraghuli

- Working with scientists and collaboration in general is extremely important because at the end of the day, the only reason we're even building this telescope and launching it is because it was the scientists who said it's worth doing. And the scientists have data they would like to gather and regions in the universe they would like us to take a closer look at. And our job as engineers is just to be the enablers of that through building the technology to enable it. Of course, with the scientists, you want to be as closed loop as possible because if you're not in very clear and constant communication with the scientists, you might be building the wrong thing, you know?

Michael Holtz

- Right, right.

- [Announcer] You're listening to "Further Together," the ORAU podcast. Join Michael Holtz and his guests for conversations about all things ORAU. They'll talk about ORAU's storied history, our impact on an ever-changing world, our innovative scientific and technical solutions for our customers and our commitment to the communities where we do business. Welcome to "Further Together," the ORAU podcast.

Michael Holtz

- Welcome to "Further Together," the ORAU podcast. As ever, it's me, your host, Michael Holtz, from the Communications and Marketing Department here at ORAU. And I have the pleasure of speaking with another of our NASA postdoctoral program fellows. Today, I'm speaking with Ali Alqaraghuli, close enough.

Ali Alqaraghuli

- Perfect, perfect, perfect.

Michael Holtz

- Ali Alqaraghuli, who is a NASA NPP fellow. Ali, thank you so much for spending this time with me.

Ali Alqaraghuli

- Absolutely, thanks for having me.

Michael Holtz

- So, if you would tell me a little bit about who you are. I know that you're an NPP fellow, but how did you get here? What's your background?

Ali Alqaraghuli

- Yeah, I actually have a bit of a unique story. So I was born in Baghdad, Iraq, back in 1996. I grew up there till I was seven years old. And then the war happened, so then I had to leave, I moved to Jordan for one year, and then with my family after that, I moved to Egypt five years. And we applied to immigrate to the United States, and I arrived in the United States when I was 13 years old, and I attended high school. And then I finished my high school. I did college in Buffalo, New York, I did my bachelor's, my master's, I moved to Boston, to Northeastern, finished my PhD. And along the way I did two NASA internships. One was at Kennedy Space Center in 2017, and then second one was at the NASA Jet Propulsion Lab in 2019. And through these internships, I was set on coming back to work for NASA at some point. And I'm very glad, because closer to the end of my graduation, I saw there was a postdoc opening for a really cool project with the same group that I did my internship with when I started out graduate school. And I applied, first time did not get it, second time did not get it, third time was the charm. And I'm here, you know.

Michael Holtz

- Awesome, so, Ali, when did or does your fellowship start? Are you in the middle?

Ali Alqaraghuli

- Yeah, so I am, no, no, So my first day should be November 30th.

Michael Holtz

- Oh, okay.

Ali Alqaraghuli

- So I should be, yeah. I'm actually packing my stuff and I'm moving to LA, I'm actually driving from New York to LA right after Thanksgiving.

Michael Holtz

- Okay.

Ali Alqaraghuli

- Yeah. So yeah, should be should be very exciting, Huh?

Michael Holtz

- And jumping right in, right?

Ali Alqaraghuli

- Yeah, exactly, yeah, yeah. I mean, I think I leave New York on Sunday, and then I think I get to LA Wednesday night, and then like Thursday morning is my first day. So bit of a tight schedule, but I like it, it's exciting, it sounds cool.

Michael Holtz

- And it sounds like you're ready for it.

Ali Alqaraghuli

- Yes, absolutely. I've been ready for like the whole year. I think the entire last year of my PhD, to be honest, was more focused on getting the NPP fellowship and trying to come back to work at the NASA Jet Propulsion lab. So when I found out that I did get it, I just of stopped everything I'm doing and planned around that.

Michael Holtz

- Right, so when you get to NASA, what will you be working on as an NPP fellow?

Ali Alqaraghuli

- Yeah, so my main project is actually really, really cool. It's a balloon-borne telescope mission named ASTHROS. And the goal of the mission is basically to launch, put a telescope on a balloon launch in Antarctica and basically have that telescope take pictures. When I say pictures, it's really like incoming signals in the terahertz band, that get translated to data from very, very far away galaxies. And the goal really of the mission is just to better understand stellar feedback. So it's basically a process involved in how stars are forming and how stars basically, like in the formation of stars, how that influences everything. So what I am specifically working on is helping build a test bed that will calibrate the antenna and the overall telescope in Antarctica. Because the problem is that when we're in LA at JPL, we have all the facilities we need to test and track and adjust things if needed. Once we ship everything to Antarctica, we're kind of a bit limited on what equipment is available, and things of that nature. So my main project really is to develop like a portable test bed that we can take with us to Antarctica that basically can do just as good of a job as if we were to have all these big fancy machines in the JPL Center.

Michael Holtz

- Gotcha, so will you get to go to Antarctica?

Ali Alqaraghuli

- Yes, yes, at least, yeah, I think I'll be going, yeah.

Michael Holtz

- Awesome. And just outta my own idle curiosity, because I would like to understand, why is Antarctica the place to launch a balloon-borne telescope?

Ali Alqaraghuli

- Right, that's a very good question. I believe it's because it has to do with the polar vortex. The conditions, the radiation conditions are ideal to launch from Antarctica. I know that there have been balloons that have launched from other sites as well, but I believe it is just that with that kind of launch you want to be as close to the polar vertex as possible, basically.

Michael Holtz

- So like less feedback, less, and that kinda thing?

Ali Alqaraghuli

- Yeah. I mean, I'll be honest with you, I don't fully understand that process, I'm not an astronomer or a scientist, I'm an engineer going to build the antenna.

Michael Holtz

- I gotcha, that's fair.

Ali Alqaraghuli

- Sure, sure, sure, sure.

Michael Holtz

- So was science always something that you've been interested in, Ali?

Ali Alqaraghuli

- Yeah, so I've been mostly interested in engineering and education. I think science is very cool, but I think engineering is even cooler because engineering enables science to be made. And the reason I love NASA so much is NASA bridges the engineering and science with education as well. And I remember when I did my very first internship at the NASA Kennedy Space Center, we worked with the education office, and one day we went to an elementary school and we worked with the elementary school students in an economically disadvantaged area, and we were talking to 'em about space. And I just loved how the things that we were doing were not just kept in the lab, but were actually being translated to people and shared with the public. So it's really that science engineering education connection that I've always really, really been fascinated by, where you're building cool things to enable cool science, but you don't just stop there, you go and tell the world about it, and you go tell students about it and how they can be a part of it too.

Michael Holtz

- And you have to be able to, in an ideal world, build it, do it, talk about it in a way that people can understand it,

Ali Alqaraghuli

- Exactly, you have to, exactly, and especially if you're talking to first graders, you have to simplify everything you're doing and articulate it in a way that is very simple, exciting, engaging. And throughout both of my internships, I think like the NASA education office has just done an amazing job doing that. And I have done other internships at private companies, you don't really get that kind of experience where you get that interface with like education and with the outreach. So that was definitely something that really, really drew me in to want to come here.

Michael Holtz

- Okay, that makes sense. I have to assume, and you've talked about this a little bit, there have been some obstacles to getting to where you are.

Ali Alqaraghuli

- Yeah, of course.

Michael Holtz

- So I mean, the obvious ones being of course born in Iraq, moved to Egypt, traveled the world.

Ali Alqaraghuli

- Right, right.

Michael Holtz

- So you've got all of that, but then are there other obstacles that you've had to overcome that have shaped you?

Ali Alqaraghuli

- Yeah, I mean definitely worth mentioning the obstacle of, of course, like leaving everything behind at a young age, moving around quite a lot.

Michael Holtz

- Sure.

Ali Alqaraghuli

- Like a lot of instability at an early stage in life, that was problematic, and it did probably have some consequences that were not ideal. But I think what that also gave me was a very strong advantage that I was able to adapt to new environments very quickly, I was able to learn multiple languages, learn to meet people, and being on the move quite a lot just teaches you to be on your toes. And I think that has advantages because you're always sharp and you're always on the lookout and helps you just take life a bit more seriously in a good way. But also, there have been I would say even more intense obstacles, at least the way I remember it, with for example, getting the fellowship, like being able to land a NASA fellowship. It's probably one of the most difficult things, I have done throughout graduate, it's not as simple as like, you do some research experiments and you document it in a research paper, and if it doesn't get accepted, it's like, oh, well. And especially because the project I was applying for has a mission, which has a timeline. So if you don't get in in time, you don't go, you know?

Michael Holtz

- You miss it, right.

Ali Alqaraghuli

- Yeah, exactly. So I think that was very stressful. And I took a very hardcore do or die attitude towards it, I turned down all my job offers, and I was only focused on getting the fellowship in time. And I'm very lucky, I have no idea how it happened. But the third time was really the last time, the time would have made sense and the timeline would've made sense. And I got it the very third time. The first two times I did not get it, but I got a lot of learning from that. The very nice thing I love about the NPP process is you get very extensive feedback when you don't get in.

Michael Holtz

- Oh, good.

Ali Alqaraghuli

- And you get a lot of comments, you get a lot of specific comments on how your proposal can be improved, how you as a student can be improved, things of that nature. So I definitely took all the feedback I could from my first two submissions, made the third one as good as I could. And I guess it worked, you know?

Michael Holtz

- Right, absolutely, absolutely. I know that, and you've mentioned, you've had a couple of NASA internships, so you've got a little bit of NASA experience under your belt.

Ali Alqaraghuli

- Correct.

Michael Holtz

- Collaboration is such an important part of the scientific process. And as you said, you are the engineer, there are scientists who are building and managing a project. Talk about the importance of that process in the work that you have done and will be doing.

Ali Alqaraghuli

- Yeah, it is, I mean, working with scientists and collaboration in general is extremely important because at the end of the day, the only reason we're even building this telescope and launching it is because it was the scientists who said, it's worth doing, and the scientists have data they would like to gather and regions in the universe they would like us to take a closer look at. And our job as engineers is just to be the enablers of that through building that technology to enable it. So of course with the scientists, you want to be as closed loop as possible because if you're not in very clear and constant communication with the scientists, you might be building the wrong thing,

Michael Holtz

- Right, right.

Ali Alqaraghuli

- So yeah, that process, collaborative process, is extremely important. and I think especially with ASTHROS, I'm very excited because the mission is mainly driven by a group of engineers, but there is a direct interface with the scientists as well. And I look forward to talking to 'em and working with them.

Michael Holtz

- And it's important to, I would imagine, to get it right, because you may or may not be there when they're testing. And so your test bed has to be able to function for the mission to be successful, like all of the parts have to work.

Ali Alqaraghuli

- Yeah, everything has to work. And that is gonna require really good integration of the mission overall, and it's gonna require very good systems engineering that you want to make sure all the inputs and outputs from each component are very well measured and you want to make sure nothing goes wrong along the chain, basically how you described it, like everything has to go right. But I mean, NASA out of all places, is a place where, especially NASA JPL, where they have flown missions to Mars, to Venus, to all sorts of planets. the ASTHROS team has previously launched a mission called STO-2 from Antarctica. So they are familiar with the process. So luckily there is the expertise and knowledge of how to do that. So yeah, we just gotta make sure everything works.

Michael Holtz

- Right, right, no small feedback, but still.

Ali Alqaraghuli

- Absolutely, Absolutely.

Michael Holtz

- Have there been, I know the answer to this is yes, but who are they? Mentors along the way that have helped you get to where you're today?

Ali Alqaraghuli

- Yeah, absolutely, 100%. I would say there are particularly three mentors that really had a big impact on me, two of 'em were actually JPL engineers. One was my PhD advisor, but my PhD advisor probably the biggest by far in that he, I mean, as a PhD advisor, when you take on a PhD student in your lab, it's a risk, you're placing a bet on the student. And at the time, I was very unfocused and I had a lot of exciting ideas, but I could tell how a lot of professors would probably be concerned with my scattered brain. But my PhD advisor actually took that as an advantage. and we combined basically our skill sets and he taught me so much about how to actually take your weaknesses, turn them into strengths, take your disadvantages, make them advantages. And my PhD dissertation ended up on designing the entire system of of high speed technology called terahertz technology. And it ended up being like something very, very cool and impactful in my opinion, and it was all thanks to him. But then also when I did my internship at NASA JPL, there's a engineer, Jose Siles, who's actually the lead engineer and the program manager, the lead engineer in the mission for ASTHROS and for STO-2 as well, and he was my mentor at JPL. He basically also helped me, gave me a lot of confidence, it was my first project that I did like entirely on my own, it was an asset NASA internship, it was scary, when you're only 20, 21 years old, you know.

Michael Holtz

- Sure.

Ali Alqaraghuli

- But yeah. But he gave me a lot of confidence, a lot of independence, and he would gimme very good feedback. And even when I left the internship and went back to my university, he gave me very, very good feedback on how to proceed. Obviously he was guiding me in how to submit the NPP proposal as well, because he's going to be my mentor for that project as well. And then one engineer definitely worthy of shouting out is Nacer Chahat at JPL, who designed the coolest deployable antennas. And I thought his work on deployable antennas was really, really cool when I interned at JPL. So when I went back to my PhD program, I designed a few deployable antennas for the terahertz systems I was working on, and it ended up being a big part of my dissertation.

Michael Holtz

- Awesome.

Ali Alqaraghuli

- Yeah, so I would say probably, I mean, there's probably, I dunno at least, 100 other people I could mention.

Michael Holtz

- Sure, sure.

Ali Alqaraghuli

- These three people probably come to my mind instantly in the context of this fellowship.

Michael Holtz

- Right, right, no, that makes perfect sense. On the flip side, Ali, have you had the opportunity to mentor others yourself?

Ali Alqaraghuli

- Yeah, yeah, absolutely, that's probably my favorite thing to do, which is take everything I have learned and gained and pass it on to other people. There's a saying I really love, "To whom much is given, much is expected." And when I'm being helped and mentored by all these people, I feel the debt on my shoulders, This information cannot just sit in my head, I have to pass it on to other people. And so I've gotten lucky, I was able to engage in a lot of volunteer activities, but probably the two things I have enjoyed the most is I wrote a very short book, like a step-by-step manual for engineering students on how to get through engineering school. But then I also made a YouTube channel where I give engineering advice to undergraduates and high school students. And from there we built a community of engineering students. And that was just super, super cool. Seeing people like actually benefit from the information you propagate is probably the coolest feeling in the world.

Michael Holtz

- I bet, yeah. Well, on that note, since this is something you have spent a lot of time doing, what do you say to young people who wanna follow in your footsteps and become an engineer, maybe go to work for NASA or become fellows?

Ali Alqaraghuli

- Yeah, yeah, I would say step one, figure out what you want and lean into your heart on that one. What do you desire deep down? And what do you desire, not like what someone else desires for you. Like what do you actually want? I think that's step one, very important, to live a fulfilled life. And very often the answer is gonna be, I don't know. And the way to figure it out is to go and try things, don't just sit there and wait for it to come to you. It won't come to you, you have to go. I switched my major four times. You have to go and try something and have it fail and try something else and have it fail and adopt an iterative mindset, expect things to not go well the first time, but you're gonna learn from it and it's gonna go well later. And then third most important advice is interface with as many people as you can, especially people who have the results you want. People are the most amazing thing in life, especially people who are like, let's say, they are engineers working at NASA or teachers or professors or people who have demonstrated some talent and hard work that is translated to some type of result. You wanna go and work with them, ask them as many questions as possible, interface with them, you want to go meet like-minded people, you want to go meet other students. It's much more efficient to bounce ideas off of other people than to just like sit by yourself in a room all day and think you're gonna figure it out that way. So I would say these are probably the three main things I would do.

Michael Holtz

- And I love number two, the iterative process, because obviously that's your experience-

Ali Alqaraghuli

- Of course, yeah.

Michael Holtz

- Getting to the fellowship.

Ali Alqaraghuli

- Of course

Michael Holtz

- Ali, last question for you, what brings you joy?

Ali Alqaraghuli

- Honestly, like, this is gonna sound really corny, but I would say like people, just being around the right people, thinking, brainstorming, working on cool projects with talented, hardworking engineers, that's definitely up there. Connecting with people who also have like artistic talents, tendencies, just being around the right people, especially in the context of doing cool work that impacts other people. I think that brings the most joy out of anything.

Michael Holtz

- Awesome, awesome, well, Ali, that's my last question, so thank you so much for spending this time with me. I really appreciate the opportunity getting to know you. And I would love if a year or so down the road, after you've got some time in your fellowship under your belt, I'd love to come back and talk about where you are, and how things are going, and if you've had the opportunity to go to Antarctica to talk about that experience and all of that.

Ali Alqaraghuli

- Yeah, I would absolutely love that as well. And yeah, hopefully I do get to go and once I'm back I would let you know how it went. It's probably gonna be awesome.

Michael Holtz

- Awesome, I love that, thank you so much. I appreciate your time.

Ali Alqaraghuli

- Alright, thank you Michael, I appreciate it.

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