



Research That Reaches Out Podcast

Episode 15: Touch3D Yearbooks with Dr. Sinjae Hyun & Dr. Scott Schultz

Hannah Nabi:

Hello, and welcome to the Research that Reaches Out podcast from Mercer University. I'm your host, Hannah Vann Nabi. Research that Reaches Out is an initiative at Mercer University in Macon, GA that was launched in 2015 as part of Mercer's Quality Enhancement Plan, or QEP. We work with faculty and students to help them integrate service and research to address real-world problems affecting our communities at the local, regional, national, and global levels.

Today we are speaking with two faculty from Mercer's School of Engineering, Dr. Sinjae Hyun and Dr. Scott Schultz. Dr. Hyun is a Professor of Biomedical Engineering and the Director of Graduate Programs for the School of Engineering. Dr. Hyun earned his Ph.D. from North Carolina State University, and prior to that he served as a Research Engineer at South Korea's Agency for Defense Development. He joined Mercer's faculty in 2003. Dr. Schultz is a Professor of Industrial Engineering and Industrial Management as well as Senior Associate Dean in the School of Engineering. He also earned his Ph.D. from North Carolina State University, and prior to joining Mercer more than 18 years ago, he worked in various engineering roles at Ford Motor Company.

A few years ago, Dr. Hyun and Dr. Schultz began collaborating on a project that creates three-dimensional yearbooks for graduating seniors at the Georgia Academy for the Blind in Macon, Georgia. For the past few years, they have partnered with the school to conduct 3-D scanning of students' faces, then print them using a 3-D printer and mount them on wooden boxes. Their undergraduate engineering students are engaged in the work from start to finish, and their community partner – Georgia Academy for the Blind – has dedicated funds to support the sustainability of the project in coming years. Today we're talking to them about the project, its expansion to South Korea, and its impact on student learning and in the communities they serve. Welcome, Dr. Hyun and Dr. Schultz!

So first, give us an overview of the project. How did it start, and how did the two of you end up collaborating on this together?

Sinjae Hyun:

Maybe I may start. And in 2017 December, I attended a workshop in South Korea and learned applications of these 3D printing technologies, especially for blind communities. And they said, you know, it is a great tool for blind people to learn their, kind of, touching sensitivity. So I brought that idea to Macon, and I thought about that, and it'll be nice if we make a touchable yearbook for a blind school. And luckily in Macon, we have Georgia Academy for the Blind

(GAB) in town. And I reached out to the superintendent at the GAB. And Dr. Gibson, she is a superintendent at the GAB, and she was really shocked by my approach because they were talking about making a yearbook that was a picture yearbook for their blind students. So I approached the idea, and they are really excited about that. And we began the first yearbook project in 2018, thereabouts. There are seven graduating seniors there and in 2019 there were 11 graduating seniors, so each student received their yearbook. That means 11 times 11 is 121 heads we need to print. Therefore, it takes about 400-500 hours for printing, the actual construction on the yearbook. So I contacted the experts in terms of manufacturing processes, Dr. Schultz, and talked about the, one of the obstacles, we have. And that's when he joined this project and he introduced molding and casting to create a mold, to cast with rapid, faster speed, and we can accomplish 11 copies and then two extra copies, one for Mercer one for the Georgia Academy for the Blind. So that's what we began this project.

Scott Schultz: Well, yeah, and this year we had, what was it, 17 students. So you know the volume seems to keep increasing, making more heads and making more yearbooks. Each year we've also made some minor design adjustments. In this, you know, the first year, it was more like a page or, I don't know how you see it, but it was just a sheet with the heads on it. Then we got into, well, is there a better way to, you know, store it, display it. And so we started into a box set. So we're making wooden frames, and then we made some other adjustments this last year in order to make it a little easier to produce. So I kind of look at it as Dr. Hyun's the brains and I'm the brawn.

Sinjaee Hyun: Oh, and I like to add one more thing. 2019-2020 this year, for two years without having QEP's support, we cannot make this project. So it is great, great support by the QEP program.

Hannah Nabi: Well, thanks for that shout out. We are definitely proud to be able to provide financial support, and especially we're excited because y'all have sought avenues to achieve some financial independence or independent funding, which sort of transitions to my next question. So students, Mercer students are really enthusiastic about this project, and you have several dozen participate over the past few years, And they're actually, you're transitioning this partnership with Georgia Academy for the Blind into the hands of the students so that it will become a student-led project, is that correct?

Sinjaee Hyun: Partly. Well last year, one of the group of Mercer students began to organize a student organization called Touch 3D Club, and they got approved by SGA. And then they're listed as one of the student body, and they are, they want to

continue on this yearbook construction project for Georgia Academy for the Blind.

Hannah Nabi: One of the things that I think is interesting is, and I think this seems to be a theme that happens in engineering when I talk to Engineering Faculty. I've also spoken for this podcast with Dr. Choi and Dr. Butler, and both of them have empowered their students to take on big roles in this project. And I think that's something that you all have done as well, and particularly in supporting your students in creating an organization so that they continue this work and sort of can establish the experience and the leadership. And so, one of the things that I'm curious about is, so you mentioned, you know, it's 400 to 500 hours spent printing and assembling the yearbooks. And that's significant time investment on behalf of the students as well. Why are they so engaged? Why are they willing to put in that much time for the 3D yearbook project?

Scott Schultz: Well, yeah, we, first we could not do this without the students. I mean, they're, they are a huge part of this. You know, not only, well they help with the labor, like you say. It's one of those projects - the more people you have, the faster it goes and the less work for everybody. It's truly one of those things where you can split it up and go faster. But they also do a lot of the design work, you know, and they, they're the ones out there scanning, you know, scanning the students and doing the modeling. They just do a tremendous amount of the work. So we couldn't do it without them. Why are they engaged? I think they truly, you know, they truly want to give back in a sense that they know that, you know, see, you know, having impaired vision is something they don't have themselves. And you know, so what can they do for someone who does. I truly think that's at the heart of what they're, you know, of why they participate. It does have all these different aspects, these technological aspects and industrial aspects but, you know, in the end, it's, you know, the product itself. I think, you know, they get a lot out of it. And then when they see the students at the blind school receiving it, you know, that's quite a blessing.

Sinjae Hyun: Well, to add to Dr. Schultz' comment, and this is a rare project from the design to the customer. It includes all the processes from the design to the customers. Therefore our students can experience that designing, production, and then to the customer experience processes. So, from beginning to the end, that's a really great experience for students. The second, I will say is, the original name for this project was Touch3D. It's one word. But if you flip the 3 to 180 degrees and then it's "touched" right, touched to blind, touched to our students, touched to ourselves. That's the, the moral or the name of this project at the beginning. So we can touch, by touching, these models, ourselves and other people.

Hannah Nabi: All right, that's, I never put that together. That's clever.

Scott Schultz: That's coming from a non-native English speaker.

Sinjaе Hyun: Oh that's from my daughter. You know she was, she named it. And I was like, okay! I think you're right.

Hannah Nabi: Well, in addition to doing this work in Macon, you also have done 3D yearbook printing and 3D portraiture as part of your Mercer on Mission to South Korea. And so for our listeners who aren't familiar, Mercer on Mission is a Mercer program that provides faculty-led service learning study abroad for our students that covers the entire cost of travel so that students only have to pay tuition. So why did you all decide to expand this project into your South Korea Mercer on Mission? And what does it look like there?

Sinjaе Hyun: Well, yes. Ah, in 2016, 17, no no no, 2018 wintertime, after we first presented, constructed the first year yearbook for the GAB, and one of the principals in a South Korean blind school, he contacted me. And he heard this 3D yearbook for the GAB and he said, Can you help us? Well, yeah, because we are going to South Korea for the summer, and if we have a chance, we'll stop by your school and we'll help you. It didn't happen 2018, and then 2019 we went to the blind school with the Drim School, which is, which are North Korean refugees students. Together we went out there. We scanned those graduating seniors at one of the blind schools in South Korea. And the Drim School students, they printed their heads for the yearbook and then they constructed the yearbook and they presented the yearbook to the graduating seniors at the Junbuk School for the Blind in February 2020. So that was the first 3D printed yearbook in South Korea. And so we gave the technology, we taught the technology to the blind school, and then they applied that technology to the blind school in South Korea.

Hannah Nabi: Which is the best kind of international engagement, right, is to share the knowledge.

Sinjaе Hyun: Yes. Yes.

Hannah Nabi: Wow. So, um, so February 2020 that was, Okay, so I'm doing Covid math in my mind. Has Covid impacted your ability to do this project this year?

Sinjaе Hyun: Well, last year we went there, last summer we, not this year 2019 we went down there. They invited us, they treated us very well. And there's a big auditorium and we scanned those students. And then we visited again, and then we brought a couple of sample printed heads and then let them touch their faces

and then their friends faces, figure out, oh, is it you, and then they'd touch the 3D printed head and then their friend's face. And then they're laughing at, you know, it was great, great experience for me, special for all our teams. But this year, when Drim School completed their yearbooks, due to Covid, all the travels kind of stopped, therefore its kind of more virtual. They gave their yearbook outside in the parking space on the playground and they gave to those that yearbook to the students. That's a little bit less activities than normal, but, you know, it's okay. And Shultz also to tell them about our process.

Scott Schultz: So it had a major impact here as well. As you know, we shut the school down right after spring break, or I guess we came back for a week. We were about halfway through the build. We had, we produced the frames, we built the frames. The students, fortunately, had gone and scanned and done the modeling of the, you know, the students at the blind school. Our students had gone there and they'd had all the heads 3D printed. You know, one copy was 3D printed of each, each of the blind school students. And then it was shut down. So we had, we had, you know, 17 heads printed and now we had to make, you know 19 more of those for each, each one of those, you know, do the math. That's a lot. We had to finish, we had to, you know, stain and polish the, or stain the frames and finish assembling the frames. So that's what we did this summer.

Hannah Nabi: The two of you did all of that on your own?

Sinjae Hyun: And a couple of hands helped like Leslie.

Scott Schultz: Leslie helped. Leslie Carol. She's our, she's one of the technicians here at the school. Leslie, it was mainly Leslie and myself did most of that work over the summer. So the last thing we had to do was assembly. But we had, you know, we had a dozen students back, and that's what made that possible.

Hannah Nabi: And then are you also doing the 3D printing for this class of 2021 as well, or are you taking a pause?

Sinjae Hyun: Well, Touch 3D Club, they want to continue. So next year there are not that many, not 17 graduating seniors. There are about 10 or 12 graduating seniors at the GAB, though, so there's a little bit less money needed to construct this, but SGA money and you know other kind of donations. We can try to complete for 2021 touch, touchable year book.

Hannah Nabi: So let's talk more about this Touch 3D student organization. How are y'all working with them to sort of transition them into a leadership role to be able to manage the partnership directly with the Academy for the Blind?

Sinjae Hyun: Well, I am advisor for the Touch 3D Club. So I'll kind of communicate with the students, president or the officers of the club. And the current officers, they knew this project. They've been participating in this for almost three years and they know exactly what's going on. So that's what they're, you know, they will do, they can, they are capable to continue on this project.

Hannah Nabi: Going back to Mercer on Mission, so you mentioned that it's different in South Korea because you and your students are teaching the students at the Drim School how to use the technology, and then they're able to continue this on their own. How does student learning in Mercer on Mission with this project compare with student learning in Macon with this project since they're doing kind of different things with the same, same idea behind it?

Sinjae Hyun: I think here in Macon, students, as their designers, workers, had to complete this project. Over there, they are student teachers. They teach Drim School students to be capable of applying this 3D technology to the blind community in South Korea. So that's a little bit different. One more teaching aspect in international travel, and also there's, it's hard to communicate between our students and their students, students over there. So that, but that's kind of overcome. They have to, you know, they have to overcome and, uh, another layer of learning experiences.

Hannah Nabi: Does that change their understanding of sort of the design process or, you know, having to teach and think about things in a different level? Because teaching and communicating about something is very different from doing something.

Sinjae Hyun: Well, I think they can learn more from their teaching. While they're teaching, they learn more. So they haven't experienced that kind of trouble when they teach the students and student asked me, how about this? How can I solve this problem? And then they try to explain and they learn by themselves. That's what I'm thinking.

Hannah Nabi: So, um, you both and your students have received quite a bit of acclaim for this work and have gotten some scholarship from it as well. So some of your students have delivered poster presentations at the highly competitive Posters on the Hill Symposium in Washington DC. And then you also both just recently co-authored a conference proceeding paper at the 2020 ASEE Conference about your work with students on this project. By the way, y'all keep good records on the Engineering Faculty website. So thanks for that. That's how I get that information. So additionally, the concept of producing a 3D printed yearbook for students who are blind and visually impaired has found a niche in

the market, and y'all mentioned exploring the idea of potentially founding a company with this, and I know you've gotten a lot of attention and communication and inquiry from educators around the country who want to work with you to make these 3D Touch yearbooks available to their own students. What are your plans for continuing this work, hopefully once the pandemic is done? But what are your plans, both at home and abroad for continuing or expanding the Touch 3D yearbook project?

Sinjae Hyun: Well, we have to continue on this yearbook project with GAB about five years ago. Uh, about three years ago when we first presented the yearbook to students, one of the younger kids asked me, hey, Dr. Hyun, would you promise to give this yearbook when I graduated? So, I mean, I cannot say no. Yeah, I said yes. So I have to have make the yearbook at least five years. So we finished the third year, two more years. Minimum. And also international, in South Korea that there are schools who contact me to come to their schools to teach their teachers how to use this 3D technology for them to make their yearbooks, so that's a great experience for us in front now.

Scott Schultz: In addition, why don't you tell them about some of your new research on when you touch and they talk.

Sinjae Hyun: Well yes, and since last year I have one honors, two honors program students They are working on, they're working on if you touch the head and then the speaker plays a recorded voice of that student, like a senior quote or their names. That's what we are making, are going to add this technology to our yearbook in the future.

Hannah Nabi: That is very cool. Yeah.

Scott Schultz: So Dr. Hyun talked about it a little bit, but you know we explored the idea of, can we make this commercial, and it's possible. It's just the, there's quite a bit of expense per yearbook. And so that expense, you know, how much can, you know, if you went commercially, how much could a student purchase this yearbook for? It's a lot more than a, you know, I imagine yearbooks from, you know, say a regular high school is running, I don't know, fifty to one hundred dollars. So, this is, this is quite a bit more, okay. So it's just that that's the difficulty we're running into on, you know, can you, can you turn this from a, you know, more of a philanthropic venture versus into a commercial venture. There's some barriers we're up against on how much are people willing to pay for it.

Hannah Nabi: So how much does one yearbook cost when you count in materials and labor?

Scott Schultz: I don't know. \$400 to \$500? We haven't completely costed it out, but it's on that range. Well, I guess the \$400 to \$500 was what you'd have to market it at, if you want to turn it into a business. And so it's probably a couple hundred dollars in actual expense materials and labor.

Hannah Nabi: Yeah, that yeah that, that's crazy. Well, that Okay, so that too is interesting. If you count up, if you wanted to quantify service that y'all have provided, Hoo! You should put that in your packets So, um, so my, my final question for y'all before we close out is, for other faculty who may be interested in working directly with a community partner, what advice do you have to offer? Particularly, you know, what are some of the benefits for yourselves or for students, and what are some challenges that you think they should anticipate as they look at establishing a new relationship with a community partner?

Sinjaee Hyun: I think for me, it takes a lot of effort to start the project, to maintain the project, to finish the project. However, at the end, if you see reactions, responses of those students and the recipients, you'll have joy in your heart. That's it.

Scott Schultz: Yes, very, very rewarding.

Hannah Nabi: Alright, well to close us out, I always like to ask our guests to leave us with their thoughts on why your work is Research that Reaches Out.

Sinjaee Hyun: Because we use our technology to reach out to those people who doesn't have the technology. Does not, who are not a beneficiary of that technology that's Research that Reaches Out.

Scott Schultz: And it's our skills or, you know, the skills that we have learned that we pass on to our students. It's a way we can apply our skills to help benefit, you know, various communities.

Hannah Nabi: Alright, well thank you both so much. I really appreciate your time today. So Dr. Sinjaee Hyun and Dr. Scott Schultz, we really appreciate the work that you're doing in the community. And thank you to our listeners for tuning in to this episode of the Research that Reaches Out podcast at Mercer University. You can check us out on our website at QEP.mercer.edu and subscribe to our show at SoundCloud.com.