



Kessler Foundation Podcast Transcript:

Stephen Canton on improving the mobility of individuals with a spinal cord injury

Recorded July 2019. [Listen to it here.](#)

STEPHEN CANTON: 00:08 [music] It seemed like the thing that really grabbed me was working with humans. For some reason, it drives me.

JOAN BANKS-SMITH: 00:15 This is Joan Banks-Smith. Today we met up with Stephen Canton. Stephen is an engineer in our human performance and engineering lab. Can you tell us a little bit about yourself?

CANTON: 00:26 I'm from Pittsburgh, Pennsylvania. I live there with my mom and my dad. My mom's from New Orleans, Louisiana. My dad's from St. Croix, Virgin Islands. I have a twin brother. I went to the University of Pittsburgh for my undergrad degree in bioengineering with a minor in mechanical engineering design. And then from then, I went to Louisiana State University to get my master's in kinesiology where I wrote a thesis, actually. And then I'm about to matriculate to medical school in the University of Pittsburgh School of Medicine, and I'm not quite sure what I want to specialize in yet.

BANKS-SMITH: 00:57 Tell us why did you come to the Kessler Foundation?

CANTON: 01:00 I'm going to give you a little bit of background. I'm going to start actually before college. I was always interested in math and science, but I wasn't sure what I'd really go into. My parents are actually engineers by trade. Actually, my mother decided to become a teacher. So I wasn't sure which route I would go, and I've always been the kind of person to break the mold. I didn't want to just follow my parents' footsteps just because. So then I went to a summer program at Carnegie Mellon University. It was called SAMS, Summer Academy for Math and Science. And I started looking at different engineering fields, and I just fell in love with bioengineering off the bat. So then I started looking into bioengineering programs around the country and Pitt just seemed great because it had the combination of good engineering and great healthcare. So-

BANKS-SMITH: 01:53 It has the Steelers.

CANTON: 01:54 It has the Steelers, of course. A lot of other great things going on in Pittsburgh. Penguins just won the Stanley Cup.

BANKS-SMITH: 02:02 There you go.

CANTON: 02:02 Yep. I went to Pitt for bioengineering. And again, bioengineering is a field that can touch many different areas. Kind of one of the chief complaints about bioengineering, at least in the past, was that you know a lot of everything, but not a lot of-- or you know a lot of things, but not a lot about a single thing, have a specific thing that you're really great at. And that was hard to translate into the work field. So as I was hearing that, I was like, "Well, I need to start focusing on one thing." So I decided to focus on biomechanics. Biomechanics is also a field that you can do many different things. You could do micro biomechanics for tissues. You could do macro in terms of body movement and things like that. So I just like, "Well, what am I going to do with my biomechanics?" And you get all these different things coming at you, an

Kessler Foundation Podcast Transcript:

Stephen Canton on improving the mobility of individuals with a spinal cord injury

undergrad, and one, you just want to get the work done. So you don't have time to really focus. And the thing that really helped me was research. So I started getting-- somebody introduced me to research, and I started getting into that, and that's really what propelled me to where I am today. It gave me some relevance to what I was learning in the classroom. I graduate. I'm like, "What am I going to do?" My brother actually had transferred to LSU, Louisiana State University prior to me graduating from the University of Pittsburgh. And he said, "You should look into some programs down here." And I was like, "Okay." I'm kind of go-with-the-flow type person. I strongly believe if you have positive energy, it comes back towards you. And I wasn't always the most prepared or best planner, but I felt if I just went with my heart, I could go where I wanted to eventually go.

CANTON: 03:46

So then I went to LSU with my brother. I actually looked on the website and see what would I be possibly interested in. And there was this great professor at LSU that I thought I could really connect with and do great research with. And it turns out that right when I wanted to go, he got a new position at Georgia State University [laughter]. And so there was a new, young professor, young gunner coming in in his place, and he actually was in Italy at the time. So we had a phone interview or Skype interview coming in. And just to fast forward a little bit, I didn't know what kinesiology was. Biomechanics at Pitt was in the bioengineering department. At LSU, it was in kinesiology. I had no idea what it was. It turned out to be a great fit. And he did research on cerebral palsy in young children. And so I got to apply my biomechanics to these pathologies. And I was, "This is really cool. I finally found something that I think really grabs my interest." And then for the first time at LSU, I saw a robotic exoskeleton, and I was sold. I was, "I have to work with these. I have to." And I actually have a video. I have a caption saying, "This is what I want to work with." And I'm coming toward the end. And actually, that clinical experience also kind of brought my interest into the health field. Or not the health field, but medical field. So that's also where I got my interest in going to medical school also. So I'm coming toward the end of my master's degree, and I need to find a job that brings all of these ideas together, because I love engineering and I love the research. I love the clinical aspect, and Kessler was just the perfect fit. I had never heard of it. Actually, my brother found it on a site. I applied, and I was like, "This looks great." But the experience here surpassed even those expectations. It's just been a wonderful experience. Yeah, so.

BANKS-SMITH: 05:49

Oh, fantastic. That's great. So the types of-- we have different exo devices here. What exactly do you do with working with these exo devices?

CANTON: 06:01

We have about three, four exo devices. Not sure if I can say because of proprietary information.

BANKS-SMITH: 06:07

Yeah. No, no.

CANTON: 06:09

But it's a two-fold thing. So some of the grants, we're looking at improvements of the actual individual, how they improve in their functionality within the robots. And some of them are more geared toward improving the robots themselves. But all in all, you get both while you do research here because we're putting the patients in, so we can still get that information. It's all about where the grant is geared toward. We have to make sure we fill in those gaps. So that's mainly what we do with the robots. We take

Kessler Foundation Podcast Transcript:

Stephen Canton on improving the mobility of individuals with a spinal cord injury

patients in. We put them in the robots. We have them do an intervention. Some of the interventions are like a 10-week intervention in which they walk around in the robots and we lower the parameters to see how they improve over time. And then we do testing. We do pre or baseline, and then we do mid, and then we do post-intervention to see how they have improved based on things that we've done.

BANKS-SMITH: 07:06

What type of patients are they, for instance? What's their modality?

CANTON: 07:10

Oh, gotcha. So I specifically work with spinal cord injury. Depending on what we're looking at, the level of the injury can vary greatly, also on the robot. Some robots can take patients to a higher level injuries as opposed to lower, because you have to have trunk control for some of them, significant trunk control. Some of them only require you to have triceps. But there are other things happening here in the lab, and we put stroke patients. But I specifically work with spinal cord injury.

BANKS-SMITH: 07:42

Now, the data that you're collecting, do you actually get to analyze it yourself--

CANTON: 07:46

Yes.

BANKS-SMITH: 07:46

--or does somebody else?

CANTON: 07:47

So coming in, I'm not sure-- it was again, two-fold. I have a lot of experience with programming specifically in MATLAB, and I wasn't sure if I would be able to apply that coming in, because, one, although I did biomechanics, it's different when you apply it in the real-world setting. And another thing is, coming in, you're not sure how much that your boss will let you do, especially off the bat, and that's where Dr. Forrest comes in. She, from the very beginning, had great confidence in me, and she let me just dive right into-- I had kind of the research assistant role, but then she was kind of playing it by ear with the analysis and the biomedical engineer role. And it just worked out really great. So from early, I worked with Arvind, the senior engineer here, and he kind of took me under his wing. And now, I'm analyzing all types of data. It's probably the highlight of my day. I come in. And the nice part about having both the research assistant and biomedical engineering hats is that I got to see everything that I'm analyzing, which makes a huge difference. I mean, at least for me. Like I said, when coming in, research is what really helped me because I could see how I could apply what I'm learning. So just having that hands-on experience first before just diving into the analysis really helps. But we analyze things from kinematics. EMG is what I mainly do, which is electromyography. Tech scan, which is where we analyze the footplate sensors. You put them under the shoes. We also do accelerometer Shimmer. I've got opportunities to analyze all types of data while I've been here. It's been great.

BANKS-SMITH: 09:42

When you meet with patients, sometimes there could be a 10-week intervention. I'm sure there are some that are longer. Do you actually get to see the difference of a patient from when they first come into the program and when they leave?

CANTON: 09:59

That's a--

BANKS-SMITH: 10:00

Are there any visible changes that maybe it helped with your gait?

CANTON: 10:05

Yes, yes. The robot exoskeleton studies, where I see most of their improvements and their ability to operate the robot. It's hard to say that they have significant gains in

Kessler Foundation Podcast Transcript:

Stephen Canton on improving the mobility of individuals with a spinal cord injury

terms of their overground walking, because, one, we see differences, but it's in the very early stages. So we need to be careful about what we report in terms of what the robots are doing to these individuals. But aside from that, we do see huge gains in their morale. We've even seen gains in their bowel movements. They do the [inaudible] exams with Dr. [Cursebloom?]. Some people reporting they're moving from different levels of injury, which is great. I don't perform those tests, but I hear about it, and I hear patients. They even tear up at these little things that would seem insignificant to somebody. They see these gains, and it's after the robot intervention. We can't directly relate it yet, but we have reason to believe that these robots are doing something positive for these patients.

CANTON: 11:12

Another study that I'm on with Dr. Trevor Dyson-Hudson is the [dipheperidine?] study. It's a drug that's administered to people with MS. So it's kind of we're testing to see how this drug will affect people with spinal cord injury. And it's a double-blinded study where no one that I'm immediately in contact with knows exactly-- even the patient, the nurses, don't know what is-- only one person knows if the person has the drug or not. And they come in a couple times a week and they get on the treadmill. They do the treadmill training, locomotor training, and we do tests with Erica to see how they're improving over time. And I tell you, I've probably seen five patients. I don't know if they have the drug or not, but whatever's going on in the study is really helping their-- I can visibly see that they're improving in their outcomes in terms of the clinical measures, arm reach. We do a walking test where they do a 10-meter test and their times improve. It's tangible evidence that there are improvements. Now, I don't know if they have the drug or not, so it's either the locomotor training that's really helping, or the drug, or both. But in that setting, I really see great gains in the individual themselves in terms of their function and morale.

BANKS-SMITH: 12:29

Wow. So your days are quite busy, it seems.

CANTON: 12:33

Yeah. They really are.

BANKS-SMITH: 12:34

Is it exciting?

CANTON: 12:35

Yeah. I love it.

BANKS-SMITH: 12:36

Yeah. So that's excellent.

CANTON: 12:37

Very rewarding too. Yeah.

BANKS-SMITH: 12:38

That's great. Is there any particular patient that stands out?

CANTON: 12:42

Oh, man.

BANKS-SMITH: 12:44

It's like we always meet one participant that is like this little beacon.

CANTON: 12:50

Actually, there's four. And one I only had one interaction with, which I'll tell you about that guy. There was a guy, when I first came in, that he's really, really down-to-earth guy. And it takes a special individual, one, to deal with spinal cord injury, and it takes an even more unique individual to take that spinal cord injury and just head straight on and say, "I'm going to find any possible way to maybe not walk, but optimize my life." So I feel like those are the types of people that we get in these studies. They're like, "I'm going to enter this study." And they have great attitudes.

Kessler Foundation Podcast Transcript:

Stephen Canton on improving the mobility of individuals with a spinal cord injury

- CANTON: 13:36      So there is this one patient that he was just full of stories about things that he's done, and it was a combination because he had these stories about things that he's encountered in his life and even in his daily life. He would come in with a smile on his face, but some traumatic happened the day before, and you would never know unless he told you. And he wasn't telling you just looking for sympathy. He was just telling you because we were walking every day. We just had things to talk about. He was just a really interesting individual. And then his gains in the robot, he was the greatest, by far. There was another guy that he just was a really interesting character. I love the stories that they have. I love hearing about their life and things that they had to overcome, even before spinal cord injury. Because we just get these special individuals that it just seems like nothing can bring them down. So there's two of them. It's hard because I can't say too much. There's also another individual who I can really relate to. He's a younger male that sustained a spinal cord injury, and he comes in every day with the same attitude. Like, "I'm going to get this done." We have conversations about whether Allen Iverson is the best basketball player ever [laughter]. He's convinced that Allen Iverson is the best there.
- BANKS-SMITH: 15:03      No. Larry Bird.
- CANTON: 15:04      Yeah. Oh, I don't know about Larry Bird. We're not going to get on that subject. So we have these long debates. We talk about soccer, and he's this quiet kid that now is so much more vocal just from coming in every day and speaking with us. And I say this to some people. It's really a joy everyday to come in, and I'm not one to just say that for no reason. I love working here. There's another patient. He's actually in TBI, and I hear him come in sometimes. He's very vocal. He has no filter. But I was coming around the corner one day, and he had never met me before in his life. And I say hi, and he has such quick, witty remarks that it just resonated with me. His whole attitude about-- even though he has this traumatic brain injury, he's still that same person that he was before innately. And that's so cool to me that whatever happens in your life, you still have your core thing that makes you. Those are the people that really stuck with me while I've been here.
- BANKS-SMITH: 16:24      So it's great that meeting these people and then being in this environment how it's helped shape you in a way. And then now the opportunity to go to med school and further--
- CANTON: 16:37      Exactly. So I mean, I can talk about that a little bit.
- BANKS-SMITH: 16:40      Sure. That would be great.
- CANTON: 16:42      So I told you I had the clinical experience in my master's that kind of gave me the inkling that I might want to go to medical school. I hadn't thought about it in a long time. I read a book by-- aside from his political ventures, by Dr. Ben Carson, Gifted Hands. And he came from really humble beginnings, and it was a really inspirational story to the point where, "I think I want to be a neurosurgeon." And I have a lot of interests, like sports. I've been playing soccer since I was four. I really like photography, things of that nature. So sometimes I'll say, "Oh, I like this," and then kind of venture away. But it's weird, because always that medical feel, it always kept-- it seemed like it was always calling me in different ways.



Kessler Foundation Podcast Transcript:

Stephen Canton on improving the mobility of individuals with a spinal cord injury

- CANTON: 17:30 So then I did different research opportunities in undergrad. It was back to microbiology, back to [inaudible] research. I did research with [inaudible] horses, which is all very interesting. But it seemed like thing that really grabbed me was human interaction, working with humans. For some reason, it drives me. And I have this weird interest. And it's not a sadistic way. I have this interest in injuries. Playing sports, I would see somebody get injured, and I'd wonder how that happened, how I can help them, of that nature. Having that experience in my master's with the patients, I didn't get to talk to them that much, but again, it gave me that interest in medical school, so I went to find out what I need to do to get into medical school. But I told you I have these things where I kind of go one way or the other. And I'm like, "Is this something that I really want?" Because I know once you go into becoming a doctor, you have to have that, "I want to do it," or else you're going to be miserable or you won't succeed. And coming to Kessler-- I know I can go all over the place, but coming to Kessler really solidified that for me. It's so rewarding to be able to apply things that I've learned, all the technical stuff, programming, analysis, all that stuff. But to see it actually have direct effect on individuals that you're not supposed to really-- I don't know if you you're supposed to, but it's not encouraged, I guess, to form a personal relationship with people that come in, but you can't help it. You're a human being. To see the smiles on their face after the things that we do, I was like, "I can do this for the rest of my life." So, yeah. This was the perfect job and just bringing everything together in propelling my career.
- BANKS-SMITH: 19:23 Excellent. That's great.
- CANTON: 19:23 And solidifying things that I want to do.
- BANKS-SMITH: 19:25 Well, we've really enjoyed having you here with us, even though it was a short time.
- CANTON: 19:30 It was.
- BANKS-SMITH: 19:30 But we're also very excited for you and for what the future holds in your educational career and medical career. And just wish you the very best--
- CANTON: 19:40 Thank you.
- BANKS-SMITH: 19:40 --as you go on to the University of Pittsburgh.
- CANTON: 19:43 Thanks.
- BANKS-SMITH: 19:44 And you never know when our paths will cross again, so.
- CANTON: 19:48 Right. Hopefully, sooner than later.
- BANKS-SMITH: 19:49 Yeah. Absolutely. Well, it's been a pleasure.
- CANTON: 19:52 Thank you.
- BANKS-SMITH: 19:52 And take care and wish you the best.
- CANTON: 19:54 Thank you. [music--]
- BANKS-SMITH: 19:55 To learn more about Stephen or career opportunities at Kessler Foundation, be sure and check out the program notes for links. Follow us on Facebook, Twitter, and Instagram. Listen to us on Apple Podcast, Spotify, SoundCloud, or wherever you get



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your podcasts. This podcast was recorded on Friday, July 22nd, 2016 at 300 Executive Drive West Orange, New Jersey, and was edited and produced by Joan Banks-Smith, creative producer for Kessler Foundation.