SMITHSONIAN INSTITUTION

Tahira N. Reid

Transcript of an interview
conducted by

Joyce Bedi

on

March 30, 2021

with subsequent additions and corrections

[**Note:** Edits to this transcript were made by Tahira N. Reid, interviewee and Alison Oswald, archivist, Archives Center, National Museum of American History in 2021. Interviewee Tahira N. Reid is also known as Tahira Reid Smith since 12/2019. However, much of her achievements occurred under her maiden name and she prefers it to be archived as such. (Note: For Google searches, Tahira Reid brings up the most results) Both names for the interviewee appear in this transcript.]

Joyce Bedi (00:00:02)

This is Joyce Bedi, I'm the Senior Historian at the Smithsonian's Lemelson Center, conducting an oral history interview via Zoom with Professor Tahira Reid Smith. Today is Tuesday, March 30th, 2021. Tahira, welcome. Thank you so much for doing this with us. We're really looking forward to this conversation. So, I wanted to start at the beginning, as they say, and ask you some questions about your childhood and your early life. So, tell us about your parents and your family and where you grew up.

Tahira Reid (00:00:40):

Sure. So, I grew up in Bronx, New York. I would say most of my childhood, well all of my childhood and teenage years were in New York City, in the Bronx. I grew up in an extended family, so I grew up with my mom, my grandparents, my aunt, and for a short stretch, my uncle before he went to the Air Force, and my father was not really involved in my life. He lived in another country, actually. But I had a lot of interactions with extended family. So, my grandparents were almost like my parents, so to speak they were the matriarch and patriarch of the home. My mom was 19 when she had me, so I think that was them giving support to help her raise me. So, a lot of my influence came from that generation. So as far as what life was like, I really had a very supportive and nurturing family, and my parents and grandparents, they're from Jamaica, so I'm first generation American. Lots of the family lived in the Bronx, within walking distance from each other. My grandfather's sister lived on the next block, and then her descendants were in the home. So, it's very common in certain boroughs of New York to have multifamily unit homes, so three families in one house, that's how we lived. We rented out the middle of ours, so we had a three-family house, and the middle we rented out to whoever wanted a place to live, and my Great Aunt's house, it was all family at all three levels. Then, the other direction, you go maybe six blocks away, there was another family member and all of her kids. I grew up in this sort of community of family in the Bronx, and it was a great environment.

Joyce Bedi (00:02:50):

So, tell us about your education, what schools you attended, what were your favorite subjects?

Tahira Reid (00:03:01):

So, I attended PS 97 in the Bronx, I think it's on Allerton Avenue. Then I went to what was called intermediate school, 144, I.S. 144. I know that it's now called M.S. 144, Middle School 144. Then I went to a Catholic high school, because growing up in the Bronx, I did try out for the specialized schools, and I did get into Brooklyn Tech, but being about 13 or 14 years old, the thought of riding the train from the Bronx to Brooklyn seemed like a daunting experience. So, I was like, "no, I'm not going to Brooklyn Tech." So, I went to school where my friends were

going, they chose to go to Monsignor Scanlan High School. I did very well in that school, I graduated Valedictorian.

I actually graduated Salutatorian from my middle school. My favorite subjects were math and science, I always enjoyed those, I excelled in them. I remember like some of the math Regents exams I would get, I still remember, like 100, 100 on the first two, and then an 88 on the third one, I think it was like a Regents exam one, two and three. And I remember my grades, 100, 100 and 88. I was disappointed in the 88, but it was good enough, clearly didn't change the trajectory of my life. I really enjoyed those subjects, and in schoolteachers took notice of that and I would be encouraged by some of the teachers, like if you want to join the math team, I don't think I ended up joining the math team, but I did participate in the peer mentoring club. We had to serve as peer mentors. I also participated in the adopt a grandparent program that they had, where once a week you'd go visit, you were paired up with an elderly person. And once a week you went to go visit them, things like that.

Joyce Bedi (00:05:08):

Let's talk a little bit more about that peer mentoring program and your friends and interests during your school years. Was anyone mentoring you at that point, as well?

Tahira Reid (00:05:22):

Sure. So, who was mentoring me? I don't remember having formal mentors, but the way the peer mentoring program worked was I guess the teachers knew students and their backgrounds. So, the idea was to give another student, to pair a student with someone else their age group, to maybe open up and share their problems. And then I guess we would go to the teacher, I don't remember hearing dramatic or crazy things, it was like kid stuff. I don't even remember many of the interactions, I just remembered having one. You had to learn to listen and I don't remember taking notes, but you had to learn to listen and offer advice.

I started doing tutoring in sixth grade, I remember that, it's not quite mentoring. I'm just remembering more childhood activities. I was recommended by a schoolteacher to a woman whose seven-year-old was having trouble in math. This was my first little business, I charged $5 a session, and he would come to my home twice a week and his mom would pay me $5 a session to tutor him in math, I remember that.

Other activities, in middle school I was on the Double Dutch team. There was a formal Double Dutch team at I.S. 144, this was the '80s, so Double Dutch was a big deal. I learned how to jump Double Dutch at age five, because the girl next door to me used to compete in Double Dutch, and she taught me, I still remember her name, Bonnie. She taught me how to jump with two legs together, like I had to jump from side-to-side cause I was still too young to have the coordination, the running in place coordination, but I would just jump side to side, and that's when I first learned.

Joyce Bedi (00:07:25):

Well, that's a beautiful segue into the next set of questions I want to ask about, which is about Double Dutch, and of course this is about your invention. So, to give us a little background about the role Double Dutch played in your community, it sounds like it was very popular from a young age. Just talk about that kind of social aspect of Double Dutch for a while. Maybe if there are some people, when we edit this down, who don't understand what Double Dutch jump rope

is, maybe you could just explain what it is and where it came from, if you know anything about the history of it, but mainly about the role that played in your community and in your childhood.

Tahira Reid (00:08:07):

Sure. So Double Dutch was sort of the thing to do that girls did. There were songs that went with it, and McDonald's came out with a commercial and they had kids jumping Double Dutch singing McDonald's stuff. I guess the best word I could think of, it was like a unifier. It was something girls did. I remember even as an adult, one time, my cousin and I, we were driving somewhere. I was in my car, she was in hers and we were, I forgot why we were separate. I think I might have had to take her to go get her car or something, but we were driving. Then she suddenly pulls over and then I pull over like, why are we pulling over? She's like, "Do you see those girls playing Double Dutch over there? Let's go get a jump".

I was like, oh okay. So, we're like adults, we're in our twenties at this point. You could be a total stranger, and I remember this being a thing, it worked the same. You could be a total stranger; it was almost an honor to turn rope for someone. So, when we came up, "Can we get a jump real quick?" They're like, "Oh, okay!" And they turn the ropes, and we jumped.

For those that don't know what Double Dutch is, it involves taking two ropes and turning in sort of 180 degrees out of phase. So, you're turning, and if you know what single jump rope is imagine doing it with two, but in such a way that they're always out of phase.

So, it's not like chaos, because you'd have like an eggbeater or something, but just alternating, just in a right out of phase motion so that you could essentially hop over each rope by one leg at a time. It looks like you're running in place when you're doing Double Dutch, traditionally. I just remembered it was a thing to know, and you can tell when people didn't learn Double Dutch, there was this regret, like in my adult years I could hear, "Oh yeah, I never got to learn", like there's a regret, and there was like an honor to say "Oh, I know how to jump Double Dutch", "Oh, I know how to turn." If you didn't know how to turn, they called it "double-handed". They say "You're double-handed" if you didn't have the right rhythm and coordination. So, you never wanted someone who was double handed to turn the ropes for you because they'd mess you up. Yeah. So, it was like a unifier, it was just like a social club.

Joyce Bedi (00:10:47):

I was a good turner, I could not jump.

Tahira Reid (00:10:54):

Some people are better turners than jumpers, and vice versa.

Joyce Bedi (00:10:59):

So, clearly this was really great memories for you, thinking about this, remembering it and continuing it even into your adult years. So, take us through what made you decide that? Did you have too many experiences with double-handed turners where you decided to use a Double Dutch machine rather than friends.

Tahira Reid (00:11:22):

It's so interesting, it started in third grade and in this moment, this same kind of thought process I think happens now. If I'm probed to think about something, then I have these aha moments. So, in third grade we just had a poster contest at P.S. 97. It was just a poster contest. The question was, draw a picture of something you wish you could have, that's what I remember it to be. At that time the space shuttle Challenger disaster had just happened. A lot of the kids were drawing pictures of astronaut suits and things related to space.

For me, I grew up as an only child and I didn't really get to play Double Dutch much unless I was at school. Then when you went to school, there was only two girls turning ropes, like it was never say multiple girls playing Double Dutch so that the proportion of girls and jumpers was nicely distributed. It'd be two girls, and then a long line of people waiting to get a turn to jump, and you got two turns, and you had to join the line again. It could take a while if you had a line of 10 or 12 girls. So that was one of the big things.

I love Double Dutch, but I didn't get to play much at home because I was an only child. I did have a friend on the block, she lived down the block, but it was the '80s, and parents were very protective of their kids, like they wanted to be able to look out the window and see you in front of the house. So, to leave the front of the house to go down the block, I'd sneak down the block sometimes to my friend Kendra actually, and go play with Kendra and then run back up the block.

So that poster contest prompted me to draw a picture. Just two poles, and three push buttons. I colored it like the traffic light, red, yellow, green, and a girl in the middle jumping. That's where it started, in third grade. And I actually won 1st prize for this poster contest. I don't think I thought about it again, I put it aside as "Oh yeah, great." For a long time, it was on large paper, it was like poster board paper. I used pink yarn to glue down to make a rope. Like I drew the girl, and I glued the yarn down. Because my mom had yarn, my mom I think would knit, and I cut some and I made the ropes with that and glued it onto the poster.

We kept it for a while. But then you know moms, my mom, especially a Jamaican mom, they are a stickler for cleanliness, and you know, clutter decluttering so I remember that getting tossed in the trash at some point. Again, it was sort of like whatever, it's just a poster. But when I got to RPI, I remembered the idea again, probed, you know, challenging the limits in sports and recreational activities. I started out with thinking about obvious sports.

At this point, it's a long time. It's like 12 years and football, basketball, I was just thinking of the obvious stuff. And then it was like, "Oh, that idea I had in third grade, that's a recreational activity." My notebook, I just, it was like mad scientist of just sketching and drawing and just all the tools, mind mapping and functional decomposition, morphological analysis stuff.

I just remember I did a two-page morphological chart. You had to open it up like that. I remember Burt Swersey was my instructor, and he would write, he wrote, "Wow!" I still have the notebook, it's somewhere, I never threw it away. That's when it came back to life again.

Joyce Bedi (00:15:27):

Amazing. I'm a little bit angry with your mother. I was just about to ask if you still had the poster, but you have images of it, right?

Tahira Reid (00:15:39):

I re-sketched it from how I remembered it. Veronica Chambers wrote a book, and needed a picture, and so I re-sketched it as best as I could remember. I know I remembered it well, it's just that the original had yarn, it wasn't crayon.

Joyce Bedi (00:16:01):

Did you invent anything else when you were a kid? Was this a one-off or did this inspire you to think of other ways to improve your childhood life?

Tahira Reid (00:16:11):

I don't remember any other childhood type inventions, but over the years I'll see problems and be like, "something's wrong with that", and try to come up with a solution.

Like one time I was on a bus and I saw a woman carrying a baby, and the pacifier fell, I think it was either the bus or the subway. Somehow, I've seen this happen a lot, where mothers will pick up the pacifier and suck it off as their way to clean it and give it to, and I was like, "Oh boy, when they're not near a faucet, we need a way for them to be able to rinse and clean their pacifier", and I sketched out something. Then when I looked for patents, I saw that someone had come up with something similar, it wasn't on the market and I was just like, okay, whatever.

But it was almost the size of a baby bottle, and one side could have a cleaning solution, and then the other has a rinsing solution that you could stick in your baby bag. That was something I thought of awhile back. And then I was like, "Oh, they have patents." But as far as childhood inventions, I don't remember anything else.

Joyce Bedi (00:17:26):

So you've told us that you liked science and math, so how did that translate into a decision to major in engineering, and specifically, why did you choose RPI?

Tahira Reid (00:17:41):

It's a really interesting story about how I decided to become an engineer, and how I chose to go to RPI. I had this really simplified logic, I don't know where it comes from. Now I do have engineers in my extended family. High school level, you asked about mentors. I did have great cousins and you know, I have a huge extended family. My grandfather is one of nine, and then my grandmother was like one of six and then they all have these descendants. So, I had a cousin who was going to Harvard, and I would ask her questions about college. I found, I'm on a funny trail, I found an old card and I sent it to her on Facebook and was like "Do you remember sending me this card?" It like a card with some well-wishes in it. But anyhow, how did I choose to become an engineer?

I had this very simplified logic. If you're good at math, you should be an engineer. If you're good at science, you should be a doctor. So, I was like, well, I should be a biomedical engineer. So, that was my intention, and then I went to the public library. I found a book on biomedical engineering. We didn't have Google back then, if you wanted to know anything, you had to go get a book. If it wasn't in your house, you had to go to the library and go get it. So that was my Google, I was like "I need a book on biomedical engineering", and they had something they

showed, they make artificial heart valves, and some things like that. And it's like, "Oh, this seems neat. All right. Yeah. This is what I want to do."

Now in high school, I had a guidance counselor, Ms. Bowler, and she was very invested in me. Now that I'm on the other side as an educator, I can see how, if someone is for you, people make things happen for you. So, for example, I was nominated to receive the Rensselaer Medal Polytechnic Institute, you know, RPI, Rensselaer Polytechnic Institute. They have something called the Rensselaer Medal. So, I received it and I'm like, "Okay, how did they even know who I am?" I think it's given to a junior who has the highest math science score at a school, or at participating schools, or something like that. When I say, when people are for you, because she's attentive, I think she helped get my name to them, right? How would they know I exist, you know that kind of thing.

So, I was like "who's this school? The Rensselaer Medal is four years of a partial scholarship. I can't even remember how much you got, it didn't cover a lot, but it covered something, and it was four years, so it caught my attention. I had never even heard of the school. I was like, "Oh, who are they?" And I found a magazine, a college magazine. They had these beautiful campus photos. And I was like, "Oh, it looks so nice", and eventually I applied, and then went to visit, saw the campus. I had this interesting perception of what college was like. I expected everyone to be very nerdy, I was nerdy, but I had to still kind of be cool to fit in, in New York, but I was a nerd at heart. So, I was like, "Yeah, I'm going to finally be around a lot of nerds and everyone's going to be like the television type nerds." I was so surprised when I went for like a campus visit and how regular everyone seemed. I was like, "Oh, they're like really regular people", like the students are just regular. They had a party and stuff. I was like, "and they go to parties too? They're not like, okay." I had to adjust that. So, I intended to do biomedical engineering, and then my freshman year I did, I picked RPI. I can't even remember the other schools I got accepted into, but I went to RPI.

That weekend, it was called Minority Student Weekend, and I actually have lifelong friends, that was like 1995, and I mean, two of them were at my wedding two years ago. Lifelong friends, we met Minority Student Weekend, we all ended up going to RPI, and we're still in touch with each other. I was at one's wedding too and her baby shower.

So anyhow, freshman year I was focused on biomedical engineering. We did not have the first-year experience like they do now. When you got to college, your major was declared when you stepped on campus. Although your first year you'd be taking a lot of the common classes.

The career fair came around, and I had biomedical engineering as my major, and this recruiter said, "Oh, you're too specialized." Even though I was a freshman, he said, "you're too specialized. We don't really hire biomedical", and I just was like, "Oh gosh, I'm too specialized?"

Then I met a senior in mechanical engineering, her name is Jennifer Otitigbe, and somehow we got into a conversation, she said, "you should switch to mechanical engineering because you can always do biomedical things with that, it's broader", and that's how I switched to mechanical engineering. So that is my story of how I chose engineering as a discipline.

Joyce Bedi (00:23:07):

Well, that's an interesting story about how other people's advice can influence the path your life takes. Now I want to ask you more about Burt Swersey, and how he came to be your mentor. I know he played a very important role in your life.

Tahira Reid (00:23:25):

Yes. Burt Swersey played a very important role in my life. So, Burt Swersey had a really good reputation amongst students for a class called Introduction to Engineering Design, otherwise known as IED. People talked about him, students always showing up, "hey, you're going to take this class, take this professor, take this person."

So, I had heard that about him. So, I made sure when it was my semester to take that class, I was like, I need to get into his section, because I heard good things about him. Clearly it was a good idea, because I had the right person, and then I had the right idea and a person who could appreciate it. So, I was in his class and again, he was such an encourager. So, the way that class worked was you work as individuals first, and then you get put into teams.

Now that I'm an instructor in a class in college, I can see how you can try to bias teams towards a certain end, if you have some information. So, he probably intentionally put me with five other people whose ideas were not as practical as mine. I remember him saying, "you need to push this idea on your team." Now I'm a very shy sophomore, I'm one of few Black people, I think it was me and one other girl, actually, we were the only two Black students in the class. She was female and she was on my team too. But I did not know about say maybe instructor bias where they could, good bias to try to make things work in your favor.

PART 1 OF 4 ENDS [00:25:04]

Tahira Reid (00:25:00):

Like, "Hey, push your idea on your team." 'Cause one had a hand-gliding idea, another one had an inline skating idea. What can six people do with inline skating? Okay, how are we going to really do a hang gliding project? And I don't remember the other ideas but I just remember those two they stood out because I was like, "We don't do that in the Bronx, I can't relate to any of those but here's my ... this is my Double Dutch idea." And I remember I started opening my notebook and they were like, "Oh my God." 'Cause I had all these drawings and all this stuff sketched out. It was pretty clear that I was sort of mad scientist with all the writing I had in my notebook and all the work I had put in to think about it.

So, Burt was an encourager and what was great about Burt is that he also grew up in the Bronx and he knew what Double Dutch was. I'm telling you. And I just was on another... There was some other sort of panel discussion I was part of. And I'm saying if Burt was not my instructor, that idea would have stayed in the notebook because if it was someone who wasn't familiar with Double Dutch or who just never grew up in New York and I think they would have been like, "Hey, work on the hang gliding projects, work on the inline skates." 'Cause where I live, we do inline skating or whatever. Burt was critical because he encouraged me and I was so shy, so shy as a sophomore. And he tends to have a lot of hope in his students. I met students' years after he passed and similar kind of sit you in the office give you this pep talk, the student looks frustrated but he's sitting there encouraging you.

And you know he uses network. I remember it was time to get a patent he sent me to Francis Hand, I think that was the patent lawyer that he worked with in Manhattan. We got the NCIIA E-Team Grant, NCIIA is now VentureWell. We got the first one and that helped to fund the patent and I think that following March was March Madness with the playful line and some of that shortly after. So, Burt was a huge supporter and he kept having these... I kept taking every class he had, and he had an adventure studio, I think it was part one and part two and I just kept taking

classes with him. And so, through the classes I took with him I kept working on the project. Different teams, there was one team and then the others moved on.

And so, we've had lots of students come through work on the project and then the semester I'm graduating is when it finally worked. And that was the year where there was so much press and it got on The Today Show, Essence Magazine, a little excerpt in there. Just... That was the equivalent of going viral back then.

Joyce Bedi (00:28:12):

Okay.

Tahira Reid (00:28:13):

It just every month a different newspaper and actually the first article was in the *New York Times.* Teresa Riordan did a piece and it was actually on February 14th, 2000 called Inventor makes good on a third-grade notion and I believe Burt called Teresa directly and said, "Hey, you need to do a story." I believe that's what he did, I think he called her. I didn't know that you could call newspapers. Right? But if you know people, you can make phone calls and I guess she liked the story and that kicked off the series of just like, okay, that was February then March.

There was something else that April then May. There just as kept being something else, some big names, some local names and when it got to The Times Union paper that was the AP. So, someone at The Today Show said, "If it comes across the AP wire a second time call this person." And that second time was The Times Union paper. And then the next day we were contacted, I can't even remember how they called. I remember they... I think they called the Office of Minority Student Affairs or something to reach me and invited me to come on The Today Show. That Times Union paper came out July of 2000 and they said, "Would you like to come in August? Or would you like to come in September?" And so, it was okay, let's do the August show. Mind you, we still had to try to get a version of the prototype that looks better on TV than the clunky one that we had. So, there was some help and some support to get supports that looked better and more presentable et cetera. So, I knew it was a huge deal. They had a whole viewing, they were like, "Oh, we're going to show, we're going to have this whole viewing of *The Today Show* in the Mueller Center." Because it was a big screen there and so people gathered to watch and it was a huge big deal.

Joyce Bedi

So, I want to back up just a little bit to talk about the patent. And so, the first patent that you've got for the Double Dutch machine has just one co-inventor listed on it with you. But the second one, it's a big team and Burt is one of the people listed on the patent.. So, can you tell us about that... How the two patents came about and how it expanded into this large group?

Tahira Reid (00:30:41):

Yeah. So that first patent, that was the most odd experience so I remember being in Francis Hand's office and he was going through different aspects of the projects that he thought was an... Basically, a novel contribution. And so, whoever's name was associated with that contribution got mentioned. So, Andrew was listed because all the other things were just sort of like, well, there's no big claim that there's no claim that you could tie to that particular feature. So, if they...

Maybe it was something substantially they did for the project but maybe it wasn't sort of... His rule was if it's not obvious to someone skilled in the art. And so, I think remember Andrew being the one that came up with the crisscross pulley system as a way to get the ropes to turn. Because at the time we had looked up old patents and there was one patent before that that seemed...that was similar. It was some kind of Double Dutch device kind of a thing and so we didn't want to create it. We didn't... I think they use... I can't remember exactly; I think they had one side free swinging the other side with gears. I can't remember the detail, but we were like, we don't want to have that kind of a power system to get it to turn.

And so that was tied to... So, because that was considered a novel or patentable kind of a thing and that was tied to what Andrew did on the project. So that's how that first one came to be and then, so I didn't... It felt weird. I remember we were going through this like, "Nope. Well, this this and it was okay, wow." The second one came about from the standpoint and I just wanted to acknowledge everybody that helped 'cause it just felt like that first one felt weird but 'cause it was literal. What did you literally contribute to make it patentable? So that second was if you even said one small idea, I mean, there was even one faculty member who came in and consulted with us during class and said one small thing and I was like, "Okay, well, we're going to include him too."

Tahira Reid (00:33:05):

Yeah.

Joyce Bedi (00:33:07):

So you had mentioned a little while ago-

Jake Klim (00:33:10):

Joyce, can I stop real quick? There's a beeping that we keep hearing about every 45 seconds I don't know if it's on Joyce's end or Tahira's? I don't know if anyone else is hearing it or not, I know Peter and I were hearing it but... And this would be a good time just to take a quick pause if we can just pause it, the phone.

Alison Oswald (00:33:29):

Yeah. I'm hearing it too Jake I've been hearing it.

Jake Klim (00:33:35):

Okay.

Joyce Bedi (00:33:35):

And I'm not hearing it.

Jake Klim (00:33:35):

It's not-

Joyce Bedi (00:33:35):

This is-

Jake Klim (00:33:36):
It's not super obnoxious. It's just sort of-

Peter Silverman(00:33:39):
It's [inaudible 00:33:40] I can point it out. It's happening every 45 seconds so let me see if-

Tahira Reid (00:33:47):
Now there is a vibrating sound that I hear.

Peter Silverman (00:33:53):
There it goes. It just went beep.

Jake Klim (00:33:55):
Beep.

Tahira Reid (00:33:57):
I don't know what that is.

Peter Silverman (00:34:00):
It's not super noticeable. We just wanted to see if you did have an idea of what it was, but it's not terribly distracting.

Tahira Reid (00:34:10):
Could I pause and grab tissue? I've been wondering if-

Jake Klim (00:34:13):
Yeah.

Tahira Reid (00:34:13):
I have to rub my nose real quick.

Joyce Bedi
I only hear that pinging coming through the computer to me so I don't think it's anything on my end.

Jake Klim (00:34:29):
It sounds almost like a...I don't think this is what it... But it almost sounds like a fire alarm.

Peter Silverman (00:34:36):
Yes.

Jake Klim (00:34:37):

Fire alarm is…The battery is about to die or something like that.

Peter Silverman (00:34:41):
That's exactly right. Yeah.

Tahira Reid (00:34:43):
Wow. I don't hear that beep at all. That's interesting.

Jake Klim (00:34:49):
I wouldn't say it's very noticeable but I just...

Peter Silverman (00:34:52):
Yeah, if it's-

Jake Klim (00:34:52):
If it was one of those things like, "if it's... Oh, it's this thing here." Then we could shut it up but...

Peter Silverman (00:34:58):
Yeah, let's not go on a... Let's not go on a search for-

Jake Klim (00:35:02):
Yeah.

Peter Silverman (00:35:02):
... The cause. I think-

Jake Klim (00:35:03):
The missing...Hunt for the...

Joyce Bedi (00:35:05):
Scavenger hunt.

Jake Klim (00:35:07):
Well, we're ready... I think we're ready to start back up again then I just... That was a good chance for us to pause anyway.

Tahira Reid (00:35:13):
And am I looking at... Cause I'm sort of feel like I'm looking... So when I think I tend to look up or..

Jake Klim (00:35:17):
That's only fine. We just don't want you to... You looking the way we want you to look. You're looking right down the lens [inaudible 00:35:25]-

Peter Silverman (00:35:25):

Yeah.

Jake Klim (00:35:25):

... thinking is fine. It's just we don't want people to kind of be looking... Quote and quote, looking at Joyce because you'll look at the corner of the screen type of thing. You're looking right down the lens, you're doing great.

Tahira Reid (00:35:34):

Okay.

Jake Klim (00:35:37):

Joyce do you want to do the countdown again? And I asked your next question and we'll... We can keep going. Everyone-

Peter Silverman (00:35:44):

You're still rolling, right?

Jake Klim (00:35:46):

I've been rolling the whole time but-

Peter Silverman (00:35:46):

Okay.

Jake Klim (00:35:47):

You guys are... The two phones will serve recording audio and Peter we'll start recording audio now.

Peter Silverman (00:35:53):

Okay. I'm good.

Jake Klim (00:35:55):

All right. I'm going back on you. Joyce, it's on you.

Joyce Bedi (00:35:59):

10, nine, eight, seven, six, five, four, three, two, one. Okay, I want to go back to some of the things where you were just talking about. You mentioned that Burt put you on the team because you had a practical idea, he wanted you to push that. So, I want you to talk a little bit more, I'd like to hear more about what it was like working with team members on the Double Dutch machine. And how did you divide the work? Who did what? What were the roles of your co-inventors? That sort of... What was the team dynamic I guess is what I'm asking about.

Tahira Reid (00:36:43):

And again, this is my inference about how Burt set up the team because I know I remember him saying, "Hey, you need to get your team … really encourage your team to try to pick your idea." That's my interpretation on [how it might have happened]. 'Cause now that I've set up teams myself I can be like, "Okay, I'm going to put these two together because I think this will be a strong team." I don't remember the details of how the work was divided. However, I do remember there was a student who had access to a sheet metal bending facility. I don't know if his father owned something. So, since we took [the class] in the fall, so over Thanksgiving break he took on the task of creating the housing that was made of sheet metal bent into boxes. Essentially these heavy boxes that could contain all the mechanisms that we had in my... I remember, I think his name was Timothy. I remember him taking that task on 'cause he had access to resources and we used PVC pipe to make stands. I remember that much.

The pulley system with the ropes sort of the crisscross belts, round belts. I know that sketch and design came from Andrew and I'm trying to remember... I know we all did time in the machine shop and made parts and things but yeah, I can't remember the full distribution of who was do... as far as the making aspects of it. But I do remember that a big part, someone took it home 'cause they had sheet metal bending facility access to that, and it came back so professional. So maybe their dad was an owner of a facility like that.

Joyce Bedi (00:38:51):

So, talk a little bit more about these prototypes. They sound fascinating. And how many did you build? Do you still have any of them?

Tahira Reid (00:39:01):

Yeah, we went through... So okay. So, there was like," I wish I was better about taking photos and..." Back then... The times that we live in now everything's visual and show it, show it, show it, right? Tweet it, put it on YouTube. So, everything is very... We're more predisposed to documenting things, right? Cell phones have cameras. Yeah, that was generation one. It was this heavy sheet metal thing and it... The ropes, every certain amount of revolutions it would get out of phase because of the slipping of the belts. And then there was version 2.0 that was made up of a plexiglass box so that you could see the mechanism. The other one was sheet metal painted white then it was... I remember that plexiglass for the box and then we've tried to... The biggest challenge was synchronizing the two sides.

We did not have that part figured out 'cause that required knowledge in electrical engineering and using microprocessors. If we had it, I don't think we had it figured out yet. And so, the next iteration I remember a nicer looking box. I think we still had the rope mechanism, the pulley and the rope. And then there were... I think some grad students in Kevin Craig's lab that helped to put a microprocessor thing on it and get it to move now. Get it to pull… We used stepper motors the whole time. I do remember that first semester we used stepper motors and we continued and what's good with those is that they move in post light motion so it's easier to control them but it had a very slow startup. I remember that with generation two. The one... And I think that's the one that... Was that the one that was brought to... I think that's the one that we showed at the Playful Mind.

That's the one that we showed. Because it was nicer, but it didn't work as well with heavy ropes, the ropes were too heavy. So, let's say the mechanism... You can't see it. When it would get to say the side position, it would stall. 'Cause it was... It just didn't have the strength to whip the

rope over. So I remember that. So, we had to use for demonstration purposes, I remember something... Just some lightweight cord and I remember there was a group of girls that clearly... They were told that, "Hey, there's going to be a Double Dutch machine at this Playful Mind." And it was so cute. These little girls came running over they were just so ready to try it. We're like, "I'm so sorry but the ropes that..." It wasn't heavy enough to turn so people could... But just so they could get an idea of, "Hey, here's a machine that could make this motion happen. We're just not there yet to have a heavy rope, a real rope." So I know that was spring '98. Then I can't remember fall '98, that semester and what progress we've made but I do remember spring 99' I was like, "Okay, I need a break from school. I'm going on co-op, make some money." Yeah, so that was... So, from January 99' to August 99' I was like semester off, worked with Pratt and Whitney made some money, bought my first car and then came back to work on it. I think by fall 99' we got something that was starting to work but it was c-clamped to a utility cart kind of thing. we did... We just rigged some things up at times 'cause that was spring 99'. No, I'm sorry fall 99'. But by... I want to say def, if it wasn't fall 99' it was definitely by January, 2000 because July, 2000 there were photo... Actually, by that time there were photos available of me jumping with the device for the news. So, there was... So, something finally... And then we changed it actually we moved to gears. Yes. It was fall 99' 'cause that was my last semester... That was my last year.

And yeah, I remember Colleen Conlon was the one that sketched out the gears and she had them cut with a water jet cutter, I remember her being so proud. I remember her like, "Oh my gears are working. A mesh." And then you saw she was so excited how they meshed. I remember that was Colleen Conlon that had done the gears. I don't remember... It's crazy how I don't remember everyone on the teams, but I just remember these pivotal moments, like when she got so excited that the gears were meshing well and so that was fall 99'. So yeah, so we changed the way to the mechanism for turning the rope several times, the way it was housed and so yeah. But *The Today Show* definitely helped facilitate getting a little bit more refinement in how it looked and the power supply that we used was this huge, large and clunky. I mean, it was so heavy and I remember... His name was Jerry Dzuba [00:44:39]

He was one of the technical [staff members]... He kind of worked in sort of the support offices that help students with their electronics and every engineering department has people like this that helps students accomplish their goals with their projects. And I remember going on to *The Today Show* when I got that invitation. I was like, "Jerry needs to be able to come, he needs to be on the set. I'm sorry, because if anything goes wrong with this power supply, he's going to know how to fix it, he needs to be on the show or part of this." So, I'm sure he was quite honored I don't know if he's ever been on *The Today Show*. So, I was like, "He has to be able to come." And then all of that time I was always the one using the device and so I was like, "Okay, if I go on *The Today*... When I go on *The Today Show* I cannot be the one demonstrating it, I need to have some other people demonstrating it."

And so, I have a cousin, my first cousin, she has first cousins... So, we're first cousins, her mother is my aunt, but her father's side of family, there's lots of little girls so it was just one household and he was like, "Okay, we want Tiffany on the show. And then we need four other girls." And so it was, we got Candace and Felicia and then went across the street and got her friend so they all were invited to be on the show to demonstrate and they were just so cute. They.... We stayed in the hotel overnight. Night before the set we figured out the order who would jump and it was... I think it was a precious experience for them and I used to have this thing where I wanted... My motivations for bringing them to was not only because they can jump

but I wanted them to see that you can get on TV because of your brain not because of how you look. 'Cause I think back then a lot of... You don't see a lot of Black women on television showing anything. Oops. I just made it tilt. I just knocked the table. Okay let me proceed. Back then you don't see... You didn't see a lot of Black women engineers, scientists on television. If you saw Black women on television, it was BET, music videos or something like that. And I wanted them to see that, "Oh, you could get on TV but you don't have to be dressed half naked and dancing to get on TV." And so that was... That was a little thing that I hoped was a seed that I could have planted in them. Who knows? I don't know that it made the impact that I wanted it to but that was sort of my thinking as well.

Joyce Bedi (00:47:20):

That's really wonderful. It's very inspiring. There's a theme coming out here I'm wondering if the continued. This whole project started when you're in the third grade with drawing and you mentioned that you had notebooks full of drawings when Burt put you on that team. And you mentioned... I think you said Colleen Conlon had drawings for the gears. Did... Was sketching a continued part of the development process of the machine?

Tahira Reid (00:47:53):

Yeah, so sketching... Sketching... So let me just say this back then when you took a CAD class the way they taught it, you had to learn how to do drawing and you had to learn how to use CAD. Now that I'm a researcher professor there are entire bodies of work on the importance of sketching and engineering because it's not emphasized as much anymore as it was when I was going through college. And so, drawing and sketching... Yeah, it wasn't easy to just hop on a machine and just start drawing CAD. First of all, you probably had to go to a lab somewhere to do it. I mean, you could sketch in your dorm. Not everyone had laptops and computers in their dorm they might have to go downstairs to a shared space and the likelihood that it had CAD on it... I don't think my dorm had CAD on it. So, then you now have to go to another building to go do CAD. So, I'm just thinking of... I'm just making inferences about logistics and why you might be more inclined to sketch then CAD, do CAD drawings. Now I do know that Colleen had CAD drawings for her gears 'cause that had to go into the water jet into the system, the water jet cutter so it knew what to... How to cut it. So yeah, sketching is important.

Joyce Bedi (00:49:15):

So, I want to ask you a little bit more about your experience with the patent process. How did that work? Both of your patents were assigned to RPI, is that correct? Yeah.

Joyce Bedi (00:49:34):

And did... Was the machine ever commercialized by RPI or anyone else?

Tahira Reid (00:49:39):

No. So here's... So that... It was an interesting process. So that first patent was sort of like I told you, it was the literal who contributed the stuff that he deemed patentable and then the second one was based on people's involvement. And so now if there was some paperwork students filled out where you would get a share.

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Tahira Reid (00:50:00):

If this went on the market, according to the grade that you got in the class, there's a certain share that you would get. So, if you got an A, in the class, it was so much, and B, C or D, so it was commiserate with the grade that you received. Now, the way things worked at RPI, it was assigned to RPI and then they would offer what's called an exclusive license.

For let's say myself. So, I actually tried to start a company after graduating. Because this is happening the semester I'm graduating. I mean, *Today Show* happened in August and I graduated in May. I mean, my graduation was in May, but I stayed in the area. And I'm just like, "Oh my gosh, things are just starting to take off".

I had a job offer at Pratt & Whitney and I didn't take it. And so, I wanted to start a business, trying to make these. You know, get them manufactured. Because I heard licensing, you're not going to make as much. Right. But this was in the 90's, the dot-com boom was happening, so everything was like software related. And here I come with all this hardware talk. And, I didn't trust a lot of people during that time.

And so, I had the exclusive access to the license. That's sort of how they do things and I believe things are split in thirds, but it never went on the market. I tried to find design firms that could help take it from this proof of concept to something refined and market ready. I remember, I went to Frog Design and I got a quote for like a half a million dollars to really take it to this refined level. And it was just like, "Whoa, that is so much".

And then I ended up just going back to grad school because I was like, "I need to learn more about electric mechanical systems". And that's what prompted me to go get a master's degree and focus on mechatronics. So, the patents and everything they are assigned to RPI, they just sort of been sitting there. Gosh, they might even be expired. I haven't even kept up with them. There is a prototype that I had a team of students create in senior design, fall 2019, it's sitting in my office at Purdue. I wanted someone to create another one, so that I had something to show later if the need ever came up. So yeah, the patents there, they've just been sitting dormant.

Joyce Bedi (00:52:49):

You just mentioned that the cost the design firm quoted you to take them to the next step. I know you applied for grants during the process of developing this. So NCIAA, now VentureWell. Explain a little bit about why you needed to do that. What that process was like, what kind of experience you gained from applying for grant funding.

Tahira Reid (00:53:19):

Sure. So, the E-Team grant, the first one that we got, that helped with some of the patent costs. That helped with materials for the prototype. And then, there was an interesting thing. We got a second one because it was given to another team at first. I don't remember what happened with the lead of that team. I don't know, I think they left the school. And then Burt got permission to allow our team, because we were still working and making progress, he got permission to redirect it to our team. So then there's a second one that we essentially got and that helped with further prototype development and paying for some of the machine shop time. When we went on

The Today Show, we actually got real machinists to kind of help make the support system look better than what we were using.

Joyce Bedi (00:54:22):

So, you've talked about the celebrity that this brought you, press and television, that kind of thing. And featured in children's books, you were on the New York State test. It's really wonderful. So, I'm just wondering, did that celebrity help your goals? Did it make some aspects of your life and work more difficult or easier? What was the net gain from your fame?

Tahira Reid (00:55:01):

Yeah, I continue to be fascinated by the fame aspects. I mean, when I think back to the first time I started working on this and how many years it's been, and yet it just continues to have interests in people. Like when I started at Purdue, they had a TEDx program for people at Purdue and they invited me to be on it. Not to talk about my research. They wanted me to talk about this Double Dutch device.

And, here I am coming in a tenure-track professor and they're like, "That's cool, but we want to hear about the Double Dutch stuff". I mean, this is just my fun way of playing on the contrast or the paradox. You know, most professors, they're just all about their research. But there's this other side that has a life of its own.

Right? And these things happened on their own. There's one book that I feel helps me get an understanding it's called, *Made to Stick: Why Some Ideas Die and Others Stay Alive*, [*Made to Stick: Why Some Ideas Survive and Others Die*] or something like that. And I say, it's the story aspect. I think people are drawn to the story. That's what I think it might be. The story draws people, inspires people, inspires kids, especially.

But, how did it help? I think it helped me to be set apart. First of all, I'm already rare, right? In engineering, Black female mechanical engineer. There's not a lot of us. And so, it helped to shine a different light on me as well. Like, "Wow, that's kind of neat that you have this". Because at the time I would have a CV and I had public appearances, and I would have like this long list of places that I…

By graduate school I had already done all this public speaking and all of this stuff had happened. I mean, this happened in undergrad. I've put all this stuff, even in my dossier. I have a section, it's what, page 40? The 40th page, one of the least critical sections. But yeah, public appearances based on RPI, based on Purdue, I have it.

It's an interesting, humbling thing. I would say. I mean, I've been talking about this for over 20 years. But, there's this other side of me. My grandmother who used to live in DC, she passed away in 2014. She was at the Playful Mind event. Because it was right there, very close. And she always would say to me, "What about your invention?" This is my paternal grandparents. I had a relationship with my father's side of the family because they lived in the U.S., although my father didn't. And she would always be like, "What about your invention? What about the invention?" Every time she'd see me, "What about the invention?" Like she would just ask me about it.

She had a perception. Now, mind you, my grandmother was biracial. Jamaican, but biracial, Black father, White mother. But she identified as Black. And so, she always would say, "You know, if you were White, people would help you more." She used to feel like I was held back. She was like, "Because you're Black, no one's coming to help your idea take off." I mean, this

was something my grandmother used to always say. That was something that she felt because she just felt like it had potential, but I'm not getting connected to the right people, who knows.

But I say all that to say, with things even continuing to happen, now she's passed on and I'm still talking about it. There is this thing in me that's like, "Okay, you're grown now, you have a little bit more access to people and resources. You should really try to do something with this." I mean, at the very least in her honor. Because she always, "What about your invention? What about your invention?" I mean all the time. She lived to 93 and she would ask about it every year.

Joyce Bedi (00:59:49):

I just want to take a little sidebar here. You've mentioned the Playful Mind symposium several times and Alison and I of course know what that is. But, for the sake of this video, if you could briefly explain what that was, how you got to be part of it and what impact, if any, it had on you.

Tahira Reid (01:00:12):

Sure. The Playful Mind was an event that took place in 1998. And, recent winners of NCIIA grants were invited to participate because the Lemelson Foundation was a sponsor or a contributor to NCIIA E-Team funding. And so, I think a variety of people were there, but I know that an invitation had come for our team to be there because of the connection to Lemelson. That's my memory of that. And it came really quick. Because that was like March of '98, I remember. The good thing with public appearances is it puts pressure to try to make quick progress on prototypes and things like that.

Joyce Bedi (01:01:09):

Great. Thank you. I want to transition now into your academic career. And so, the first question I have is how did you decide to focus on mechanical engineering and psychology, in your PhD work?

Tahira Reid (01:01:27):

No, this is great. Basically, how did I choose to pursue a degree in design science? I think, I had a pivotal moment where I'd been doing traditional mechanical engineering. I did it in undergrad, I did it in my master's program. And when I went to University of Michigan, my original motivation for going for a PhD was because of my maternal grandparents.

So, let me just clarify. I had a relationship with both sets of grandparents. I knew them, both. Which I know a lot of people don't have that. I knew both sets and had a relationship with them. So, I grew up with the maternal grandparents, but I would visit and see the paternal ones. They lived in the Maryland, D.C. area. My maternal grandparents passed on, my grandmother, I was 16 and then grandpa died three years later, they were both diabetic.

And so, I had this thing where I want to do something to make a difference for diabetics. Like if I go do a PhD, it has to have an impact on diabetics, and I don't want to have to become a doctor to do it. I have to be able to stay in mechanical engineering. And so, I was applying to different universities and there's a whole story for all, I mean, everything can be a long story, that I won't go into it.

But I did apply to Michigan because there was a faculty member in mechanical engineering that, she also had an appointment in biomedical materials. She did some things with diabetic heart collagen or did something with diabetics and the project that I would have been working on to join her lab was sort of, heart collagen related stuff.

So, I was reading tons and tons of stuff on heart collagen. That's where I started, in the M.E. Department there. And I was like, "This is so dull. Oh my God, I'm just reading about collagen." Then I learned how to use the atomic force microscope. And I was just like, "This stuff is so dry". I didn't like it.

And then some things happened too where I ended up not staying in the mechanical engineering department. Because design, and even my advisor that I had at the time said, " You know, your strength is design. You're more of a design person." And then a woman who I call my godmother because, I can't call her friend because, she could be my mom. So, I call her my godmother. She's known me since I was 18. She worked at RPI, Deborah Nazon.

And the night before I met with a person that helped me figure out design science, the night before, she said, "You know, Tahira, you're not a one-dimensional thinker. You're interdisciplinary in how you think". And, something about that conversation the night before meeting with a faculty member at Michigan, his name is Richard Hughes, was critical. Deborah knows me well. She knows the whole Double Dutch thing, she knows the whole journey, again, age 18, right? So, freshman year she's known me.

And so, I meet with Richard Hughes because I was like, "Okay, I think I want to switch to a different department. And, I think I might want to work with him." He was doing biomedical stuff and yeah, his stuff sounded boring too.

And I happened to ask this question because of the meeting, the conversation. I said, "Do you happen to know of design programs that deal with social issues?" And he said, "Yes, it just so happens that I do. There's a new program starting in the fall called design science. And if you want to do design, you should work with Panos Papalambros." And I was like, "Okay, wow."

So of course, we had Google at this point, right? So, I could Google and look stuff up. And he actually shared the proposal of this program that was starting in the fall. And, there was a seminar series that they had that I started to attend, and I actually volunteered to do a presentation. So, mind you, looking back, I can see how bold that was. Because, now that I'm a faculty member, guests never want to present and people don't want to present ever, even students.

And here I am just sort of, " Hey, I'd like to present something." And so, because I felt like the things they were talking about, it resonated so much, and I felt like I could fit in. And so, I did a presentation real quick, just on some of the things I accomplished with my jump rope device.

But anyhow, I remember feeling the imposter syndrome was really strong. I was like, "Gosh, if design is what I want to do and Panos Papalambros is who I should work with, I don't know if I'm good enough to work with him." You know, it's almost like, how do I get to be in his lab if he's this great guy? Turns out one day he says, "Tahira, would you like to join my lab?" Inside, I was like, "Sure!" But all along, I was just kind of like, "Oh my God, I don't even think I'm good enough". Because you know, to get presented that way with like, Richard: "If you want to do design, you need to work with..." So now he's on a pedestal, like, "Okay he's the greatest of the greats at this university. And I'm just me. So how am I going to close that gap?" And then he turned in and invited me to join his lab. Let me just pause, I need to take a sip.

Jake Klim (01:07:13):

And this is actually a good time, Peter for you to pause your recording and **Joyce**, to pause your audio and Tahira, to pause your audio.

Joyce Bedi (01:07:25):

Okay.

Tahira Reid (01:07:25):

Do I pause mine too?

Jake Klim (01:07:28):

If you can. Yes. Or stop it so we can restart it for the third one.

Tahira Reid (01:07:34):

Okay. Maybe I'll just stop

Jake Klim (01:07:37):

Peter, just chime in when you're ready to go back again.

Tahira Reid (01:07:44):

I needed a sip. My throat got a little dry right there.

Sorry for the bunny trails. You're asking questions and I am going on bunny trails. I'm not always sticking to the question [crosstalk 01:07:58].

Joyce Bedi (01:07:58):

You're doing great! In fact, you've anticipated so many of my questions, I didn't even have to ask them. We are in the home stretch here. So..

Jake Klim (01:08:09):

Peter, are you good?

Peter Silverman (01:08:11):

I am recording again.

Jake Klim (01:08:13):

Okay. Joyce you're recording again?

Joyce Bedi (01:08:16):

I am now.

Jake Klim (01:08:16):

Okay. Tahira, you're recording your phone again? Okay. Joyce, you can just do a five second countdown and ask your next question.

Joyce Bedi (01:08:24):

Okay.

Jake Klim (01:08:25):

I'm going to go back on mute

Joyce Bedi (01:08:27):

Five, four, three, two, one.

I want to come around to something you were just talking about, about design and social issues and combining engineering and design and psychology. So, I think it would be really interesting to hear your perspective on how people interact with technology. What do you think needs to change about how people use technology?

Tahira Reid (01:08:56):

Oh, wow. How people use technology and what needs to change. That question can be approached in so many ways. But I'm going to take the angle of something I'm actually working on. I was invited to write a perspective piece for *Science*, that's still in progress. Maybe by the time this video comes out, it will be available. So, some of the work that I do now involves human machine interaction, trust and autonomous systems. That's sort of an area that I've been working on with a collaborator at Purdue.

And what I have come to realize is when we say human machine interactions, and you look at the data it's based on and the participants that are in the studies, we say human machine interaction, but it doesn't represent all humans. And what are we doing as researchers to ensure that we minimize the bias. And you know, I won't even go down that trail about artificial intelligence and the bias that's buried in the data, just because of so many, blind spots and the way the data is acquired and the way team members do that work. But, I'm in this head space of the need for researchers to think more critically and do the harder thing. Do what's hard. We tend to like convenience, especially with the pressures of publishing or getting preliminary data to write grant proposals.

Those pressures can make you do what's convenient. Let's just recruit students on campus. Let's just go to Amazon Mechanical Turk. Let's just use this convenient sample to get our data. Because all of it is sort of proof of concept, right? Fundamental studies, fundamental science. Okay. Yeah, we had a, a thousand people, or we had 500 people and we've proved that this is how the algorithm works. Check, publish your paper, get your citation.

But we're going to pay for this at some point. We need to find a way to do the inconvenient thing. To reach the populations that are maybe not convenient to reach. I've done IRB applications, IRB stands for Institute Review Board applications, and there's a section that looks scary. Like when you say, "Who will you recruit?" And you always just want to say 18 and older, I just want adults.

There's other boxes that look scary if you check them. Because it seems like you're going to need to do more work. If you want to recruit pregnant people, people in prison, there's a constant list

of categories of people that are considered more vulnerable members of the population. Children, of course, it's sort of like, "Oh, glad I don't have to check that. I'm glad I could check 18 and older and just be done and get my IRB approved, so I could do my studies."

But if you want to get a broader representation, you might have to check those uncomfortable boxes and go through the extra stress and worry or whatever to get that data. Even when I was doing my PhD, I was very intentional. I collected a lot of data on campus, but I really wanted people off campus.

I got permission to set up a computer at a public library in a city next to Ann Arbor that had a little bit more diverse population. I called the BWI airport. I had a long layover say, "Hey, can I use, can I just try to recruit." This is, actually it was after 9-11. But I got permission from someone there. I didn't have a nice enough sign. I had a little sign that was: "Get $5 gift card for 15 minutes of your time." People didn't see it. But the person who approved it came and found me and did my study.

Anyhow, it took effort. A local mom and pop coffee shop. I sat there like I tried my best. Also, an elderly home, an assisted living home. I got permission to go over there and recruit some elderly individuals. If you think about that, that's a lot of effort. I mean, it, would've been easier to just stick with people on campus. But, doing all this stuff to try to get more representation takes a little effort. And that was sort of a microcosm version of what needs to happen at a larger scale for researchers in running research programs, on campuses, especially in the U.S.

So, when you talk about people and interacting with technologies, there's some that are ready for this because they are exposed and educated. But I'm trying to figure out who's getting people ready. Like, when a driverless Lyft shows up in front of someone's home and you're taking your grandma to an appointment and grandma's like, "Where's the driver?" Who's preparing her for driverless cars. I mean, there's a variety of things that are happening, technology wise, that there are entire populations that have no clue that this is even happening, like zero clue. And they're trying to mix this into the service sector. I just can't imagine. I mean, I'll see a driverless car show up and I'm like, "Yeah, I know what it is, but I'm not ready to get in there." At least I know what it is.

PART 3 OF 4 ENDS [01:15:04]

Tahira Reid (01:15:01):

I keep looking at the NYPD and the Digidog that they released to help them in The Bronx, Brooklyn, and Queens. I see the benefit, so as a researcher in Human-Machine Interaction in Autonomous Systems, yes, you want to help create devices that can collaborate with humans and help them accomplish some tasks. But was there a conversation had with the people in the community? To tell them, "Hey, by the way, we're going to be trying out this new Digidog that looks very dog-like." You don't have to be a rocket scientist, you can look at it and could tell it's a dog, at least for me, but maybe that's wrong. Maybe someone else would not. So, what are we doing to prepare and empower communities to have a say in this stuff? These are the kinds of things I think about. So, I'm sorry. I took a bias path, 'cause I've been thinking about this for the last month or so because of this piece I'm writing.

Joyce Bedi (01:16:09):

No, that's great. That's exactly what we want to hear your voice. So, I agree with you a hundred percent. So, I want to switch over a little bit now. It's kind of a continuation of what you've just been talking about, about your lab at Purdue, about what motivated you to create the REID Lab? What it is? How did the university help or hinder you? What are your goals? Give us an overview of what the REID Lab is, what it does, and what you hope it will do?

Tahira Reid (01:16:44):

Sure. So, the REID Lab, I love acronyms. So, I took my maiden name at the time I found an acronym Research in Engineering and Interdisciplinary Design Lab, which also spells Reid, and the focus is broadly speaking on any human-centered design or human-centered problem that matters that piques my interest. And if I have a pathway for getting it done, I'll go after it. Sometimes, that means getting a collaborator, and yeah. So... When you start as a professor, you get a startup package, so you have funding to cover the cost of students and get supplies and some of that. So, my original vision again was engineering and interdisciplinary design, and because of this design science degree that I got, where I got to really learn how to be interdisciplinary and think a lot more about the human. And then my postdoc allowed me to continue with that.

I learned how to use eye tracking as a tool for collecting data besides just self-reported information. And so, when I started my lab, I was like, okay, well, I'll continue building on that. I do want to have eye tracking data. And then I also want to have electroencephalography data which measures electrical signals that pass across the brain as you respond to visual stimuli or other stimuli. And so, all of this was motivated by design, I just want to get closer and closer to understanding what people are feeling, thinking or whatever about designs and that was my thinking at the time. However, there were others around me that saw a greater potential in the tools that I had for more like system development, people who are into controls and control theory.

When you think of a traditional feedback control loop, there is a place for sensors, and so these devices are a type of sensor that can help with any type of human in the loop studies, or anything that involves trying to collect real time data, human data that can maybe inform mathematic models. And so that's what my lab has branched into. I'm just now circling back to do big more about design process related work. I was on sabbatical last year, and part of the time I was with NASA as a visiting scholar and working with the cast team. I'm still actually a visiting scholar with them, but not in a full-time capacity, and they're using design process methods, qualitative methods to really get deeper understanding of users, stakeholders, beneficiaries, those types of people, and what that means for complex systems.

And that was a refreshing time because like I said, I've been doing a lot more with systems and so coming full circle on just real “traditional” design process thinking was refreshing. So, my lab, I'm there to think about human-centered problems, and also support graduate students and some of their ideas, and I leave room for what are some passions of students? What are they wanting to do? And how can the lab help support that passion? And it'd be mutually beneficial. So, the lab, yeah. So, we exist to address human centered problems. My university has actually been quite supportive of some of my ideas. I've had one of my favorite stories is about the hair project.

I remember while interviewing, I had mentioned that project 'cause I thought about it as a grad student, I was just like, "Hey, will you guys have a problem if I do something related to hair

because I've been thinking about blah, blah, blah" and they're like, "no" and so anyhow, that's been a fun project, that project has been a favorite because it's a radical intersection in diversity and engineering. Talking about curly hair, looking at thermal properties of curly hair because a lot of Black women were having trouble with something called heat damage, and we're using kitchen methods, kitchen science methods to figure out how do I prevent heat damage.

And I'm like, gosh, mechanical engineers, we've learned heat transfer. Can't we do something about this a little bit more systematic? Turns out, yes. There's things that you can do, but it is very detailed. We worked two years on it. We were funded by Procter & Gamble. And I just feel like we only touched the tip, I mean the tip of the iceberg, I mean a sliver of the tip of the iceberg. There's so much deeper things to explore and studies to conduct to really do it the way it needs to be done. So, they haven't been a hindrance. A favorite story I do have though, is someone telling me, "You should wait until after tenure to pursue this idea, there's day science and then there's night science, and this is more like night science. You should focus on your day science.

And so, I was like, but I couldn't, it was burning too much. That was like, "Oh, I feel this too deeply inside. I've got to try something." So, I had a master's student work on it and he generated some preliminary data that finally was ready to see 'cause it took three years actually to finally close the loop with them. Like, "Hey, I got an idea. I got an idea. I got an idea." And then that led to two years of funding. So, that's one of my favorite stories because it was a testament in your gut, how much you have to go for it, go pass what people might say, and I think it actually helped me get tenure. I think it helped because I got funding, we wrote papers. That was the second thing I did that got a lot of news and attention.

So, the two big times that I've been featured in the news and both of them, the Double Dutch and the hair projects, what they both have in common is engineering. I mean, hardcore mechanical engineer, I should say there's a lot of mechanical engineering. It intersects experiences of Black women in it right – hair, Double Dutch, curly hair, heat damage, this is something that Black women talk about. Although this problem I learned happens to non-black women with curly hair too 'cause I've heard this. I met people that said, "Oh yeah, I noticed my curls are not the same after I flat iron it too much." So, this is a thing across all people groups but it's a bigger thing for Black women because it's like, I'm going to have to cut that hair and I don't want to do that. So anyhow, yes. I'm going to pause. I feel like I'm rambling.

Joyce Bedi (01:24:08):

Well, it's a nice place to transition to, and one of the last things I want to ask you about is I like to hear more about your advocacy role in black and engineering.

Tahira Reid (01:24:23):

Yes. So Black in Engineering that started sometime after, so a couple of things were happening last year. The George Floyd thing happened the same day as the Amy Cooper situation in Central Park, and they were just like, okay. And then there was the ivory, there was a hashtag about the Ivory Tower complaints from Black academics. But we noticed that it was mostly non-engineering Black academics that were sharing their experiences, and so myself and two other faculty members, Black women faculty members got together and was just like, "We need to gather folks. We need to talk. We need to process. We need to do something for Black engineers" because I think when George Floyd and that happened, Black people in America were

reminded of all the ways in their sphere of their sector of society, the ways in which they were they're suffocated.

Right? So, in his world, unfortunately, low-income low-whatever he was in a space, unfortunately that caused him to encounter police. But academics like us, we have other ways that we might encounter things that are oppressive, but not in that exact way. So we gathered in about 70, 60 or 70 Black faculty around the nation from all variety of universities, got on a zoom call, and then we just started to organize and talk about what can we do to have a voice, and some of the things that are happening in academia, that's where we have authority and influence more than…We're not lawyers. We can't go out and go write new laws to change what's happening, but we can influence academia. And so, we did the video as a statement that was our first media thing. And then we put together the call-to-action document on how to have an anti-racist university. And, and that is a very comprehensive document. It started with two faculty members, that framed it out and then several just kept adding and making edits. So, we have that final piece.

I think it's a great step, it's been getting good attention. We've been able to share it with deans at universities. There are people who have used the document to help rewrite some of their diversity plans and visions for their departments. There are faculty that are doing diversity talks, they're using, we have a set of slides. They are using that to give these talks, so I think it's raising a lot of awareness at a time that people were ready to hear, which a lot of us recognized, like it was tangible last year. People's readiness to pause and be like, "Okay, I need to hear and listen to what's really happening." And so, we not capitalized, but we took advantage of that to say, "Okay, by the way, here's some other things that are happening that maybe go overlooked in academia." So, yeah, we actually just had a meeting last night. We had a partners meeting, a meeting for those that want to be allies and advocates and other partners that want to work with us.

Joyce Bedi (01:28:08):

I've watched several of the videos and I've found them very powerful because they're so quiet. They have such strength to really- [No Audio 01:28:18]

Tahira Reid (01:28:23):

What is next? Speaking, going back to that topic of trying to increase diverse representation in human machine type work. I'm really curious about that space and seeing how I could explore research projects that allow some more intentional data collection in such a way that we could conduct studies that have a broad enough, or address a set of research questions and then be able to share the data with researchers who could use it, right? Not everyone- for some of the things that I'm envisioning as some of the strategies that I'm envisioning, hopefully NSF will get the vision.

Hopefully I write it in such a way that NSF will get the vision, but how getting data from diverse. I mean, just really getting radical with representation, like who don't we have in the data and how do we get them? And what does that mean? And how do we get to it obviously in a dignified, respectful way. And then can that data be available for researchers to use in their studies? So that they can finally maybe cross check some things with their algorithms or, I mean, it would have to be done in such a way that it would be useful because not everything depending on what the research question is and what the experiments are, blah, blah, blah. It may not be

generalizable or useful, but if it's written right and have the right members of the team, there might be a way to say, " Okay, here are a couple of big rocks that we want to address that would be useful to this field and that field, for example.

So that's literal next, the types of things that I'm thinking about, and I did learn about some licensing, like Stephen Key and some of his work, and I've been saying, I need to make it a point to really look at what he's talking about and revisit this jump rope device 'cause I do get email and someone even tweeted me asking about it. And I'm just like, "Okay, how many others would want this, right?" It's 2021. And I mean, I got an email earlier this year, "Hey, I just came across this thing." And so I feel like I owe it to my grandmother and almost like, I feel like I really owe it to myself to just try to, now that I'm not this young sophomore, I'm not the shy girl anymore to try to revisit it and see if I could close the loop on this story. So.

Joyce Bedi (01:31:10):

So, what advice would you give to the young Tahira's out there? The young women who are inventing today?

Tahira Reid (01:31:19):

Oh, yeah. I will say to the young women out there that are inventing... I can't remember which one said it, is it Helen Keller? But I feel like there's a quote, "Even if you feel afraid, do it afraid." You're going to doubt yourself. There will be others that will doubt you. You will doubt yourself but do it anyway. There's this little saying that Jamaican people say, " Nothing beats a try, but a failure." I don't know if it's a Jamaican thing, but I've heard that said by people in my family all the time, nothing beats a try, but a failure. Fail fast, fail early. We know about that.

But... If you feel it, go for it. Just try, don't give up. Don't let anyone talk you out of what you're thinking. I was fortunate to have a Burt Swersey to encourage me. I don't know what I would've done if I didn't have a Burt Swersey. So, some of you may not have one, but maybe borrow me as a voice that says, "You need to do it. You need to push this idea on your team. You need to go for it, give it a try." And if you fail, try again, try again and just keep trying again. And yeah. And your ideas matter. They really matter. You just never know. I know we did not know this Double Dutch poster would be what it is. I mean, I'm on this program because of a poster I drew in third grade. So, don't underestimate your ideas and chase them.

Joyce Bedi (01:33:02):

That's wonderful. That's the end of my formal questions. I'm going to ask Alison, if she has any that she would like to ask you at this point?

Alison Oswald (01:33:15):

No, Joyce I'm good. That was great. I mean, a lot of my questions obviously were incorporated into... The larger group. So, yeah.

Joyce Bedi (01:33:24):

Wonderful. I do have, it's not kind of an oral history question. It's we're going to make a video question. Ye-

Tahira Reid (01:33:34):

[inaudible 01:33:34] Do I look at the camera to answer that? Or... [Inaudible 01:33:42].

Jake Klim (01:33:43):

Yes.

Tahira Reid (01:33:45):

You said yes?

Jake Klim (01:33:45):

Yes.

Joyce Bedi (01:33:49):

It would be really helpful. You've mentioned the prototypes, the drawings, the notebooks, things like that. Photographs, if you have materials like that, that you'd be willing to share with us to use in the video that we're going to edit from this interview, and that will go on our channel, that would be really helpful to Jake and Peter in producing the final edited video, which will be roughly five minutes.

Tahira Reid (01:34:17):

Sure. Yes. I was able to add some things and send it.

Joyce Bedi (01:34:25):

That'd be great.

Jake Klim (01:34:28):

Can we do one thing while we have you, and we may not use this, but it's just good for us to have it anyway? Would you mind just looking at the camera and introduce yourself? Hi, my name is, and then kind of give us just your 5 to 10 seconds, sort of, well, I don't know what you might want her to say Joyce, but just I'm the inventor or I don't know, just basically my name is, and kind of your title, I guess.

Tahira Reid (01:34:57):

Sure. [crosstalk 01:34:58] I didn't hear that last part.

Jake Klim (01:35:06):

If you don't mind just giving it to us, two or three different times, just so we have options. 'Cause it's usually one of those things that's at the very beginning of the video. So if we end up going that route.

Tahira Reid (01:35:18):

Sure. So, should my title be, I'm the inventor of automatic double Dutch device or...

Jake Klim (01:35:18):

Yeah, if that works for you, Joyce.

Joyce Bedi (01:35:38):

That's fine. [crosstalk 01:35:38]

Jake Klim (01:35:38):

That's really it. Just your name and I'm the inventor of the Automatic Double Dutch Device and just kind of keep looking at the camera and just do that three times for us. That's all.

Tahira Reid (01:35:42):

Okay. Alright. Hi, my name is Tahira Reid Smith, and I am the inventor of the automatic double Dutch device. [inaudible 00:20:57]

Hi, my name is Tahira Reid Smith, and I'm the inventor of the automatic double Dutch device.

Hi, my name is Tahira Reid Smith, and I'm the inventor of the automatic double Dutch device.

Joyce Bedi (01:36:16):

And if I could ask her just one version, where you don't say hi, and instead of device, you say, "The Double Dutch rope turning machine" or something like that. So, people will really understand what we're talking about right away.

Tahira Reid (01:36:33):

Okay. Should I mention big- okay. Because it's the oral history and the topic is the jump rope device, focus on that. Don't necessarily say, and I'm also a professor.

Joyce Bedi (01:36:45):

I think it's fine if you say you're also a professor at Purdue.

Tahira Reid (01:36:48):

Okay.

Joyce Bedi (01:36:49):

Then it's not just about, we're focusing on the invention story 'cause that's what we do. But we've asked you about your childhood, your academic route. We were trying to capture as much of your life as possible, so anything that you think is important for identifying yourself.

Tahira Reid (01:37:07):

Sure. Okay. My name is Tahira Reid Smith, and I am the inventor of the automatic double Dutch jump rope turning machine. I'm also an associate professor in the School of Mechanical Engineering at Purdue University.

Jake Klim (01:37:24):
That was great.

Joyce Bedi (01:37:25):
Yeah, I think that's perfect.

Jake Klim (01:37:27):
Oh, boilermakers.

Tahira Reid (01:37:29):
Okay. I guess I could say “go boilmakers” Keep it neutral for the intro.

Jake Klim (01:37:37):
I'm good if you're good, Joyce. That was really nice.

Joyce Bedi (01:37:40):
I'm good too.

Jake Klim (01:37:42):
Anything on your end? Room tone?

Peter Silverman (01:37:48):
I'm also good.

Jake Klim (01:37:49):
Okay. Great. Alright, I'm going to stop my recording. Anything- I'm going to stop my recording now, is that okay everybody? And so, I guess **Joyce** you'll stop your recording.

PART 4 OF 4 ENDS [01:38:03]