Season 2 –Episode 8 –Dr. Alex Mihailidis

Transcript

CHRISTIAN COTÉ:
Welcome to behind the breakthrough, the podcast, allabout groundbreaking medical research and the people behind it at Toronto's University Health Network, Canada's largest research and teaching hospital. I'm your host, Christian Coté.

Joining us on the podcast today, Dr. Alex Mihailidis, award winning scientistat UHN's Toronto Rehabilitation Institute research group called kite, which stands for knowledge, innovation talent everywhere. Dr. Mihailidis is a pioneering inventor of technology and devices designed to help us live longer and safely at home. Dr. Mihailidis, welcome to behind the breakthrough.

DR. ALEX MIHAILIDIS:

Great. Thank you very much for having me.

CHRISTIAN COTÉ:
Let's start, Alex, with the idea of living at home as long as we can. It's really one of the core mantras that drives research, at Toronto Rehab's kite group. What's the strategy or rationale behind thatthinking?

DR. ALEX MIHAILIDIS:

The rationale behind trying to keep older people in ourhomes is really the same rationale for any of us. We all want to remain in our own homes and communities for as long as possible. We want to stay connected to our family and friends as long as possible. And you know, I'd never heard anyone say you know, my goal is really to end up in a nursing home or a long-term care facility. So, we want to do anything we can to avoid that at all costs right now.

CHRISTIAN COTÉ:

So obviously, though, when we suffer an injury or as we certainly enter the aging process, those things get in the way and make it sometimes unsafe for us to be at home. So, your research has been all aboutharnessing existing and emerging technology to design a smart home. What's that?

DR. ALEX MIHAILIDIS:

Yeah, so a smart home is essentially what it sounds like. It's a house that has the intelligence built into it, using things like artificial intelligence and sensors that can basically understand your needs, your wants, your abilities, your disabilities and react appropriately,whether that is providing assistance during a common self-care activity or helping to take care of you by looking at your vital signs or other information about your health.

CHRISTIAN COTÉ:

let's go back to your early days. When you first joined Toronto rehab, Alex, in the late 2000s, one of your first initiatives were prompts to help people with dementia do daily tasks in the home. Talk tous about what you came up with?

DR. ALEX MIHAILIDIS:

yeah. So, the idea there was looking at how to keep people with dementia in their own home safely and independently. And, and what we realized is a big issue was that these individuals were unableto complete even the most basic activities of daily living things such as getting dressed on their own or hygiene tasks or preparing even a simple meal. And, and what we discovered was the solution to that back then andstill very much now, is having a caregiver or a family member really remain with the person for as long as possible and give them these reminders.

And obviously, we can all imagine you know, being in the washroom or something and and having someone there with us telling us what to do and how embarrassing and difficult that could be. So what we did back then was applied this concept of smart homes that using sensors in a variety of places, such as the washroom or the kitchen, the system itselfcan understand what the person was trying to do, whether they're washing their hands or brushing their teeth, and then give them the prompts automatically to them, very much the way a caregiver would.

CHRISTIAN COTÉ:

maybe, before we go further with this device, do you mind painting a picture for us, for the audience of the Toronto rehab researchfacility where a lot of this work takes place, the the home lab? Could youwalk us through what it looks like and what goes on there?

DR. ALEX MIHAILIDIS:

yeah, so Toronto rehab has a very unique facility calledhome lab. And again, it's basically what it sounds like. It is a home within the hospital itself. So, it replicates a one-bedroom apartment and it has all the furniture in there. All the appliances are typically you would have and we purposely built it so that it actually looks like a real apartment. So, it's not accessible. It's not easy to maneuver in, the washroom is a very tight space. And the reason we do that again is to simulate as much as possible what a real-life environment for an older person may be. In order for us to develop our technologies in that same type of setting.

CHRISTIAN COTÉ:

okay, so fast forward 10, 12 years since those early devices to help prompt dementia patients. What has this evolved into in your homelab research?

DR. ALEX MIHAILIDIS:

it really has evolved into us embracing more things such as artificial intelligence and machine learning. And in some of these really new concepts are coming out of fields such as computer science andengineering and elsewhere. That's allowing us to add more sophistication to the technologies we've developed. So. Instead of just sensing that something has happened to someone, maybe they fall in or they become sickand providing assistance. Our technologies now can be more proactive. We're working on things such as predicting these things before they actually happen so that we can put in the proper interventions and avoid injury and further illness if possible.

CHRISTIAN COTÉ:

so, I'm guessing this is where ed the robot comes in?

DR. ALEX MIHAILIDIS:

yeah. So, robots is kind of a passion of mine over the pastfive years, especially in elder care. And five, seven years ago, you know, robots would still have been one of those science fiction solutions to caring for older people because they are so costly. And really there are a lot of unknowns in terms of robots themselves. But that's really changed.And today, you know, robots that would have cost one hundred thousand dollars five years ago is now only in the thousands. And i expect soon this will just be in the hundreds as well.

So, we've done a lot of work where we've built our own robot. So, you've mentioned ed is our first robot that we built. That we use to again provideprompts and support to older people during very common activities in the home. And that was a really exciting trial that we conducted that really has pushed us further to see what else we can do with robots to support older people.

CHRISTIAN COTÉ:

you mentioned that it could be proactive and anticipate apatient or a person's behavior or actions in the home. Can you give us an example?

DR. ALEX MIHAILIDIS:

yes. So, for example, you know, we've developed systems that can predict whether an older person may develop cognitive impairment, such as dementia, just based on observing them in their own home in terms of what they're doing, how they're walking or changes in their walking speed. Which rooms are they spending more time or less timein?

And based on those patterns and the system, whether it's the home or the robot or some other type of device, can then provide some type of intervention and maybe just alert the caregiver, the family members, thatyou know, something is changing with this person. You may want to go see the family doctor and and talk to them to see what may be happening. So,

So we're not diagnosing anything with our technologies. What we're just trying to do is trying to predict things that may happen and raise alerts early enough.

CHRISTIAN COTÉ:

and i'm curious, how does that alert get elicited from ed the robot? How do you get that observation out of them?

DR. ALEX MIHAILIDIS:

it may be something just as simple as in a text message being sent to the caregivers within a link to a data set that kind of shows the information behind the prediction that's being made by, again, the robot or the home or, or any interface that we want to use with that particular person. So, we try to keep the information flow as simple as possible. I think all of us are inundated these days with text messages and and zoom calls and this and that, that we we don't want to add to the burden of the family caregivers already. So, we really try to keep that information flow as simple as possible and basically cater to what they want to see and what they want to understand.

CHRISTIAN COTÉ:

how does this robot interact with the patient in terms of helping them with, say, everyday tasks?

DR. ALEX MIHAILIDIS:

ed the robot itself was very, very simple. You know, it is basically just a screen, a video screen on top of a body that was able to move around and and using a video screen, it would either give verbal prompts to the older person or maybe play a video for them on how to complete something, whether it's how to turn on the tea kettle or how to turn on the water tap, etc. And that would all be really adapted to the person themselves. Right. And that's where the power of artificial intelligence comes into play, is being able to customize the interventions and the approaches that these technologies take.

CHRISTIAN COTÉ:

so, when you say it helps them, say, with turning on a kettle or turning on a tap, it's because the robot has sensed the person is confused about that particular action?

DR. ALEX MIHAILIDIS:

exactly, yes. Or the person you know, is doing something the wrong order, for example. And so, it really just tries to correct them and keep them on the right path to complete that activity.

CHRISTIAN COTÉ:

i see. What does ed look like?

DR. ALEX MIHAILIDIS:
ed as i said, it's quite simple. It's it's essentially a white body with a head, so to speak, on

top. But the head is just a video screen andthat's all. We're getting to more sophisticated robots now that we're buying off the shelf that actually look more, quote unquote, human with arms and fingers that can point and eyes that light up and do expressions,Et cetera. So, we're trying to see whether these more sophisticatedlooking robots are required with this population.

CHRISTIAN COTÉ:

and I'm just wondering, given dementia patients sufferconfusion, et cetera, and changes to routine upset them, what's the response from patients?

DR. ALEX MIHAILIDIS:

this is something that when i started doing this work a long, long, time ago, we thought it was going to be a complete disaster. Youknow, we're thinking to ourselves know we have a person with dementia who may obviously be quite confused, may have other issues around delusions, et cetera. And all of a sudden now we have voices coming out of the walls and from computers telling them what to do. But surprisingly, it wasn't a disaster. They actually responded quite positively to the voicesand it all depended on the person as well in terms of how we presented it.

So, some people thought it was just someone in another room you know, calling in or yelling in instructions to them, which we're all used to having done to us. Some people thought it was someone on the radio that was providing you know, support and assistance to them. And then others you know, in our trials, for example, with ed the robot knew that it was a robot and was actually quite intrigued that this robot was providing assistance to them. So overall, it's been very positive, positive enough thatit's been keeping us going for all these years in this area.

CHRISTIAN COTÉ:

It sounds like there's the potential here for a relationshipor a bond to be formed between the patient and ed.

DR. ALEX MIHAILIDIS:

yes, absolutely. That's something that we studied as well. So, it's not just about the technology. We want to understand exactly what you said. You know, this whole notion of human robot interaction, how accepting what the older person be to the robot and what we found, again, was very positive results that many of our, of our participants in our trials you know, would start to personalize the robots and would give the robot a name or would say you could really usea hat or a scarf. You know that personalization is a very positive finding in the area of human robot interaction.

CHRISTIAN COTÉ:

and given this is a smart device, can it learn more about thepatient based on their behaviors and become more and more smart about the person they're helping to care for and be proactive for?

DR. ALEX MIHAILIDIS:

yeah, exactly. And that's a big goal of our research areain artificial intelligence is using a variety of techniques from artificial intelligence and machine learning. And more recently, deep learning, which is the big hot area in a.i. that's happening around the world to make our devices to be able to learn in real time so that they can learn aboutthe person and adapt accordingly and again, not replace the family caregiver, but simulate the way a family caregiver would interact with the individual.

CHRISTIAN COTÉ:

and what do you see as the potential, i don't know, fiveyears down the line for something like ed?

DR. ALEX MIHAILIDIS:

yeah, I see great potential for technologies like robotsand smart homes and others to support older people. You know, these devices are getting smarter as research and artificial intelligence continues to move along. As these technologies get cheaper and more affordable is making them a greater possibility. And also, as they become more attainable by the general population. We work with partners like best buy and other you know, kind of consumer shops that want to sell these devices as consumer electronics, as opposed to them becoming medical devices and having to go through all the various hoops that you typically would have to do in that case.

CHRISTIAN COTÉ:

so, what's the measure for success when you're doing yourresearch with the say ed the robot?

DR. ALEX MIHAILIDIS:

Our number one measure is the person themselves, right? Are they able to perform activities on their own? Are they able to regain their privacy and their dignity? And are they accepting of these technologies as well? And and that's one thing we can't really trick ourselves into thinking, is that you know, this is going to be the the one and only solution. These technologies will work with some people, but they're not going to work with others. And that's something we really need to understand and that we do keep in mind as we move forward in ourresearch.
CHRISTIAN COTÉ:

Absolutely. What's the input or reaction or both ofcaregivers to ed?

DR. ALEX MIHAILIDIS:

so, we find family caregivers to be really excited by thistechnology. And from robotics to the smart homes, they see the great potential and using them as a tool, right. So, again, not replacing them as the caregiver, but allowing them to do other things in their lives that they may not have been able to do before, because now the technology is inuse and caregivers, family caregivers are getting younger and younger andyou know, they're far more tech savvy than they ever have been before. So, family caregivers have an expectation that technology is going to be part of the way that they provide care to their loved ones or to their spouses

Or whoever it may be. And so, i do see this acceptance increasing as wecontinue to move forward.

CHRISTIAN COTÉ:

amazing. Okay, let's move into some of the other devices, you've created an in-home lab to again towards the goal of helping us alllive at home longer, talk to us about the fall detection device that againgoes back to those early days when you first came to Toronto Rehab.

DR. ALEX MIHAILIDIS:

so, we've been working on fall detection for quite a while and we've developed various prototypes and devices. Now, one of theprimary ones that we developed was a unit that would essentially be installed on your ceiling like a smoke detector would be or another device. And this system had everything contained and it had the sensor, with a camera at that point. It had the computer required and all the communication hardware as well to send out messages. And what it woulddo is it would detect the fall and then at that point would actually havea conversation with the person.

So, we were using speech recognition and dialogue management approacheswhere the system would ask a series of yes and no questions. And based on the responses to those questions or or lack of response, because maybe theperson was unconscious or something, the system at that point would make a decision as to who to call. And that may be anything from shutting itself off because the person was okay to calling a neighbor, calling a family member or going right through to emergency services if needed.

CHRISTIAN COTÉ:

so how is this a better mousetrap, say, to what we seedominating the market right now in terms of fall devices?

DR. ALEX MIHAILIDIS:

The current solution is dependent. Right. And i think we've all seen those commercials, you know, help I've fallen and i can't getup. And the person is required to manually push the button on a device that they're wearing and whether they're wearing it as a necklace or a bracelet, you know, it's all kind of the same technology. The problem withthat is you know, the fact that people don't wear the devices. If you look in the literature, if you talk to the companies that make them, the numbers are quite consistent. That you know, 70 to 80 percent of these customers don't wear the pendant. And if you're not wearing the pendant, then obviously it's useless.

When we talk to older people, we say, well, why don't you wear it? The answers are very much what we would expect and what probably anyonewould say is, well, it's the stigma. I don't want my friends and family to think that there's something wrong with me because i have to wear this device. I don't want to push the device because i know that's probably a

One- way ticket from my home into long term care. And so, it really comes down to a usability issue. And so, our goal was to get rid of that button altogether. You don't have to wear anything to do anything special. The device is built into the home and it's proactively ensuring that you're safe.

CHRISTIAN COTÉ:

And today, where is that falls device at?

DR. ALEX MIHAILIDIS:
We kind of took a step back with the fall detection andrealize, well, it's great if we can detect a fall, but the holy grail is preventing the fall from happening. So, we've been doing quite a bit of work, myself and other scientists on our team at Toronto Rehab around, trying to predict falls before they actually happen. And so, if we can predict that someone has become a greater risk of falling again, we can put interventions in place that hopefully will prevent that fall from occurring down the road.

CHRISTIAN COTÉ:

got it. Okay, some of these other devices that are more recent are absolutely fascinating. Talk to us, Alex, about you've createdbathroom flooring that monitors blood pressure?

DR. ALEX MIHAILIDIS:

so, this has been a project for the past about five years now, was started by one of my PhD students in collaboration with severalclinicians at not just Toronto Rehab, but UHN in general. The idea again here was, well, how do we have older people monitor their physiological data and send this to their doctors in a way that is usable? And again, this started from a usability problem. Where you know, working with the cardiac clinics at the hospital where people were required to monitor things such as their weight or their blood pressure, their heart rate, and send this information to the clinic. We found a majority of them were not doing it.

And again, when we talk to the older individuals and say, well, why are you not doing this? We got very common answers again that we'd all expect. I can't figure out how to put the blood pressure cuff on my arm. I can't see the buttons i need to push and other things like that. So, again, similar to the fall detection, we said, well, again, let's take that out of the hands of the person and make the house proactively collect this information. So, our first prototype was a floor tile where the person wewould stand on the floor tile, we would get their heart rate and blood pressure from them automatically.

And the idea there was then to take those types of sensors and the software that we built and applied to other common things within the home, the sofa, chairs, handrails, objects that the person may be interacting with and so that's currently where we're now expanding into

Is how do we take the results, which were very positive from my ph.d.students work and and move forward to expand it across different aspects of the home.

CHRISTIAN COTÉ:

and how do these devices for measuring and monitoringblood pressure measure up to cuffs?

DR. ALEX MIHAILIDIS:

you know looking at how we get the blood pressure andit actually goes back to a very, very old and simple concept called bcg or ballistocardiogram. And you know, this is a concept that was published in papers in the early 1900s. And all bcg is, is basically you know, as your heart pumps blood out with a certain force, you know, according to newton's laws, there is an equal and opposite force. And so, by measuring that equal and opposite force we're able then to take that obviously applied various types of signal processing to it and from the get the blood pressure as well. It's a relatively simple concept. It's complex to implement. But that's what the main goal of my PhD student was. And i said we are quite successful doing that.

CHRISTIAN COTÉ:

what I find interesting from the stories you're telling us isthat in many respects the patient plays a quite a large role in almost inspiring what you guys think up or try to come up with.

DR. ALEX MIHAILIDIS:

yeah, absolutely. Everything we do is driven by by the patients and the individuals themselves or or the clinicians themselves. So, we really try to take the approach of listening to people, whether they're at Toronto Rehab or UHN or in the community, and then understanding the problems and the difficulties they're having and thenusing that to develop projects.

CHRISTIAN COTÉ:

all right. Another device that you guys are working on inthe lab, a sensor over the stove to warn us when a pot has boiled. I coulduse that.

DR. ALEX MIHAILIDIS:

yeah. So, this is a device that was developed in collaboration with some industrial partners and other researchers that really, again, wanted to help use technology to figure out a very common issue. And as you said, we all leave the stove on. Unfortunately, it is a big issue with people with dementia or older people with some cognitive impairment trying to live at home. And it does result in fires and in perhapssome severe injury happening to the individual. And so, this is just a very simple device that can monitor whether the stove is still on.

And then it just turns it off automatically and and sends a message again either to the person, to the older person themselves or to the caregiver.

CHRISTIAN COTÉ:

another one pressure sensitive mat's that could say go under your mattress to monitor our health during sleep or detect if, I'm unstable when getting up?

DR. ALEX MIHAILIDIS:

yeah. So, you know, again, this is one of the things that we discover that using very simple sensors and very simple info, we can learn a lot about a person's health. And for example, working with researchers at Toronto Rehab, that does work around sleep apnea. You cansee a person's breathing pattern from these relatively simple pressure mats. And from the breathing patterns and the breathing noises. Perhaps you can detect or predict if someone is going to develop sleep apnea. We also use these pressure mats to look at quality of sleep as well of, say, residents in a long-term care facility.

And our hypothesis is, if a person has a poor night's sleep, that may lead to more episodes of agitation and aggression in that individual. And we all have heard in the media issues of patient on patient violence or patient oncaregiver or staff violence that sometimes results in death and quite severe injury.

CHRISTIAN COTÉ:

this is in long term care homes?

DR. ALEX MIHAILIDIS:

yes, exactly in long term care. So, if we can predict if aperson is going to be agitated or develop aggressive behaviors and again alert the staff before it happens again, hopefully we can reduce the possibility for injury and possible death.

CHRISTIAN COTÉ:

although I shouldn't just confine it to long term care, because there is potentially if there's a caregiver at home, this could alsobenefit them.

DR. ALEX MIHAILIDIS:

oh, exactly. So, you know, while we started in the long- term care facilities and Toronto rehab and UHN to develop these concepts,the ultimate goal is, again, within the home, in the community.

CHRISTIAN COTÉ:

at some point i know you want these devices to be on the market and i understand you want to be say at a best buy, like in the consumer market, as opposed to, say, prescriptive through the you know, the health system where these would be medical devices. Talk to us aboutthe challenge, though, of navigating that world, of getting these devicesapproved once they're ready.

DR. ALEX MIHAILIDIS:

this has been a huge challenge and we've done a lot ofwork with health canada and the FDA in the united states to understandthe processes that are required to get approval.

However, you know, the big issue that we have and this is really no fault of anyone is is these are brand-new technologies, and brand-new applications that we're talking about, that health canada, for example, has never seen before. So, they really don't know how to classify them. You know, are these devices in the same class as implantable pacemakers? Well, the answer clearly is no. But no one really understands that because there's not been enough research,enough data collected on these technologies to understand the potential outcomes, whether positive or negative.

So, we've done a lot of work with health Canada to help understand and to develop actually a new class of technology that some of these devicesmay fall into. But as you said, you know, ultimately, many of these devices are consumer products. Does a robot that provides prompts to a person while they make a cup of tea? Should it be classified as a medical device?
And my opinion is, no, I'm not saying that everything should just be purchased at best buy or home depot or ordered online that a caregiver can install themselves. But i would say a large majority of the new technologies being developed in the care of older people can go throughthat consumer channel.

CHRISTIAN COTÉ:

Talk to us about you know, where does Toronto or Canada fit into this field as a hub?

DR. ALEX MIHAILIDIS:

Five, 10 years ago, Canada didn't really have much of a place. We were really lacking in terms of technologies, research, industry and ultimately funding. However, this has been changing, and a big reason this is changing is because the federal government about six years ago funded something called age well. Age well is a network of centre of excellence. It's across canada it includes 42 universities, over a thousand researchers and students, and about 350 industry partners that are all working together to develop and commercialize new technological solutions for older people.

And the great news for us is the hub is here at Toronto rehab. It is based out of the hospital where our management offices and really the goal isto ensure that Canada is not just among the leaders in age tech in the world but is the leader. And I think we are moving towards that steadilyright now.

CHRISTIAN COTÉ:

I want to touch briefly on the covid pandemic, Alex, and how that intersects with your work. You've written in part that the pandemic has brought into sharper focus not only the underfunding and lack of accountability in long term care and how we care for our elderly population. But it also emphasizes how vital the research and innovation you're helping to pioneer. How so?

DR. ALEX MIHAILIDIS:

COVID really has shone a very, very bright spotlight onmany of the issues we have in the care of older people. And in particular, we hear obviously about long-term care. We hear of problems around social isolation. We hear issues around the safety of the caregivers and the care staff in facilities or in the community to provide proper care to older people because of COVID. And this is where technology can really play a great role. We have shown through research in age well in our research at Toronto Rehab that technology can help to connect older people to their families, to their friends, to their community. We're not seeing technology being used, though, in that way during this pandemic.

And instead we see these awful images of people standing on other sides ofwindows trying to communicate and and connect with their loved ones who may be in a care facility where, again, technology can play a significant role. Things like robotics and other types of technologies can help with the safety of the care staff to do some of the activities, whether it's sterilisation of the environment to delivering medication to the person can really play a significant role. And and again, there are examples. These robots are not science fiction. They exist. They exist in hospitals around Toronto. And so you know, what age well in particular isreally trying to do is really to advocate with all levels of government and really anyone who'd listen to us at this point, that technology must be a part of the solution moving forward in COVID.

CHRISTIAN COTÉ:

What's the story you tell people when you go out into thecommunity to seek funding for your work to help compel them or inspire them that they need to invest in your research?

DR. ALEX MIHAILIDIS:

the story I tell basically is really asking them to tell me a story. And it's amazing that once you start digging into someone's lifethat everyone has someone, they're taking care of. Everyone is a caregiver in some way, whether it's your you know your aging parents or your spouseor yourself. And everyone is starting to face the issues that we talked about, whether it's cognitive impairment, physical disability or whatever it may be. And once they understand that and they understand the burdenthat is placed on themselves in doing these things, you know to sell the technology is not that hard to make.

And then showing them, obviously, examples of some of these technologiesand really gets them excited. Now, whether that translates into funding or not is a different story, right? It's still a challenge to to convince the funders that this should be a priority area and that should be funded at the levels that are required not only to develop the technologies, but to move them forward, commercialize them, support Canadian based startupsin this area, and then keep those companies here.

CHRISTIAN COTÉ:

you're listening to behind the breakthrough the podcastall about groundbreaking medical research and the people behind it at Toronto's University Health Network, Canada's largest research and teaching hospital. I'm your host, Christian Coté.

And today we're speaking with dr. Alex Mihailidis, award winning scientistat UHN's Toronto's rehabilitation institute research group and a pioneering inventor of technology and devices designed to help us live longer and safely at home. His work is supported in part by the Toronto rehabilitation institute foundation.

Now Alex, you're Toronto born and raised. You've spent a number of post-secondary years studying engineering with the dream of going into aerospace. And yet after graduating, it just took a couple of months andyou reached the conclusion that this wasn't for you or the opportunityjust wasn't there. Talk to us about that?

DR. ALEX MIHAILIDIS:

yes. As you mentioned, i was trained to do aerospace and I did several of my internships in the aerospace industry, in fact, working on things like the Canada arm and the international space station. Unfortunately, when i graduated, those aerospace kind of left Canada and there just weren't any jobs. So, i ended up working for an automotive company. And four months of that was enough for me to realize that i wanted to apply my engineering skills in something else. And at that point really thinking it'd be really great to also be able to work with people.

Which we typically sometimes don't do in an engineering position. And so, I really wanted to look for a field where I could apply my engineering skills, advance my interests in things such as artificial intelligence and robotics, but also be able to help and work with people at the same time. And that's where I landed in the area of biomedical engineering and specifically rehabilitation engineering. And that's where i met my supervisor, Dr. Geoff Fernie, who was doing a lot of work in the area of technology for older people. More on the physical side. And that's where istarted to do my graduate work on these types of technologies.

CHRISTIAN COTÉ:

and like you, he's another trailblazer in the field. I'mcurious, though, how did Dr. Fernie convince you to join the medical research cause?

DR. ALEX MIHAILIDIS:

it wasn't really Geoff who convinced me it was actuallya chance meeting with another engineer. So, myself and Geoff met this individual and we learned he was an engineer. But more importantly, as welearned that he was a caregiver for his wife, who had very early onset Alzheimer's. She was in her early 50s and was really moderate to severe in

Terms of her cognitive impairment. And and this gentleman was telling us about all the challenges he had of taking care of her and and how he hadto stay in the bathroom with her, a reminder to you know, pull her pants down or to use the toilet paper.

And and just the fact that you know, how difficult and embarrassing it was for both of them and how this just led to further agitation for her. And, you know, in passing during this conversation, he said to us, well, youknow wouldn't it be great if computers could just do all this for us? And that idea kind of stuck with me. And I approached Geoff and said, I really think your research on wheelchairs and walkers and other physical devices is fantastic. But i want to build a system, a computer that can prompt people with dementia, just like the gentleman we met suggested. And again, Geoff being very open minded in this area said, yeah, let's go forit. And that's what i started doing for my graduate work and has led to the program of research i lead now.

CHRISTIAN COTÉ:

Wow. You now, you know, you lead the largest age tech research in Canada. How do you go about inspiring the people who workfor you to bring their a game every day?

DR. ALEX MIHAILIDIS:

it comes back to the people we're developing these technologies for. It, really, you know, them understanding the problems and the issues that we are trying to solve. Again, many students and researchers come to me already with their own personal stories of their parents that they're looking after or whatever it may be. And so, they already have a personal motivation. And so, with those individuals, it's nothard to keep them going. With others who may not have that personal story, we make sure they get to experience the problems that older peopleare going through. And this may be by having them volunteer in the long term care home and actually going through the process of providing care and support to an older person there or ensuring that they're talking to as many older people and caregivers as possible so that they can hear their stories as well. And what we find is when they hear and they understand these stories, that's what motivates them to keep going.

CHRISTIAN COTÉ:

now, you're around mid career, Alex. You're leading a bigteam. I'm curious how you've distilled all that you've learned when youapproach mentorship.

DR. ALEX MIHAILIDIS:

mm-hmm. Yeah so, that's a great question. And it's different with every person. Right. But, you know, it's really trying toprovide enough resource and support to an individual that their creativity can come out as well and that their ideas can come to the forefront. And it's not just about me pushing things down to them and

Telling them what to do. Every student you know, i ask them, what do you want to get out of this project? What do you want to get out of this area? What are your ideas? And we try to go forward with that. And and for themost part, that really has worked, at least for me personally.

And hopefully the people i mentor would say the same thing in terms of inspiring them and how we go forward. And people kind of ask me, well, what's my measure of success that I mentored someone appropriately? Andmy response always is you know, when the people or the students that I've mentored are now doing things that I can never imagine myself doing because I don't have that capability then I've done my job. And I can definitely say that you know, the people that have graduated from our program have gone on to become full professors, tenured professors, but they are just doing amazing work that, again, I can never picture myself doing during my time. And so, I'm very proud of that when I see that happen.

CHRISTIAN COTÉ:

and we all know that in research, in the lab, failure is a way of life. What counsel do you give your students when it comes to thechallenge of failure?

DR. ALEX MIHAILIDIS:

yeah, that's a talk I always give them very early on, is beprepared for failure. Be prepared to be challenged by not just me, but pretty much everyone around you. And that's really the nature of research, is you know, learning from things that didn't work and applying new ways of doing things, but at the same time embracing the failures as well. So, we've many papers that are published about our failures because these are lessons that are not just important for us to learn, but also important for the field and our other researchers and colleagues to learn about as well.
CHRISTIAN COTÉ:

and what keeps you going Alex?

DR. ALEX MIHAILIDIS:
I think, again, it comes back to the people that we're serving. I always go back to the gentleman that I met and remember him and his story. And I even still have emails with him, probably on a yearlybasis and let him know what we're doing.

CHRISTIAN COTÉ:

wow.

DR. ALEX MIHAILIDIS:
but it's also then the mentoring part as well is developing the next generation of researchers, just on academic researchers you know, in helping to generate you know, the next source ofindustry leaders in this area. And so, you know, a few of my students have gone on to do startups and are doing quite well in this area. And seeing that also gives me great pride as well, because obviously, you know, we're

Not just here to build the academic researchers, but we're here to buildthe age tech industry in Canada.

CHRISTIAN COTÉ:

the reason i was asking about what keeps you going is because in part, you know, we all face obstacles in life. And you faced apretty horrific one in august of 2019. Do you mind telling us about thatstory?

DR. ALEX MIHAILIDIS:

yeah, sure. You know, that was a you know, typical day up at the cottage. And you know, my my son was off hiking with one of his friends up one of the cliffs that are near our cottage. And unfortunately,he got stuck up there and started to panic. So, i went up. I climbed up to make sure he was safe and to get him safe. But unfortunately, in doing so, the ledge i was standing on gave out and I fell down 30 feet.

CHRISTIAN COTÉ:

oh my.

DR. ALEX MIHAILIDIS:

you know, straight down this cliff. And obviously that resulted in some fairly traumatic injuries, including you know, broken pelvis, many broken vertebrae and a complete spinal cord injury at the l 3 level. So, i was airlifted out of there to Kingston General Hospital, then finally moved back to Sunnybrook hospital. And then I ended up being a patient in Lyndhurst, right. So, at Toronto rehab for three months where I had to regain the ability to walk and to you know complete my daily activities and functioning. So, it's quite an experience to become a patient in the same facility where you're a researcher.

CHRISTIAN COTÉ:

I was going to say, I don't know if the irony is lost on you. I doubt it. What what was that experience of being on the other side of thebed like for you?

DR. ALEX MIHAILIDIS:

to be honest, actually, at first was a bit depressing because I realised that a lot of the work that we've been doing has not had an impact on clinical practice. You know, many of the nurses, many of the therapists just did not know about the research that was happening not just in my group in Toronto rehab in general, to be honest with you andand talking more with them, they just did not, one understand that we aredoing research in these areas. But two that it became very clear that we were not focusing in the right areas when it comes to a lot of our research and then how our technologies can be used in places. And it definitely taught me that we were not talking as well as we thought we were to the clinicians and the care staff. And so, this is kind of become a thing with me now to ensure that we really are taking into account you know, the needs of the clinicians and the patients and that we've become

Far more integrated between the research side of the house and theclinical side of the house, so to speak.

CHRISTIAN COTÉ:

that was a long recovery time, right? Like three to fivemonths?

DR. ALEX MIHAILIDIS:

four months in the hospital, yeah.

CHRISTIAN COTÉ:

what sustains you through that recovery time?

DR. ALEX MIHAILIDIS:

obviously was you know, getting back to where i am in terms of my health for my family and others. But a big part was my my work still. You know people still comment to this day that they were receiving emails from me you know three days later while I was in ICU. Whether those emails made sense or not because of the pain meds i was on is another story. But I kept working through the entire thing just becauseone, you know, the research needs to continue and the support the students need to continue. But two, the work that I do, again, was such a distraction from everything awful that was going on with me then, because I can sink back into the other issues and the problems that we were trying to face and trying to to solve for older people and other people with disabilities, so.

CHRISTIAN COTÉ:

but we are so appreciative and grateful that you are stillfunctioning and well. And how are you, how are you doing over a year later?

DR. ALEX MIHAILIDIS:

so, doing well, so fully walking and and that's going well. I still have a bit of pain and good days and bad days and learning to live with the things that I'll have to live with due to a spinal cord injury.And, you know, that's just become everyday life. But again, it's amazing thesupport that I've received from Toronto Rehab and UHN. Not just professionally, but also personally as well you know. It was many scientists and clinicians at Toronto rehab that really made a big difference for me in my recovery and still do.

CHRISTIAN COTÉ:

there's an author i like to quote and read, Simon Sinek, whosays people don't buy what you do, they buy why you do it. Why do you do what you do, Alex?

DR. ALEX MIHAILIDIS:

yeah, I do what i do because i know we're helping the individuals we're serving, and we can throw all the stats we want aboutan aging population and this and that. But the challenges that older people face the challenges that we all face. And if we can come up with asolution through technology that can help ease those issues, even just a

Little bit and make it better for not just the older person, but the familythat support them, then that's why I continue to do this.

CHRISTIAN COTÉ:

so, what's next? What should we look for next from you?

DR. ALEX MIHAILIDIS:
we're going to do a lot more in advance in areas of artificial intelligence in this area and showing people that artificial intelligence, robotics, advanced sensors do have a place in the care of older people. Looking at new ways of better predicting things again before they happen again. In my mind, I think that is the the holy grail, so to speak, in terms of health care, is prevention and technology play a hugerole in prevention. But ultimately, i think what's next for me is really helping the new researchers and students become the leaders, you know, clearing the path for them to move forward

You know, I mentioned this before in terms of I'm doing things I cannot imagine. You know, i have students that I go off and do something on a weekend that would have taken me a year to do when I was at their stage. So, if I can help clear that road for them and remove obstacles that their research can move faster and their solutions can be get into the marketplace quicker than i ever could have, you know, back in my day. Thenagain, that's a big success and a big piece of motivation for me.

CHRISTIAN COTÉ:

Dr. Alex Mihailidis, award winning scientist at UHN's Toronto Rehabilitation Institute, thank you for sharing your amazingwork with us and continued success.

DR. ALEX MIHAILIDIS:

Thank you very much for having me. It's been a greatpleasure.

CHRISTIAN COTÉ:

Dr. Mihailidis research is made possible in part thanks to generous donor support. If you'd like to contribute to this groundbreaking medical research, please go to www.Torontorehabfoundation.com and click on the donate now button.

For more on the podcast, go to our website www.behindthebreakthrough.ca and let us know what you think. We loveto hear from you. And that's a wrap for this edition of behind the breakthrough, the podcast all about groundbreaking medical research and the people behind it at the university health network in Toronto, Canada's largest research and teaching hospital. I'm your host, Christian Coté. Thanks for listening.