

[00:00:00] **Swathi:** Okay, Tamsin, so what comes to your mind when you think of AI?

Tamsin: Um, probably sci fi movies, things like robot waitresses coming to serve you at a table, robots taking over the world, that kind of thing.

[00:00:16] **Swathi:** Okay, but do you use your phone's voice to communicate? Assistant or unlock it using face id or have you ever found yourself scrolling endlessly on Instagram or TikTok? 'cause you just keep getting sub videos that you can't stop watching?

Tamsin: I've definitely been there on the doom scroll at some point.

Swathi: Well, all of that relies on ai. Welcome to Beyond Boundaries from the University of Aberdeen. Today, we're talking about AI, short for Artificial Intelligence. It's been a big news over the last few years.

And our guest is someone who really eats, sleeps, lives, and breathes AI.

Tamsin: Wait, it's not a robot?

Swathi: No, afraid not. I'll let him introduce himself.

[00:01:01] **Prof Georgios Leontidis:** My name is Georgios Leontidis. I have two different roles at the university. I'm the university's interdisciplinary director for data and AI, but I'm also a professor of machine learning.

[00:01:12] **Swathi:** Machine learning, that's the technology behind things like facial recognition, self driving cars, chatbots, and tools like ChatGPT, where you can give an instruction or a question, and it spits out an answer within seconds. Do you remember all the hype around ChatGPT when it first launched? Have you tried it?

Tamsin: I have tried it. I thought it

[00:01:30] was quite interesting, actually, especially when you're trying to reword something creatively. So AI is this *new* technology that all of a sudden is changing the way we do things, the way we work, the kinds of jobs that we can do.

Swathi: Well, yes, but also not quite.

[00:01:45] **Prof Georgios Leontidis:** I would say that to have a full picture of what AI is, we have to start from the, you know, about 1940s with Alan Turing.

[00:01:52] **Tamsin:** You might have heard that name, or if you haven't, maybe you've heard of the film about his life, *The Imitation Game*, starring Benedict Cumberbatch?

[00:01:59] **Prof Georgios Leontidis:** So Alan Turing obviously was a brilliant scientist. He published quite extensively in AI and most of the stuff that he developed back in the '40s are really very relevant nowadays.

So he defined a whole era of AI and he inspired quite a few of the successors of Alan Turing to develop what we have today, the modern AI. That's why Alan Turing is as relevant today as perhaps he was back in the '40s. But there's a long history of AI since then with, you know, several milestones and ways that AI techniques have been developed and are used even nowadays in practice.

[00:02:40] **Tamsin:** Okay, so even though AI seems like a super modern technology, it actually goes back a pretty long way.

[00:02:46] **Swathi:** Yep, but that said, it does feel like the pace of change has ramped up a lot in recent years. The speed of innovation in AI is kind of mind boggling. And again, I feel like ChatGPT is one of the AI tools that everyone has heard of. There's been so much publicity about it.

[00:03:04] **Prof Georgios Leontidis:** Now, what happened with ChatGPT back in December 2022 when it came out is that AI became even more popular, so I think most of us started seeing the potential of AI in this kind of text generation type of systems. But this is just a very small portion of what AI approaches are.

Now, obviously, Chat GPT is a system that is quite successful in what it's doing. I think everybody has been surprised to see that you can just throw a couple of words and a couple of prompts and it gives you a very nicely generated text or, uh, you know, a few paragraphs and then you can use them, you can reuse them or expand upon them, but it will be unfair for AI to be conflated with Chat GPT as that being the only AI system that is out there.

I would say that what we see currently as being the most popular AI systems, including Chat GPT is based on a system which is called artificial neural network. These techniques are scalable, which means that they have the capabilities of adding more data and more resources to it, and they become bigger and better.

But this is not the only system that exists within AI. So, for instance, there is a big area of AI which called multi agent systems, or argumentation or reasoning.

[00:04:18] **Tamsin:** So yeah, there are lots of different types of AI systems, but the one that Professor Leontides specializes in is machine learning.

[00:04:26] **Prof Georgios Leontidis:** And within machine learning, the past 12,15 years, we've seen a growing component in terms of, you know, how much is used, how much is adopted, and, you know, there are many universities around the globe that have developed machine learning systems.

But even within machine learning, we have another category which is called deep learning. So deep learning systems, actually, if we want to be precise, is what Chat GPT is based on. And if we want to go even a step lower than that, we have generative deep learning systems, which is exactly what Chat GPT is about.

That's why we call Chat GPT 'generative AI'. So you will see that generative AI is used sometimes to refer to those systems like Chat GPT.

[00:05:06] **Swathi:** So rather than helping us understand existing data, generative AI is about actually creating new data, new content like new pictures, videos, or text.

[00:05:15] **Tamsin:** Earlier we heard about Alan Turing, who was an early pioneer of computer science. But have you heard of the Turing test? It's named after him.

[00:05:31] **Prof Georgios Leontidis:** With all of these machines that we are using nowadays, could they pass the Turing Test? This is could we have a Chat GPT that the output that it generates can be considered as being a human generated output? So do we have a case where human and AI is really something that is indistinguishable? I think to some extent we are at the point where a Turing Test has become a bit irrelevant. The reason for that is that the systems of today, like Chat GPT and some newer models that are out there, are very good in specific type of questions to, um, be able to pass Turing tests. The problem is that the systems nowadays are so complex, where you might have the case where the same system, say Chat GPT. If you prompt it, so if you ask it to give you something as an output, It could be that in one time, what you get out of the system, you say, "yeah, perfect, that would be a human".

The next sentence you would say, “no, that's definitely not a human”. So then to what extent do you go to evaluate those systems, so that you are confident that they pass the Turing test? Because you have 10 questions, and the first five of them, you say, yeah, that's a human. And the rest five, you say, mm, that doesn't sound like a human.

So then overall, You might not pass the Turing Test. So, you understand the complexity. It's really how far you go to evaluate those complex systems. Where they fail in some very simple cases, and they are succeeding in some very complex cases. So, I think we have to understand that distinguishing an output of an AI system from what an output of a human generated content could be is not as simple as just reading a paragraph or a text. So we might need different types of tests to be able to understand whether actually those systems could pass what Turing thought back then to be the appropriate Turing test.

[00:07:21] **Swathi:** How do you feel about the idea of AI being able to pass the Turing test, being able to convince us it's human?

[00:07:28] **Tamsin:** It's a bit strange considering you've got a limited number of questions and some of them pass as human and some might not. Would we pass as humans?

Swathi: Tamsin, are you trying to say to me you are a robot??

Tamsin: Well maybe...

[00:07:43] **Prof Georgios Leontidis:** I think we have to appreciate that AI is with us now. We see it everywhere. It's producing so much data. In the past, you could say that if you were using Google's search engine, you were confident that the output of the Google search engine would be, you know, human-generated content, you know, there was an article, a magazine nowadays, most of the data that we might be seeing out there might be AI-generated data.

So then the question is, what do we do with that? Do we cherish that? Or do we have to be careful about that? Do we have to be critical about that? For me, it's an opportunity, right? It's part of how society has evolved, right? You know, 20 years ago we had YouTube and then people were excited about YouTube. And now, nowadays, YouTube is everywhere.

You know, students watch courses on YouTube. They learn from YouTube. Now it's AI. AI is everywhere. So, how do we explore that? And for me to explore that effectively, given how it propagates across all facets of our society,

you have to have this kind of multiple perspectives and different perspectives to be able to explore and evaluate AI. And evaluation of AI is a very big topic nowadays.

[00:08:55] **Tamsin:** Georgios mentioned that studying and working with AI isn't just about the actual technology, it's also about exploring and evaluating its impact, like how it affects our society.

[00:09:04] **Prof Georgios Leontidis:** Now, I think what has changed with AI, especially the perception of people over the past few years, is that AI is not only a technical discipline.

It's not only a discipline that a computing scientist will explore, or an engineer, or a mathematician. I wouldn't even say that's a discipline, because it's so broad, that it really spans multiple disciplines. You can have people in law, you can have people in social sciences, or philosophers exploring different areas of AI.

It could be the ethics of AI, it could be the legal implications of AI, or the social implications of AI.

[00:09:41] **Swathi:** And by the way, this theme of AI and ethics is one we talk about in an earlier episode of Beyond Boundaries on AI and the Law with Dr Patricia Živković. Go find that one in the podcast feed if you haven't heard it already.

[00:09:59] **Prof Georgios Leontidis:** But what is the most enjoyable part of what I do specifically is you have the opportunity and the joy to be discussing with multiple different people and very big diverse cohort of people in different disciplines and different backgrounds about AI. You can, you know, go for a coffee and you meet a philosopher. You know, uh, our schools here and you might start going down the route of ethics of AI or the philosophy of AI in general. Why do we need AI? What is AI? What is a human or, you know, whether there's a symbiosis in the future between those two things and the cultural elements of that and, you know, the evolution of the human species and so on.

[00:10:43] **Tamsin:** As well as all the opportunities that AI opens up, there has also been a lot of talk in the media about the risks it poses, like the risk that a lot of jobs might end up becoming irrelevant, because AI can just do them more quickly or more cheaply. But Georgios is actually pretty optimistic about our future.

[00:10:58] **Prof Georgios Leontidis:** Well, I am excited by AI. I don't know if I'm biased given my background in AI, but I'm thinking that the opportunities that we have nowadays with AI definitely are overshadowing the risks that are imposed by AI. This doesn't mean that the risks should not be considered or should not be tackled, but I think we have a unique opportunity here, and the opportunity is to allow AI to do some tasks That might be more onerous tasks or interrogate large amounts of data that, in the past, it wouldn't be possible for a human to interrogate the data and then try to identify what risks exist and try to solve or mitigate those risks with the advent of systems like Chat GPT, we have to think, how can we use those AI systems to actually support research activities that we have at the university. So say for instance you have a researcher that we have at the university. So say for instance you have researchers, they want to develop a very small programme, like programming languages, and there's an error in the code. And they might say, okay, let's, let's try to see if the Chat GPT can find what the error is, and, and solve it for me, because that would allow me to use that piece of code to analyze some data that before it would take me 10 hours and I will take me five minutes. So I'm definitely excited because there are multiple examples of how AI is used for, you know, energy transition or for the climate emergency or for health care. But then you have AI that is used to evaluate biodiversity loss, which is a huge issue in terms of climate emergency and so on.

So there are so many positives of AI out there, it would be a bit naive from our perspective to dismiss that just because of the potential risks that this imposes.

[00:12:46] **Tamsin:** It's so interesting that AI can help us track biodiversity loss, improve healthcare, all of these things that humans have worked on for years, but AI can assist us?

That seems quite sensible, really.

[00:12:57] **Swathi:** Well, it's here now. We have to find ways to make good use of it.

[00:13:08] **Tamsin:** Food production is another area that Georgios thinks AI could really transform.

[00:13:12] **Prof Georgios Leontidis:** One of the biggest activities that we have at the university at the moment when it comes to AI is how AI is used for sustainable agriculture. That means that we are trying to develop AI systems that can support the transition of agri food systems to net zero, which means that we are working with growers, with farmers, and we are using agricultural

data, for instance, to predict yields for strawberries, or to evaluate land and see how land changes or deforestation.

So then you have AI applied to the agri-food setting, so agricultural setting. So that's a kind of a very exciting moment for us because we have a very large project that started a couple of months ago together with a few other universities. Then we are using AI for energy transition problems. And for instance, we are working with companies for, um, predicting emissions of gas turbines.

So suddenly you have an AI system that can support this element of more industry-related projects. In the past, we've had projects where we use AI to detect operational abnormalities of, of nuclear reactors. We have quite a few academics, I go to university and researchers that they are. developing AI systems for healthcare, about medical diagnosis and systems like breast cancer screening and so on.

So there are lots of nice projects, so what we have to do is grasp the opportunity, but reflect on the risks and try to work with different academics, different, you know, universities, different departments, different schools to solve and mitigate the risks. those risks, but the opportunities are there. We should not just discard that.

There are many initiatives across the university here in Aberdeen, but also across the UK, where AI has really become a central part of, of the university, just because of all of these opportunities that we have.

[00:15:02] **Tamsin:** As Giorgios says, here at Aberdeen, there are loads of opportunities to get involved with AI in all sorts of ways and to study it from all angles.

[00:15:10] **Prof Georgios Leontidis:** It really depends on the interests, right? Across the university, we have quite a few AI experts that are spread across multiple different schools and departments. AI. It is not a single discipline, as I mentioned before, you might have, for example, the Department of Computing Science, where you have AI experts that are computing scientists and they are more developing, you know, the programming side of things more, you know, the underlying technical developments.

But then you have a psychology department where you have AI experts that are more on the psychology side where they are perhaps exploring face recognition systems or, you know, like neuroscience and how you can use AI to interrogate

signals of the brain. But then you might jump onto the Social Sciences School and you might have people exploring the use of AI in social settings and you know, the politics and the policy behind AI and then if you go across the road, you might end up in the School of Law and you have legal experts exploring it though, or the legal implication of AI in the regulatory.

So how do we regulate AI? Do we have to regulate AI? How do we moderate the risks of AI? So then, depending on which department or school of the university you study, you're going to meet AI experts that approach AI from a very different perspective, from their own discipline perspective.

But then at the university level, our students have the opportunity to liaise with people like myself. And then we have, you know, researchers, academics that are coming together. We have events, we have some successful networks like the Human-Centred AI Network, where we have people from different schools coming together, discussing topical topics and, you know, some very challenging topics that we are facing in society.

And that's a great opportunity because you have different people from different backgrounds coming together, expressing ideas, disagreeing with each other, which is always part of the process. Nice, and that's how society progresses, and coming up with some exciting ideas to explore in the future.

And obviously students are at the very centre of that. So that's, that's a very exciting opportunity to have here, obviously within the ethical dimensions of research. But it's, it's everywhere.

I cannot see a single discipline that will not benefit from AI. We should not underestimate the risks that are imposed, but we have to find a way of mitigating them rather than being scared.

[00:17:39] **Swathi:** Georgios believes the future of AI is in the hands of today's students and tomorrow's students like you.

[00:17:45] **Prof Georgios Leontidis:** We are, let's say 'seasoned' academics, but in the future lies with the new generations. Those students will be the future of AI, and they have to come along and work with us and think what the future of AI is, how do we perceive new AI systems that might be just in the fantasy at the moment.

Chat GPT as a system 10 years ago was just a science fiction. Maybe no one had thought about that as a possibility. So who knows what will be the case in

10 years from now, and perhaps the best suited people are the students of today or of tomorrow to explore that, and we are just here to help them out and to have this kind of synergistic approach to that.

I would say that it's a very exciting period of time to be an AI researcher, and the reason for that is that it's become very popular. Even people that they didn't know what AI is or that AI existed, they now talk about that. You see it on the news. So I think it's a very exciting moment to be exploring all the facets of AI.

[00:18:45] **Tamsin:** Thanks to Professor Georgios Leontidis for talking to us about his work and giving us an insight into all the different opportunities for studying AI at the University of Aberdeen.

[00:18:59] **Swathi:** If you want to join the Boundary Breakers, you can come to one of our open days and see our historic campus. You can also download our digital prospectus at www.abdn.ac.uk.

[00:19:12] **Tamsin:** And to hear more from us. Check out the rest of the podcast. Each episode discusses the groundbreaking research from one of Aberdeen's academics.