

Podcast - How to Hochschule VOICES



Show transcript

Prof. Dr. Matthias Krauledat

00:00:00: Stephan Hanf:

00:00:05: Stephan Hanf: Welcome to Haow toHochschule Voices. This monthly bonus feature to the main podcast features full length interviews, personal stories and a collection of conversations with people from Rhine-Waal University of Applied Sciences, Kleve, Kamp-Lintfort and the entire Lower Rhine region. In this episode, we are excited to meet Professor Dr.

00:00:35: Stephan Hanf: Mathias Krauledat, a unique blend of computer scientist and musician. Join us as Professor Krauledat shares his journey through his current role in the Faculty of Technology and Bionics.

00:00:52: Prof. Dr. Matthias Krauledat: I grew up in Essen in the Ruhrgebiet and lived there for 18 years before moving to Münster, where I studied mathematics and computer science.

00:01:02: Stephan Hanf: Was it always

00:01:03: Stephan Hanf: your plan to go into academia?

00:01:06: Prof. Dr. Matthias Krauledat: When I was five years old and just coming from kindergarten to school, then was my plan to become a mathematics professor.

00:01:14: Prof. Dr. Matthias Krauledat: I enjoyed mathematics my entire school career, but then after the first year or so, I never thought of becoming professor ever again, because then I decided later to become a doctor in medicine. And just before my studies, yeah, I had my Zivildienst, that is a military service or the civil service, which I spent in hospital, which was when I decided not to become a doctor.

00:01:41: Prof. Dr. Matthias Krauledat: In a hospital, there are lots of hierarchies. And when you're looking at it from the bottom, then it's no fun at all.

00:01:48: Stephan Hanf: You

00:01:49: Stephan Hanf: found out that you're really good at math. Do you remember like the first time you figured that out for yourself or when you had that experience

00:01:56: Stephan Hanf: with

00:01:56: Stephan Hanf: math as a topic?

00:01:57: Prof. Dr. Matthias Krauledat: Honestly, I don't know.

00:01:58: Prof. Dr. Matthias Krauledat: That was a thing in my entire kindergarten time already. So I learned reading at quite an early age before coming to school. And also I was just pretty good at math and it was fun and the fun part, that's the thing that stayed.

00:02:15: Stephan Hanf: Yeah.

00:02:16: Stephan Hanf: Sometimes people don't imagine math.

00:02:19: Stephan Hanf: Equals fun, but

00:02:21: Prof. Dr. Matthias Krauledat: why not? I can't really, I have no idea why people say that.

00:02:24: Stephan Hanf: Why do you think people say that actually? Is it about the education?

00:02:27: Prof. Dr. Matthias Krauledat: I think that it is something that you either learn at an early age that, that this is fun for you or that this could be something that is entertaining or you want to use these techniques to figure something out. And it's like puzzling also, and people actually like puzzles on my desk.

00:02:46: Prof. Dr. Matthias Krauledat: I have. couple of puzzles because they are the fun and it's something that you are trying to figure out. And after a while you get it and then you're happy or you don't get it and then still want to get it.

00:02:59: Stephan Hanf: Um, so, uh, so first you had the idea to be a math professor and then he came back

00:03:06: Stephan Hanf: to that idea.

00:03:07: Prof. Dr. Matthias Krauledat: Uh, yeah, actually I studied mathematics as my major subject and along with it also mathematical logic and, um, computer science.

00:03:17: Prof. Dr. Matthias Krauledat: The reason to study mathematics was actually, since first of all it was fun for me and I found out that I had I had many interests and I wanted to do something which allows me to peek into all the other disciplines and math is one of these connecting topics, especially in engineering or in sciences, you need math everywhere.

00:03:39: Prof. Dr. Matthias Krauledat: That's what I figured and I said, okay, this is something that can keep my interests going. For quite some time and later throughout my studies, I move more and more towards computer science, which is also a connecting topic these days, and especially artificial intelligence. So that's something that you again, find in many disciplines now.

00:04:02: Prof. Dr. Matthias Krauledat: And yeah, this is something which again, I find fun and entertaining, and it is something that is very useful because you can need it in all the

00:04:10: Prof. Dr. Matthias Krauledat: subjects.

00:04:11: Stephan Hanf: But you didn't stay in

00:04:13: Stephan Hanf: academia, right?

00:04:15: Prof. Dr. Matthias Krauledat: That's true. First, I studied mathematics in Münster, with one year in Oxford, in England, in the middle of it, let's say.

00:04:23: Prof. Dr. Matthias Krauledat: And I moved back to Münster after my, completing my master's, which back then was a diploma in Germany. I moved to Paris for a year, and actually... studied musicology and musicology in terms of recording equipment and also algorithms, which are used, for example, in recording devices. There are many algorithms that help you to do signal processing on a computer level, which is also one of the topics that I'm teaching these days, uh, signal processing.

00:04:56: Prof. Dr. Matthias Krauledat: together with a bit of mathematics, and all of that has a meaning in musicology. So the ILCAM, that's the music research center that I was working in, is in the middle of Paris. It works together with modern composers of all sorts, and I developed algorithms for these composers to estimate fundamental frequencies of sounds.

00:05:17: Prof. Dr. Matthias Krauledat: And yeah, so this is one of the things where mathematics and computer science helped me to get into a different field again.

00:05:25: Stephan Hanf: So you, you also had an interest in music on a private side, or why did you

00:05:29: Stephan Hanf: pick musicology?

00:05:31: Prof. Dr. Matthias Krauledat: I play musical instruments. I play the cello for 40 years now, and I play viola, violin, and also the double bass for quite some time.

00:05:41: Prof. Dr. Matthias Krauledat: And yeah, because I find that Not only entertaining, but also interesting as a topic. I found this was a good idea to look deeper into it.

00:05:51: Stephan Hanf: When

00:05:52: Stephan Hanf: was the first time you heard about

00:05:53: Stephan Hanf: the Hochschule Rhein-Waal?

00:05:55: Prof. Dr. Matthias Krauledat: Well, actually, uh, when the Hochschule was established in 2009, of course I heard about it because, um, I, uh, was just about.

00:06:04: Prof. Dr. Matthias Krauledat: finishing my PhD studies, moving back to North Rhine Westphalia from Berlin. And back then I worked on biomedical engineering and worked out a

break computer interface algorithm and moved into industry. By that time, the Hochschule was established. And of course, it was a big thing in North Rhine Westphalia because at the same time, three different universities of applied sciences were created in North Rhine Westphalia.

00:06:33: Prof. Dr. Matthias Krauledat: So that's a big thing in general. And I also found, so as I said, I was just going into industry. I worked at the company Henkel as a laboratory head for some years later on, I worked at the company TÜV Nord in engineering purposes. So we, for example, did some engineering on windmills and condition monitoring on these windmills and it.

00:06:58: Prof. Dr. Matthias Krauledat: Although I was having a career in industry, it was still interesting for me to get back into academia and with the knowledge that I had acquired in the companies. And that's exactly what I can do now as a professor. This knowledge of how, for example, processes in the companies work and how research and development in these companies work.

00:07:21: Prof. Dr. Matthias Krauledat: That is really useful for me because I can tell the students about it and also consult the students when they're doing their internships, for example, in big companies.

00:07:30: Stephan Hanf: What year did you

00:07:31: Stephan Hanf: start working for the, as a professor for,

00:07:34: Stephan Hanf: for the university?

00:07:36: Prof. Dr. Matthias Krauledat: Yeah, I'm here for nine years now from 2013.

00:07:40: Prof. Dr. Matthias Krauledat: So, a little bit, I always say in German, Sturm und Drangphase of the university.

00:07:44: Stephan Hanf: What was like your first experience you had here,

00:07:47: Stephan Hanf: coming to Kleve?

00:07:48: Prof. Dr. Matthias Krauledat: When I had my interview here, it was already at the campus in Kleve. Before the Hochschule was located in Emmerich and only partly they were

here. So none of the rooms were ready. So we were in one or two of the rooms during that interview period.

00:08:03: Prof. Dr. Matthias Krauledat: Uh, where there was already some kind of IT infrastructure and there was a projector and this sort of things. But when you walk through the corridors, you could still see, um, painting wasn't finished everywhere and some walls were not fully in place and this sort of thing.

00:08:19: Stephan Hanf: And the

00:08:20: Stephan Hanf: city, what, what was your first impression of the city Kleve?

00:08:23: Stephan Hanf: Cause you told before that you lived in quite huge, large cities. How was it for you?

00:08:27: Prof. Dr. Matthias Krauledat: Yeah, that's

00:08:28: Prof. Dr. Matthias Krauledat: true. Kleve is by far the smallest city that I've ever lived in. I lived in Essen, in Münster, Oxford, Paris and Berlin and Dusseldorf. And Kleve is just so a city. It is nice. So culturally there's a rich environment.

00:08:46: Prof. Dr. Matthias Krauledat: So for me as a musician, that is really. Very helpful and it makes it worthwhile living in Kleve. Uh, but still, it's very far out if you look at it from the perspective of Germany. It's really at the border of Germany. And the largest cities close by are actually Nijmegen and other Dutch cities. So one of the things that I noticed was when I was looking for furniture for my apartment, was that the nearest IKEA is not in Germany, it's in the Netherlands.

00:09:18: Prof. Dr. Matthias Krauledat: So this is one of the things where I realized, okay, we are more in the middle of a European environment rather than a German only environment.

00:09:28: Stephan Hanf: But in your experience, because you're also, I don't know the English word for that, Vertrauensprofessor?

00:09:32: Prof. Dr. Matthias Krauledat: Trust

00:09:33: Prof. Dr. Matthias Krauledat: professor.

00:09:33: Stephan Hanf: It's the literal translation of?

00:09:35: Prof. Dr. Matthias Krauledat: Yeah,

00:09:35: Prof. Dr. Matthias Krauledat: that's right.

00:09:36: Stephan Hanf: Okay. I didn't know that. What are the things in this line of your work that you heard from students about their expectations that they had from Kleve and a second position

00:09:46: Stephan Hanf: of the university?

00:09:47: Prof. Dr. Matthias Krauledat: Maybe from a slightly different perspective on this question. So, when I moved to Kleve, I was a bit surprised at, uh, that there's, that there's not very much nightlife.

00:09:59: Prof. Dr. Matthias Krauledat: So there's, there are practically no bars and of course, some Kneippen in that sense, some places where you can drink alcohol most of the night, but there's, there are, I think, two discos and, and that's it. So it's a restricted here. And I was wondering why that is, because we've got so many students at this university, and I believe that they also need to party every now and then.

00:10:25: Prof. Dr. Matthias Krauledat: For me, it's not quite clear why that doesn't happen, because I think there is a market in Kleve, but nobody's really tapping into that potential. So maybe for all the students who are listening to this podcast and also think of planning a business. So maybe this would be something where you could, could make a big deal.

00:10:42: Stephan Hanf: But as

00:10:43: Stephan Hanf: someone who grew up in this area, it was always

00:10:44: Stephan Hanf: an issue.

00:10:45: Prof. Dr. Matthias Krauledat: Exactly. So you have to travel far to get to somewhere where you can, uh, can have a party. Yeah. But, uh, I was just thinking about the statistics because there are 50, 000 people living in Kleve and 5, 000 students who are just moving in somehow.

00:10:59: Prof. Dr. Matthias Krauledat: So I think there's a huge potential for that.

00:11:03: Stephan Hanf: I

00:11:03: Stephan Hanf: don't know why, why that didn't happen. Is that something that you hear in your sessions with the students as a trust professor that they miss this

00:11:12: Stephan Hanf: kind of activity?

00:11:13: Prof. Dr. Matthias Krauledat: No. So, uh, seriously, most of the topics, uh, that, uh, I'm discussing with students as a trust professor, um, Concern the, uh, the academic career.

00:11:25: Prof. Dr. Matthias Krauledat: So usually they, they come to me if they have an issue, for example, with one of my colleagues and they think that let's say, uh, treated in an unfair way. And so the first thing that I'm trying to do is giving them the perspective of a professor and maybe trying to figure out why my colleague may have acted in a certain way or what is the basis for him.

00:11:49: Prof. Dr. Matthias Krauledat: Or her to treat students in such a way. And if there is a persisting problem, of course, I can also discuss that with my colleagues. So this is one of the things that I regularly do. Unfortunately, in most of those cases concerning the academic career, students come to me when it's already very late and a problem has already occurred.

00:12:14: Prof. Dr. Matthias Krauledat: For example, in cases where they have finally failed an exam. And if that happens, the study course is entirely over for most of our examination regulations. That means that they have failed a subject for three times in a row because you don't get more than three attempts at a single exam. And if you fail it,

00:12:37: Prof. Dr. Matthias Krauledat: then that's the end of your study course. And of course, if that has already happened, there's not much I can do because I cannot revert that decision by one of my colleagues, for example, or by the examination office. However, if students come to me before writing their third attempt. Yeah. And this also happens, of course.

00:12:58: Prof. Dr. Matthias Krauledat: Yeah. People say, okay, I'm really, uh, very nervous and I'm really stressed out because next week I'll write, or maybe in two months I'll write my final examination or the third attempt at, I don't know, for example, programming or any other hard subject that they want to Yeah. Want to write, and in that case, I can at least give them a couple of hints, how they can prepare for it.

00:13:20: Prof. Dr. Matthias Krauledat: What kind of mental strategies can they take and how can they cope with the stress? How can they plan the third attempt accordingly? And so on. These are some things that I can actually do also. When people or when students come to me and ask me about social problems, for example, we, we do have a network of, uh, counselors at the university, not only with the professor's perspective, but also, uh, from some counselors who are doing social or psychological counseling, and I can provide pointers to these places and I can direct them to the right person.

00:13:59: Stephan Hanf: In your experience, you talked about stress. It's a really big topic, but like, if you would give advice, how to deal with stress,

00:14:06: Stephan Hanf: what would it be?

00:14:08: Prof. Dr. Matthias Krauledat: I think my major advice on this would be. To get organized, because if you're organizing your studies well, and that means really from the, from day one, arriving at the university, planning out what subjects am I going to take, which of those will be hard for me and where will I have to learn something more or on top of those hours that I'm spending at the university, and if you are already planning that from the first day, that's Then you will not be surprised a week before the exam that the exam is coming.

00:14:43: Prof. Dr. Matthias Krauledat: And if you're well prepared for the exam, uh, if you have always practiced, for example, each day, 10 minutes or so, then you're already, um, setting your mind on your target, uh, namely to pass this subject. And then all of a sudden, uh, it becomes manageable.

00:15:02: Stephan Hanf: What about students

00:15:03: Stephan Hanf: that, um, might feel stressful because they haven't figured out yet that it's not the topic they should

00:15:10: Stephan Hanf: study?

00:15:11: Prof. Dr. Matthias Krauledat: I think this is a very serious, let's say, problem or a very serious issue, but it's nothing that ends your career. Also, it doesn't need to end your academic career. So it's always, I myself am a person who has changed his views and targets. I wanted to be a math professor at some point, but then I wanted to be a medical doctor.

00:15:35: Prof. Dr. Matthias Krauledat: And now I'm a professor for computer science. So those are actually in between. I wanted to become a professional cellist, but that's another story. So, but there are some targets and every now and then you can. Pick a new target.

That's okay. Also, it's not entirely bad on the CV if during the first, let's say, one, two semesters of your studies, you realize, okay, that's not for me.

00:15:59: Prof. Dr. Matthias Krauledat: I need something slightly different. However, if you do that after, let's say, 12 semesters of study. It becomes a bit problematic if, if you then realize, okay, that's maybe not what I want to do. And then it may get harder to change the topic without, let's say, losing too much impact of your study. Then it's easier to change into

00:16:23: Prof. Dr. Matthias Krauledat: a different study course, which is close by where you can use most of the techniques and most of the material that you've already learned.

00:16:31: Stephan Hanf: I think what's

00:16:32: Stephan Hanf: also interesting about your role as trust professor, because a few people from different education system aren't used to speak with professors without a certain kind of hierarchy.

00:16:44: Stephan Hanf: How would you describe the German system in comparison to the other systems and the relationship between

00:16:49: Stephan Hanf: professors and students?

00:16:51: Prof. Dr. Matthias Krauledat: Yeah. So the way I, that I view my role as a professor, not necessarily as a trust professor, but as a professor would be that I'm trying to manage a student's way of learning.

00:17:01: Prof. Dr. Matthias Krauledat: So I'm not actually, of course I am in the role that I. I have already worked a lot in the topics that I'm teaching, and so that means I'm also pretty experienced in that and can also tell students which is right and which is wrong, but that's not my role, really. So my role would be, I provide a couple of pointers, I provide some material that are the core essentials of this topic, and then I provide further links for the students to learn it themselves.

00:17:34: Prof. Dr. Matthias Krauledat: And, for example, I'm pointing at literature, I'm pointing at self learned courses, where students really, for example, in programming, we've got a MATLAB software, which is also available at the entire university, and students can simply download it and start practicing by themselves. And that, I think, is the best way to learn.

00:17:53: Prof. Dr. Matthias Krauledat: They get a couple of exercises, which they can do at home. And this is something that I can explain MATLAB for a thousand hours, and you won't really understand it. Unless you actually start doing it. So this is the thing that, that I think would be very central that students actually start to become active and really get into the active role, which by the way, also alleviates stress.

00:18:19: Prof. Dr. Matthias Krauledat: Because once you get active, you're tackling a problem, you know, you're on top. And the problem is not on top of you.

00:18:25: Stephan Hanf: Yeah. And I also

00:18:26: Stephan Hanf: think it's not about, um, memorizing like books. It's about getting the tools and

00:18:31: Stephan Hanf: using them.

00:18:32: Prof. Dr. Matthias Krauledat: Exactly. Yeah. We're a university of applied sciences, and that means you get a bit of theory, but the major part about the learning outcome is that you actually get to use these tools and that you find a way to apply the theory.

00:18:46: Prof. Dr. Matthias Krauledat: Uh, for example, some students expect that exams. We'll always look the same every year. They don't, I can't, I can assure you they look different next year. Uh, they still have the same content in that sense, but the exercise will be completely different. And the reason is we don't want people to know which box to tick.

00:19:07: Prof. Dr. Matthias Krauledat: So on the first page is the first box and then the third one. And then the fourth, that doesn't make sense. It that's no learning outcome for me. The learning outcome would be, you see a new exercise. And aha, this is the tool that I could use for that. And that's exactly what we are expecting from students to become active and also to become active with the new tools that they acquired at the university.

00:19:32: Stephan Hanf: And I

00:19:32: Stephan Hanf: think there are many misconceptions comes from the wrongful thinking that it's more or less the university. It's a service for me, right? Someone will take me by my hand and guide me through everything, but that's not really what it's all about. Even with the private stuff, like finding a room or we talk a little bit about nightlife, social life, it's, it's up to you, right?

00:19:52: Stephan Hanf: So there are a few tools the university provides you, of course, with academia, of course, with, uh, if you want to find a home, you can, uh, go to welcome center and nightlife. There's something like AStA who will sometimes do events, but still it's just tools. It's up to you

00:20:08: Stephan Hanf: to use them, right?

00:20:09: Prof. Dr. Matthias Krauledat: Yeah. Among programmers, there's the saying:

00:20:12: Prof. Dr. Matthias Krauledat: I can explain it to you, but I can't understand it for you. So that's exactly how I see teaching. And yes, I expect students to become active at some point during their studies and really to, yeah, embrace this project that they're on. So this is something I hope everybody learns something new at this university.

00:20:35: Prof. Dr. Matthias Krauledat: And. Of course, I expect the students to become active and to start using it.

00:20:39: Stephan Hanf: What's also interesting about computer science that sometimes a program works, but you have no idea why. And you have to find out why, or maybe you don't, but, but that's like the saying, it's, it's not a bug. It's a, it's

00:20:50: Stephan Hanf: a feature.

00:20:51: Prof. Dr. Matthias Krauledat: Again, we're at puzzles, you know, so this, this is something which can be interesting for some people. Usually I would expect students. At least to find out how something is working and how they can make something work. And if it doesn't work, that's, uh, that's a higher level usually to actually figure out why it doesn't work.

00:21:10: Prof. Dr. Matthias Krauledat: Yeah. Yeah. That's tricky.

00:21:11: Stephan Hanf: Yeah.

00:21:12: Stephan Hanf: I mean, especially in your field of studies, like the advancements are getting so quicker and quicker and quicker, especially with AI. For me, it's getting scary because how far it goes, but, um, talking about innovation, um, you really, I guess more and more deep in the future and I am that sometimes you are, you can be afraid how far technology might

00:21:35: Stephan Hanf: go in the future.

00:21:37: Stephan Hanf: I

00:21:37: Prof. Dr. Matthias Krauledat: wouldn't say afraid, once again, I'm, when you start understanding certain technologies, then it also takes away your being afraid of it. If you understand it somewhat more and the processes that are behind that, it actually becomes pretty interesting. There's actually, in the past couple of years, there has been a rise of this.

00:21:58: Prof. Dr. Matthias Krauledat: Trustworthy computing and also about the fair machine learning, uh, as a science, let's say, um, and there have been huge publications about this. If I've encountered this topic a couple of years ago and, and find this also one of the aspects in terms of ethics of artificial intelligence. That I also find useful and let's say important to teach engineering students.

00:22:26: Prof. Dr. Matthias Krauledat: So I've got a course machine learning in the bionics masters course, and this is also one of the topics that I'm teaching there about ethics and machine learning just as an example. So, by the way, there's a great Netflix documentary about this. "Coded Bias", that's what it's called, where one researcher at MIT found out that face recognition doesn't work for her.

00:22:49: Prof. Dr. Matthias Krauledat: The reason was, she is black, and therefore has a black face, and as soon as she started putting on white makeup or a white mask, everything started working out for her. And she wanted to know why that is. And there is a simple reason, actually, most of the machine learning corpuses. So the big databases that image recognition algorithms are trained on are using white people's faces.

00:23:16: Prof. Dr. Matthias Krauledat: Uh, so by that, they are perpetuating something that is working for white people, but for non white people, it is really tricky to work with it. And of course, if we develop technologies that are actually, uh, for everybody. But we don't see this as a problem. So that's also my machine learning algorithm itself, by the way that we've trained it is somewhat biased and has, let's say, exposes some signs of racism.

00:23:43: Prof. Dr. Matthias Krauledat: Yeah. That's the point where it becomes tricky and where we really have to. Exactly understand what we're doing here. So I think this is something that also engineering students who are working with this kind of algorithms should know. And also it's an example where you don't really expect something like a racial bias could be in place, right?

00:24:03: Prof. Dr. Matthias Krauledat: But, but it actually is. And, yeah, so there are a couple of technological measures that you can take. So there are remedies against that problem, but they also need interdisciplinary work, for example, with social science and so on. So this is, again, I'm seeing this computer science field as a very interconnected field to other sciences.

00:24:25: Prof. Dr. Matthias Krauledat: And this is exactly where we can see those links to other sciences.

00:24:31: Stephan Hanf: In

00:24:31: Stephan Hanf: simple terms for the layman, what is like the difference between a machine learn something and a human that learned something? Probably not that easy to explain,

00:24:38: Stephan Hanf: but

00:24:38: Prof. Dr. Matthias Krauledat: well, uh, every algorithm that you see in machine learning is actually just as good as the data that it sees.

00:24:46: Prof. Dr. Matthias Krauledat: And usually these algorithms are only good for a very specific purpose. When you see children grow up and learn stuff, then this is usually They learn on so many different levels and they learn so many things at once and they take the same data set and apply it to different things. For example, when they're playing with a toy or so it helps them both train their motor system and their, let's say, Actuators, if you look at that in a machinistic way, and in the same place, they learn something about the physics of this object.

00:25:23: Prof. Dr. Matthias Krauledat: And when I let go of it, it falls down. And these things, there are so many informations that, that humans, when they're learning are drawing from data. Yeah. And I think we are far away from actually mimicking that. And I don't think that right now machine learning has the target to actually do that. So usually what machine learning is doing is trying to become very good at a very specific task.

00:25:48: Prof. Dr. Matthias Krauledat: For example, finding all the images of dogs with closed eyes or something. That's what machine learning can really do very well and very quickly and better than humans also. Yes.

00:26:00: Stephan Hanf: But, but what's interesting, there are machines out there who can write quite capable. Um, letters or text that express emotions, but someone might think, Oh, it's like an emotional expression, but it actually, it,

00:26:15: Stephan Hanf: it,

00:26:15: Prof. Dr. Matthias Krauledat: I think that machines are very good at mimicking emotions, but there's no, not really a place in the construction of these machines that where this emotion could be.

00:26:26: Prof. Dr. Matthias Krauledat: So it's not really that they are feeling this emotion by themselves. So some algorithms are actually being trained in recognizing emotions from Uh, for, for example, from images or from sound clips, or this can also be pretty useful if you're scanning big image databases and you want to know which of these persons is currently angry or so.

00:26:49: Prof. Dr. Matthias Krauledat: So for a company that is doing some custom relation management, that could be very interesting, but these machines themselves. Um, not really experiencing, so they don't really know what, what these emotions are. So that's not really the point of training them, I guess.

00:27:07: Stephan Hanf: And then also interesting, like the way fiction sees that, like in the Western part, it's mostly the machine's evil.

00:27:12: Stephan Hanf: If you go more to the Eastern Japan, um, then the machines are your helper, or there might be something like a friend. It's, uh, how cultures see machines in a different way. It's also quite interesting, but, um, but I mean, it's more or less always a mirror of ourself, right? Because what I read inside this text or the music, probably you experiment with AI creating

00:27:34: Stephan Hanf: music as well.

00:27:34: Prof. Dr. Matthias Krauledat: Right now, we started a research project on. Biomedical data, and in particular, together with the University of Nijmegen, we are running a sleep study project. Of course, we are going to do that with artificial intelligence. And what we want to find out is what happens to people during lucid dreaming. So lucid dreaming is kind of dreaming where the sleeping person is aware that he or she is currently dreaming.

00:28:04: Prof. Dr. Matthias Krauledat: And if you are in that position and you can all of a sudden interact with your dream, then you may become the active part in your dream and influence where this dream is going. So this lucid dreaming state, for example, has been used by composers. So there was a composer in Munich who is regularly doing this kind of strategy to tap into his unconscious when he realizes I'm currently dreaming.

00:28:32: Prof. Dr. Matthias Krauledat: Then he goes to his imaginary cabin in the wood and opens the door. The only thing inside is a radio with two buttons and he's switching it on. And then he's turning the sender knob to a frequency where. A new musical song is coming and at some point there is a new song that he has never heard before and then he listens to that song, memorizes it and wakes up and writes down the song.

00:29:01: Prof. Dr. Matthias Krauledat: So this is something where he's really, so of course he has created that song by himself and this is a Wonderful method of, uh, of applying this kind of lucid dreaming. There are other applications as in trauma therapy. So if you have traumatic experiences and, uh, uh, your unconscious is, is working through this in your dreams, then lucid dreaming can help you to confront

00:29:29: Prof. Dr. Matthias Krauledat: this fear or the stress or traumatic experience that you have and interact with it in some way. Yeah. And the role that we're playing here as a university is we are providing the machine learning part to help with the induction of lucid dreaming and also with the automatic. analysis of lucid dreaming content.

00:29:48: Stephan Hanf: Did they

00:29:49: Stephan Hanf: ever try to recreate it in virtual

00:29:50: Stephan Hanf: reality?

00:29:51: Prof. Dr. Matthias Krauledat: Yes. So that's actually a very good suggestion because, uh, that's exactly what they did for, uh, induction of lucid dreaming. So they recreated a. a part of the Mensa in, in the university, a room that all the students of that study knew. And, and then they started randomly turning off the physics engine.

00:30:12: Prof. Dr. Matthias Krauledat: For example, people were just floating around or suddenly the texture of their bodies changed and they all of a sudden wore something completely different or the walls in the building. Moved or something like that. So things where you think, okay, this is not right, so something must be wrong here.

00:30:31: Prof. Dr. Matthias Krauledat: Exactly the kind of thing that happens during a lucid dreaming and during you realizing that, okay, this must be off. Uh, so I must be dreaming right now. Uh, they use exactly that to induce lucid dreaming in patients could

00:30:45: Prof. Dr. Matthias Krauledat: lucid dreaming help me, uh, pass my math exam. Did they ever try to research that if it can help with

00:30:53: Prof. Dr. Matthias Krauledat: studying?

00:30:53: Prof. Dr. Matthias Krauledat: Sleeping has lots of functions and among other things, also memory consolidation. So if you're practicing just as I suggested, so you're doing 10 minutes of training every day or so, and after that you sleep. So if you do it, for example,

before going to bed and then you're sleeping, then your performance is much better than if you're doing that.

00:31:15: Prof. Dr. Matthias Krauledat: Without the sleeping before, so it's not necessarily the dreaming part that, that helps you, but sleeping regularly, sleeping, and also doing this consolidation of your memory. So when you have learned a new technique, you can memorize it much better when you're sleeping after. And sorry, one more thought about this.

00:31:34: Prof. Dr. Matthias Krauledat: I frequently encounter students who think that they can start learning in the last week before the exam. And that's exactly why you shouldn't do that. Because you're learning very hard, and you're spending a lot of time, but you don't have this relaxation period with the memory consolidation of sleep during.

00:31:56: Prof. Dr. Matthias Krauledat: So it doesn't really make sense to learn straight for 12 hours, because you're never reconsolidating your memory again. So that means you forget 80 percent of it. Uh, by the end of the day.

00:32:08: Stephan Hanf: Yeah.

00:32:09: Stephan Hanf: Well, what I find interesting, because we talked a little bit about AI and there's also different, uh, text from image creators.

00:32:15: Stephan Hanf: A lot of people say that the pictures AI, uh, put out, put out as really dreamlike. Um, I don't know how the algorithm work. Probably they won't tell me if I could

00:32:27: Stephan Hanf: understand the algorithm.

00:32:28: Prof. Dr. Matthias Krauledat: No, the applications of AI. Or, uh, machine learning in particular are of course, not only in the human context and not only for exploring our dreaming our body and our consciousness, but also they have so many industrial applications these days that this is really a very flourishing topic, for example, in the big automotive industries or so, or anything that is produced that is being produced in Germany needs some kind of quality inspection.

00:32:58: Prof. Dr. Matthias Krauledat: And. This all is just being developed right now, and they need so many data scientists working on this, or ideally even, for example, engineers who understand a bit of the production process itself, plus they understand also the machine learning aspects of it. So, that's the, for me, that's the ideal combination of having Uh, students also to work in industry.

00:33:23: Prof. Dr. Matthias Krauledat: So partly I can also look into my network and see, okay, this student could fit into this company or into that company or into this work group. And so, and where I know that they're frequently working together with us. And usually during such an internship or a thesis project, the students learn a great deal.

00:33:43: Prof. Dr. Matthias Krauledat: And honestly, in the big companies, it's these days. So that once a student does their internship and thesis there, they already offer him a job right after. This is really working very well right now. Engineers and on top of that, good engineers are really very rare. The companies know that. And usually once they have good experiences with our students, then they also want to hire them right away.

00:34:12: Stephan Hanf: What is in your experience, an attribute of a good engineer?

00:34:15: Prof. Dr. Matthias Krauledat: I think a good engineer should be thorough and should have a good idea. Where to find the answers that he's looking for, because of course you need a bit of theory as a general tool set, but in your work life, you will always find something that is in none of these toolboxes right away because technologies are evolving over time.

00:34:37: Prof. Dr. Matthias Krauledat: What we have these days with AI. That wasn't around, let's say 15 years ago or so, we don't actually have to go back that far, but in industry and in digitization in general, there are so many things that are changing over time and. If you just have that toolbox, that is a very general toolbox and just helps you how to look into problems and how to dissect a problem until it is manageable by the tools that you have, or until you find out, okay, this is a new tool that I will be using and okay, then you'll have to learn a new tool that could be.

00:35:15: Stephan Hanf: Yeah, no, I think it's a really good point because I know people who work at Amazon and, but they will told them early in the beginning, try to cancel your own job so that that machine is doing your own job. But of course, if you just a one trick pony, right, you won't really succeed as an engineer. So your goal is to evolve and also as, as an

00:35:37: Stephan Hanf: engineer, right?

00:35:38: Prof. Dr. Matthias Krauledat: Absolutely. I've worked in industry and there were also a situation where I thought. Okay, this is a job that a trained monkey could do, so I don't want any of my students to get into such a job because it doesn't really make sense. These are the jobs that are cancelled as the first thing when it comes to improving processes and so on.

00:36:00: Prof. Dr. Matthias Krauledat: You should be trying to, to watch out for the jobs that give you some I would also say intellectual puzzles to solve. So something where we really, as of these days, need human persons to work them out. And this is something that is not

easily automatized. You need to be curious. You need to have a very broad range of tools and you should know how to dissect problems.

00:36:28: Prof. Dr. Matthias Krauledat: I guess those are the things.

00:36:30: Stephan Hanf: And these are the

00:36:30: Stephan Hanf: things that you can learn here,

00:36:32: Stephan Hanf: right? You

00:36:34: Stephan Hanf: said that you had to plan to be a professional musician in between, and that's something that's still happening. I don't know if it's professional or not, but still you evolve your interest in music in the activities from the Hochschule Rhein-Waal with classical music, right?

00:36:49: Stephan Hanf: Yeah. You said that you had to plan to be a professional musician in between. And it's something that's still happening, but I don't know if it's professional or not, but still you, you evolve your interest in music in the activities from the Hochschule Rhein-Waal with

00:37:03: Stephan Hanf: classical music, right?

00:37:04: Prof. Dr. Matthias Krauledat: Yeah. I played in the orchestra up to two years ago.

00:37:08: Prof. Dr. Matthias Krauledat: We used to have an orchestra here. Um, there used to be a choir also. Uh, yep. So there's a lot of musical activities going on usually. Uh, there's also a connection to, um. Uh, one of the music schools here, uh, in Kleve. Uh, so if students, for example, bring an instrument, uh, a guitar or, uh, or they want to just play in a band or so this, this is exactly what you can do here.

00:37:36: Prof. Dr. Matthias Krauledat: Um, and you can find other musicians as well. Yeah, for me, uh, the orchestra was always the thing to connect to other people also. So I think playing in ensembles is something that, that helps you to meet new people, of course, and to communicate with them on a different level. Yeah, so it's a musical in that sense.

00:37:56: Prof. Dr. Matthias Krauledat: So right now I'm playing in the Bach Collegium Renanum, so that's an orchestra together with a choir and each month we're playing a Bach cantata. So there are hundreds of Bach cantatas, so there's enough for the next. Tens of

years, so no problem. And, uh, yeah, so I'm really happy to have found such a combination where all the musicians are very good and it's fun to not start at zero, but you know, everybody is already able to play their parts.

00:38:26: Prof. Dr. Matthias Krauledat: You just have to. Match them on a musical level. So that's a completely different way of interacting. And yeah. So that's, uh, that's something that you can also find in Kleve and, uh, and around Kleve.

00:38:37: Stephan Hanf: About classical music. So

00:38:39: Stephan Hanf: maybe to tie it all together, AI and music. Do you see in the future and AI, which can make really impressive sheet or

00:38:50: Stephan Hanf: orchestra music?

00:38:51: Prof. Dr. Matthias Krauledat: There, there have been tons of attempts at doing these things. For example, already in the early 2000s, there were, uh, AI based impro machines. So you could actually have some kind of a synthesizer that is playing along and improvising something and that that machine is playing with you. That's fine.

00:39:15: Prof. Dr. Matthias Krauledat: That's interesting and, and could also be done into something. For example, there was a, um, uh, Beethoven anniversary, uh, a couple of years ago. And, uh, they. Uh, took his, uh, some fragments from, uh, a symphony that he has never, uh, concluded and let an AI finish it. They had trained it on, uh, other works of Beethoven and have then put it together.

00:39:41: Prof. Dr. Matthias Krauledat: And they actually did a, so a first performance of, uh, this new piece or, uh, this. piece that has been finished in the style of Ludwig van Beethoven with a big orchestra and a very renowned conductor. And yeah, so it's something that, that people are working on and this could be interesting, not only for classical music, I would say.

00:40:02: Stephan Hanf: I heard that the reaction were quite mixed about that.

00:40:05: Prof. Dr. Matthias Krauledat: I know. Yes. Yeah. Yeah. It depends very much what you put into it. And of course there's no, Ingenuity spark, Beethoven always said about himself that he, he claimed to be a super genius in music. And you can't expect that from a machine learning rhythm, of course, and it's only as good as the data that you feed into it.

00:40:25: Prof. Dr. Matthias Krauledat: So it's very much of a choice of the composers or of the users of this composing algorithm. Yeah. And you're perfectly right. It's not great. Uh, it

was actually in the style of Beethoven. It sounded a bit like Beethoven. Yeah, that was fine. Of course, that's nothing entirely new and nothing that nobody had ever heard before in that sense, because that's not what an AI system can really do.

00:40:51: Prof. Dr. Matthias Krauledat: But what could be interesting would be, for example, to write machine learning techniques that can distinguish between AI composed and actual human composed. Classical literature, for instance. Yeah. So this could be something that it could work out.

00:41:08: Stephan Hanf: What's interesting that

00:41:09: Stephan Hanf: machines are going so far, AI said they can recognize other

00:41:12: Stephan Hanf: machines cheating.

00:41:13: Prof. Dr. Matthias Krauledat: Actually, this is something that is even heavily in use in machine learning because this is called generative adversarial networks. So you train two different neural networks. One of them is very good at creating stuff. And this is, for example, being trained on an image database and the other one is a discriminator and finds out, is the image that I'm currently seeing, is that something that comes from the other network or is that from the database or is that something which is an actual image?

00:41:47: Prof. Dr. Matthias Krauledat: And so these two are playing ping pong in that sense. And, uh, both. Get to know the truth after having presented and judged about a certain image and both are improving All the time and the interesting part about that you have a generator network that you can then use for example for your DALL-E. You can train that and this is a this is very good at painting all of a sudden or at generating fake images You can do the same thing for music, too

00:42:16: Stephan Hanf: Do you

00:42:16: Stephan Hanf: think you will ever come into a situation during your, uh, work life that someone will raise a question if AI might be better at grading a paper than a human?

00:42:26: Prof. Dr. Matthias Krauledat: I thought you meant writing a paper. No. Okay. Okay. Grading. Yeah. That's something different. I think grading a paper. Yeah. That can be done.

00:42:34: Stephan Hanf: Already?

00:42:35: Prof. Dr. Matthias Krauledat: Yeah, I think so. Yeah. You mean something like somebody is writing a bachelor's thesis and that, I think that's feasible. Yeah.

00:42:47: Stephan Hanf: And the other way around?

00:42:48: Prof. Dr. Matthias Krauledat: The other way around is trickier.

00:42:50: Prof. Dr. Matthias Krauledat: Yeah. So creating something is always trickier than just, just ranking. It, yeah, because the space that you're working is much higher dimensional. And so, for example, a new book to write or something that is always, that is a challenge. And it's also the larger the book or the paper is, the easier it would be to tell if there is a spot, okay, that doesn't sound right.

00:43:16: Prof. Dr. Matthias Krauledat: That must be an artificial intelligence. Uh, so there are more places where this could go wrong, but just ranking, yeah, that can be done.

00:43:34: Stephan Hanf: Thank you very much for listening. We appreciate any feedback and are always open to suggestions for improvement. You can reach us directly at podcast@hsrw.eu. In the show notes, you will find links and more information about today's topics and guests. My name is Stephan Hanf. Thanks for listening. Hear you next

00:43:52: Stephan Hanf: time.

00:43:53: Stephan Hanf: Tschüss.