Constellations Podcast

Episode 164 – Generative AI: the Opportunities, Risks and Future in the Space Industry

Speaker: Buffy Wajvoda, Head of Solutions Architects, AWS Space & Satellite – 17 minutes

John Gilroy: Welcome to Constellations, the podcast from Kratos. My name is John Gilroy, and I will be your moderator. According to a recent Bloomberg Intelligence report, the world is poised to see an explosion of growth in the generative AI sector over the next 10 years that promises to fundamentally change the way technology sector operates.

To learn more about the potential of this transformational technology for the space industry, we have with us Buffy Wajvoda, Head of Solutions Architects, AWS Space & Satellite. She will provide her perspective on the opportunities, risks, and future of the technology for the space industry. Buffy is an experienced leader with a demonstrated history of working in public cloud and big data in a range of industries from aerospace and satellite to U.S. government. So Buffy, we're going to jump right in here so put on your seatbelt. Generative AI has been around since the 1960s. It's nothing new. So what has taken the technology to the mainstream today?

Buffy Wajvoda: Yeah, absolutely. I would say there's actually three compelling reasons to why Gen AI is being seen more as mainstream.

First off is tech. It's always tech, right? We have advancements in compute, we have advancements in data storage, and we have advancements in new machine learning algorithms. In the past, if you wanted to do something like a large foundational model, you would probably need a data center of computers in order to produce that model. Cloud fixes that with pay as you go compute and storage. So tech has been a huge part of this. In addition, we now have AI/ML algorithms that specifically focus on creation or generation. So these new models are really poised to do that sort of generative AI/ML.

Buffy Wajvoda: The second compelling reason that I think Gen AI is more mainstream, it's just the accessibility to large foundational models. I think we've all played with some of the large language models that are out there where these foundational models have taken an opus of literature all the way up to 2021 in most cases, and allows you to interact with all of this data in sort of a natural way. Saying things like, where can I go see this? Or who was president at this time? All without actually understanding or knowing the innards of AI/ML.

The third compelling reason is just media and culture. That kind of speaks back to the other one, but there has just been so much excitement and so much focus on generative AI/ML that I think it's just naturally becoming more and more compelling for customers and individuals.

John Gilroy: Last week, I sat down with a guy named David Linthicum and he just came up with this book. He says something kind of interesting. He said that AI and ML are concerns with new life thanks to cloud architecture. It's always been there and now all of a sudden, you finally have the horsepower to move the plow through the field or something. People may be more familiar with traditional concept of AI. So how is generative AI different?

Buffy Wajvoda: Yeah. First, let's actually talk about the definition of AI/ML just to set some framework. So AI/ML is the use of machines or algorithms to produce intelligence for problems that were either cost-prohibitive or resource-prohibitive, usually because of the size of data, the complexity of the algorithm, or both.

For example, let's take weather predictions. Weather predictions have been happening for decades, well before cloud, and before that ease of access to AI/ML. The meteorologists and the scientists working these predictions were able to do them, but it was very cost and resource-prohibitive. Now, with the use of more compute and more data storage, we can do this all with machines.

Buffy Wajvoda: Generative AI, on the other hand, is the ability to use AI/ML to generate new things. So whether you're generating new texts, you're generating new images, you're generating new music, it's a creative algorithm for AI/ML that actually produces more new things.

John Gilroy: Well, let's get a quote from McKinsey to spice things up here. It's always interesting.

Buffy Wajvoda: I love McKinsey.

John Gilroy: Yeah and this is an amazing number. I don't know if I believe this number because this is quite a number. McKinsey estimates that generative AI technology could add between $2.6 and $4.4 trillion dollars of economic activity annually across industries. So where's this fit in?

Buffy Wajvoda: Absolutely. Right now, we're letting space customers and customers of all industries lead the way to experiment and define where this technology will take them and provide them with the most benefit. So it's still early days of generative AI, but we definitely see a bunch of promise, and especially in the space industry.

Buffy Wajvoda: For space in particular, the areas that I see generative AI being the most beneficial are analysis, digital engineering, manufacturing operations and then, of course, that culture access part again.

So when you look at analysis, I already talked about weather predictions. But you can use generative AI for geospatial predictions. So taking pictures of the Earth from space and then predicting where maybe a natural disaster is going to happen, where there's going to be a change in economic activity, all through the use of generative AI and pictures. We'll have better object identification, and we'll even have better image security.

Buffy Wajvoda: Right now, when a company buys an Earth observation picture, that is a picture taken from a satellite and delivered, how do you know that that picture was actually the picture that was taken or somewhere during the midstream it didn't change somehow? So generative AI is going to give us that ability to look at images and provide us with image security. When you look at things like manufacturing and digital engineering, that is such a big topic in space right now. A lot of companies are playing with things like digital twins, digital engineering, using generative AI for different parts and different ways of thinking about parts.

Then on top of all that, we have things like Amazon CodeWhisperer. So I don't know about you all or the audience that I am speaking to, but a long time ago, in decades far away, I used to be able to code. If someone asked me to code something today, it would be ridiculous. It would be a mess. But using something like Amazon CodeWhisperer, you can say exactly what you want to do and which language you want to do it, and it builds the functions for you. So it's absolutely game-changing for developers. Going back to the actual areas, operations for space, whether it's mission planning, it's operator training, or disaster recovery from something happening to a spacecraft or a mission, generative AI is going to help each one of those actually be performed quicker and more accurately.

Buffy Wajvoda: So a great example there is using something like retrieval augmentation generation, where you would take something like all of the manuals for operating a satellite or all the manuals for operating a rocket, and you would put that in your model. You would let your model build all of that information in a secure way where you're holding onto all of that information. And then instead of an operator needing to remember, “my goodness, that was page 377 where I knew I needed to do this”, if this red blinky light came on, you'll just ask generative AI, "Generative AI, what do I do with this?" And it'll give you an exact answer. So super, super important for efficiency in operations and mission planning.

John Gilroy: Buffy, I'm taking so many notes I'm running out of ink. I mean, so many things. It's idea after idea. Just take digital twins as an example, this idea of a digital

twin. This can be game-changing for engineers and manufacturing things. So, let's go back to the potential it has here and maybe think about digital twins. We know that generative AI has lots of potential but there are space leaders listening to this podcast that don't know where to start with the technology. So what would you tell them? Digital twin, or where do they start?

Buffy Wajvoda: Yeah, it's hard and it's unique. It's unique to every single business. But I will say that I think generative AI is going to be a part of every single industry and every single business. So there's huge impetus to get started with generative AI right now. Now, with Amazon-type services, anyone can be a process in the process of generative AI. AWS is making it easy, practical, and secure for customers of all sizes to use generative AI in all the layers of the ML stack. So while space has a long heritage in these deep hard problems like manufacturing, operations, analytics, generative AI can help in all of those. So I would say a great place to start is the workforce and just getting it started.

John Gilroy: Well, Buffy, I don't want to rain on your parade here or turn this into a downer, but we know there's a lot of opportunities in generative AI, but there's some limitations to the technology too. Some people misapply it, so let's go to the other side of the coin. Sometimes there's bad applications, aren't there?

Buffy Wajvoda: So for AWS, we are committed to the responsible use of AI/ML across the board, and we want to provide customers with the tools and guidance to use AI/ML responsibly. One of the ways that we're able to do that is working directly with customers. So AWS works directly with these customers to understand some of the concerns over generative AI and continue to push responsible AI/ML for all customers.

John Gilroy: Well, Buffy, I'm recording this in Alexandria, Virginia, about 10 miles from the Pentagon, just down the road is the Pentagon there and I'm always thinking about cybersecurity, because they are certainly thinking about cybersecurity all the time. So it is difficult for us to discuss generative AI without covering the risks and cybersecurity threats that it may pose to the space industry. So what is your perspective on the risks and threats of the technology? I mean, bad guys have AI too, don't they?

Buffy Wajvoda: Yeah, absolutely. I would say that whether we're talking about generative AI or not, cyber is no longer a "if it happens" it is a "when it is going to happen." So companies just need to be more flexible and vigilant all up on detecting and mitigating cyber attacks.

One of the things that our customers in particular tell us is that they're overloaded with information. So using AWS services, you can reduce the undifferentiated heavy lifting of storing that information, parsing that

information, understanding that information, and instead produce actionable insights that you can take against cyber.

Buffy Wajvoda: So AWS has over 300 security services and features, as well as things like our AWS Security Lake, and again, those dashboards of actionable insights so companies can start to work on the "when cyber happens" instead of the "if cyber happens."

John Gilroy: Okay, Buffy. This is a part of the podcast where I read a quote from a luminary and you have to tell me who said it. Okay? It's going to be easy for you. So here's the quote. He said, "My heart is in space, but my brain is in the cloud."

Buffy Wajvoda: That sounds like Tom Soderstrom.

John Gilroy: It is. That's a great quote, isn't it? I mean, it's perfect with the discussion today.

Buffy Wajvoda: Tom's great and we've actually had the opportunity to be on stage together, so I very much enjoy working with Tom.

John Gilroy: Yeah, he'd be a wonderful person to work with. Let's go back to generative AI here. So do you see generative AI replacing human efforts for certain tasks and jobs in the space industry in the near future?

Buffy Wajvoda: I would say that I see generative AI augmenting tasks and efforts in the space industry.

So if we reflect back to the ways I think that generative AI is going to help the space industry, for example, again, look at the digital engineering or digital twins. Using something like generative AI are going to allow the individuals working in that part of the mission the ability to work faster and innovate faster to see an actual spacecraft or a rocket in 3D, be able to model when certain activities happen, whether it's bad radiation or, at this point, with all of the space activity going on in the belts, even something like space collision.

When I look at the industry all up, it is growing faster than ever before, even faster than 1960s, quite frankly. There are over 10,000 commercial space companies now. It's no longer a nation-state activity. It's a very commercial activity, and I think the human connection to space will certainly continue.

John Gilroy: Well, we look at all these 10,000 companies, look at all these new services and all kinds of startups taking advantage of the innovations. It seems to me that there’s this huge appetite for generative AI applications. Can the cloud keep up with the demand for this computing power today?

Buffy Wajvoda: AWS is highly committed to generative AI. For example, we actually just announced five new things around generative AI including the general availability of Amazon Bedrock. So that's huge in terms of letting people experiment with generative AI.

Amazon has been heavily invested in the development of AI/ML and machine learning for about 25 years, actually. We use it all across our portfolio, whether you're looking at our warehouses, our robots, our e-commerce platform, aka amazon.com, for just buying something. Even our Alexa is using AI/ML. Amazon, therefore, and AWS have been very invested in making sure this technology goes forward and making sure that we have the best infrastructure for AI/ML.

So Amazon, for example, has developed specific silicone for AI/ML. We have our Trainium chips and our Inferentia chips, which offer the lowest cost for both training models and running models.

So take something like the Trainium Trn1 instance. It can deliver up to 50% cost savings. Training, however, is only one part of the equation. So you train a model and then you need the predictions to come out, which is a huge part of generative AI, right? That's what you want. You want this creative output to come out.

So our Inferentia chips are able to provide customers with about 4x output on predictions with about 40% better price comparison. An example of this would be Autodesk. So Autodesk is currently using our Inferentia chips, again, to make those creative outputs to customers. They're able to provide over 100,000 natural language processed answers a month to their customers with what they estimate as a 4.9% improvement over the standard chips for AI/ML.

John Gilroy: Wow. Well, Buffy, I'm glad you brought up Alexa. I was thinking about asking Alexa this question, but I'm going to ask you. Here's the question. For those of us who want to learn more about generative AI, can you tell us a bit about the free and low cost courses that AWS offers?

Buffy Wajvoda: Oh, absolutely. Like I said before, AI/ML is so important to AWS, and we want everyone to get started with it. So right now, you can go on to aboutamazon.com and you can find that we have seven courses right now that are completely free, that get customers and individuals started with generative AI.

In addition, we've also stood up our Generative AI Innovation Center. So this is a center of deep scientists, deep AI/ML experts, industry experts, developer experts that companies can use to come with and just brainstorm about how generative AI can innovate their company.

So I'm super excited about that, and I'm super excited to see all of the new ideas that companies come up with. While I can postulate on all the ways that generative AI is going to change industries and change the space industry, it's going to be so much bigger and so much more inspiring than anything we can ever imagine right now.

John Gilroy: Wow. This has been a great interview. I think what you've done, Buffy, is given our listeners pretty good insight on the complex and rapidly changing world of artificial intelligence. I'd like to thank our guest, Buffy Wajvoda, Head of Solutions Architects, AWS Space & Satellite. Thanks, Buffy.

Buffy Wajvoda: Well, thank you for letting me come and talk to you all. I really enjoyed it, and I'm highly passionate about the topic, as you can see.