

Humanoidization: Costs, Demand, and the Future of Work

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Dwain: [00:00:00] Hello Christoph.

Christoph Bartneck: Hi, Dwayne.

Dwain: In part two of our series on the new humanoids, we're going to look at the economics of humanoid robots. We're going to try and uncover what the key costs associated with operating a humanoid are, how companies might deploy them profitably, and whether or not humanoids will take our jobs.

And if so, we're going to what we should be doing to prepare, and so much more. Are you ready?

Christoph Bartneck: Yes, sounds great.

This is the Human Robot Interaction Podcast. Your host, Christoph Bartneck.

Dwain: I'm curious, Christoph, when you first started studying robots in the early 1980s

Christoph Bartneck: Come it wasn't that long ago.

Dwain: Nevertheless, did you think that by late 2024, you would have a humanoid robot in your home?

Christoph Bartneck: Back in the early 2000s, [00:01:00] yes, because at that time we had Sony's Aibo and it was available for purchase. You could buy it in the shelf and it did something and you could program it and have some fun with it. It wasn't useful, but it was a product. Still expensive, I couldn't afford it, but the hope was that it would get cheap enough so it would be possible. So, yeah, I would have expected a robot by now, and I'm still too poor to own one.

Dwain: What about humanoids in the workplace?

Christoph Bartneck: That's more difficult. So back then, there were already the first humanoids out there. But they couldn't do anything. They were able to talk to you, and they could gesture, and maybe, they were just communication devices. In terms of being able to pick up and do stuff, those were just the industrial robots. And they were there already as well in manufacturing but nobody had dared to put the industrial arms into the home yet. To [00:02:00] honest, I thought we would be much further along by now.

Dwain: What do you think has stunted the potential?

Christoph Bartneck: I suspect cost is one factor.

Dwain: I asked Will Jackson, CEO of Engineered Arts and the creator of Amica, one of the world's most advanced humanoids, about how they deployed the humanoids profitably.

Will Jackson: We just deployed what we had early and one of the first robots I sold went to Carnegie Science Center in Pittsburgh. Thank you people at Carnegie for trusting us. And that robot was terrible. It sucked to be honest. It was very, very unreliable and it was put in as part of a robot gallery and it, it talked about various robotics things.

It didn't have any kind of AI interaction. So it was basically a replay device, but it was entertaining. I remember flying back and forth personally a few times to fix that robot and iron out all of the things that we should have ironed out while it was [00:03:00] still in the lab, to be honest, but we didn't have a choice.

We had to just deploy it. So we deployed it and We spent a fortune trying to maintain it, and it got to a point where I remember saying to the customer, you know, hands up, I give up have your money back, and I'll take this thing away, and they really wanted to keep it, they were like, absolutely not, this is super popular, you know, people come from miles to see it, and, you know, they bring their friends and family back to see it, and we're keeping it, and They actually upgraded that robot at least once, maybe twice.

I felt, oh this is kind of proof here, even though that product, early product really sucked. There, there was still enough value in it that the customers was willing to go with it. And to this day, I don't think we've ever had a robot sent back because it didn't live up to expectations. Our return rate has been about zero. We get robots to come back for repair, [00:04:00] sure. But we don't get ones where people just say, ah, it didn't do what we thought. Yeah.

Dwain: So what kind of business use cases are we talking about here? Cause you mentioned they always live up to expectations.

Will Jackson: It's about communication with people. Nine out of ten. It's talking, it's interacting it's gesture, it's facial expressions. Yeah. And are they

Dwain: going into a museum or something? Was that? Yeah. Museum,

Will Jackson: science centers. Gotcha. Yeah. We also do a lot of work with corporates and corporate communications.

Yeah, we do work with some big corporates. Yeah. Humanoid robots are a really, really good way of interfacing with people, bottom line. So then you see, we've seen some demos. So I saw a demo it was one of the newer companies showing off a robot and it was, hey robot, tidy up the trash for me and pick me out something nice to eat.

You've probably seen this video. And I was Hang on. Wasn't your business model supposed to be [00:05:00] light type manufacturing, Factory where nobody is talking, there's nobody even in there and the robots just doing these tasks. Why the hell is it interacting with a person in your demo video? Because the person ain't supposed to be there.

So you immediately look at that video and how many hits it gets. And you'll see, I don't know what it's at, but probably millions, tens of millions even of views. Why is that? Because people are compelled by that experience, by that idea that you can interact with technology in a human way.

That's very exciting. So I remember a similar thing. I went to the launch of Tesla bot, Optimus and Elon comes on stage and Optimus comes out and does a little gig and a dance and the crowd are going nuts. And then you got 2000 people or something in that room, like screaming and shouting.

Absolutely loved it. And I can see why it was compelling. [00:06:00] I loved it. Then Elon goes, well, then we're going to get it in a factory and it's going to move a pipe from this place to that place. Wow. Really? Is that why they were all cheering? Because there's going to be a thing they can never see that moves a pipe from A to B.

Who cares whether it's a humanoid or not? If you want to move a pipe, just get a ramp and roll it down. It's so dumb. It's, in a way, this doesn't matter. It doesn't matter what the people running these companies think the application is, because the application will come and find them. And I'd say you're now seeing that with Boston Dynamics. Suddenly we see spot dressed up as a character and performing

Dwain: giving, giving relationship advice.

Will Jackson: Yeah. So suddenly we're seeing human interaction as a business model. I've got a bunch of very channel vision, whatever you call it, tunnel visions kind of engineer types who were just focused on Value equals task performed [00:07:00] cost of task performed multiplied by rate that task can be performed at, they never see the human value.

They never see, the example, Hollywood is 5 percent of US GDP. I, people look at us and say, oh it's just entertaining. What rubbish, you know? Oh, okay. Yeah. Let's scrap Hollywood as well.

Christoph Bartneck: We spoke with Bruce McDonald from the University of Auckland about the financial costs associated with building and operating a robot.

Bruce: Traditionally, there's a cost of commissioning a robot, which could be as much as the cost of buying the robot. Which is what a lot of people forget. The robots, you've got to buy it, but you've also got to install it somewhere. program to do its job and set up everything it needs. So, especially in factories, you know, in the past, it's been costing as much to buy as to buy in the robot is to set it up. So that's something that engineers need to think about in terms of cost.

I'm Bruce McDonald. I'm a professor in engineering at the University of Auckland and the director [00:08:00] for CARES, which is the Centre for Automation and Robotic Engineering

Ongoing operating costs shouldn't be too bad. Shouldn't be a lot, I think, as long as the robot doesn't break and robots do break. from time to time. So you need to be doing maintenance as well and make sure the company you bought it off is going to help you.

Jobs

Dwain: Now let's investigate the ever persistent question on everybody's mind, which is, will robots take our jobs?

Christoph Bartneck: Here's Joe Cripp, the author of the book Don't Worry About the Robots, How to Survive and Thrive in a New World of Work.

Jo Cribb: it's not a robot that's going to take your job it's a human that has leaned in and learnt and become AI enabled faster than you. So there's a lot of I guess it's our tech literacy, it's our ability to learn and adapt and [00:09:00] change will make us employable in the future. And most people are predicting most industries will have a degree of AI enabled tools and systems.

Bruce: No, I don't think they're going to take our jobs. technology has improved the job situation for hundreds of years, and I don't think robots are going to change that. There's more people employed in the world than, in a percentage, than there ever were, which is quite dramatic because like 60 percent of women are working now, and that hasn't caused a decrease in employment.

Technology tends to increase employment more than decrease it, I think. We were always worried about people losing their jobs. With new inventions, starting with the printing press, when we thought the monks would lose their jobs copying books. But, you know, we found other things for monks to do. When word processors came along, we were worried about typists. But they got jobs doing the, editing of documents. And we ended up [00:10:00] making longer documents and printing out more paper than we ever had before.

Christoph AI3: Rodney Brooks from the Massachusetts Institute of Technology had similar ideas when he introduced his Baxter robot.

Rodney Brooks: But fear of losing jobs to technology has been around for a long time. Back in 1957, there was a Spencer Tracy, Katharine Hepburn movie, so you know how it ended up. Spencer Tracy brought a computer, a mainframe computer of 1957 in, to help the librarians. The librarians in the company would do things like answer for the executives, what are the names of Santa's reindeers, and they would look that up, and this mainframe computer was going to help them with that job.

Well, of course, a mainframe computer in 1957 wasn't much use for that job. The librarians were afraid their jobs were going to disappear. But that's not what happened, in fact. The number of jobs for librarians increased. For a long time after 1957, it wasn't until the internet came into play, the web came into play, and search engines came into play, that the need for [00:11:00] librarians went down.

And I think everyone from 1957 totally underestimated the level of technology we would all carry around in our hands and in our pockets today. And that, you know, we can just ask, what are the names of Santa's reindeers and be told instantly. Or anything else we want to ask. Uh, by the way, the, uh, wages for librarians went up faster than wages for other jobs in the U. S. over that same time period because librarians became partners of computers. Computers became tools, and they got more tools that they could use and become more effective during that time. Same thing happened in offices. Back in the old days, people used spreadsheets. Spreadsheets were spread sheets of paper, and they calculated by hand.

But here was an interesting thing that came along with the revolution around 1980 of PCs, the spreadsheet programs were tuned For office workers, not to replace office workers, but it respected office workers as being capable of being programmers. So office workers [00:12:00] became programmers of spreadsheets. It increased their capabilities. They no longer had to do the mundane computations, but they could do something much more.

Dwain: but humanoids are very unlikely to be taking our jobs, yes?

Will Jackson: I don't think, not, mainly because of practical reasons. You know, it's not because of ethical or any other considerations. If people could do it, they would do it. Why isn't, it would happen right now if it was possible, you know, and it isn't happening because it isn't possible.

Christoph Bartneck: This begs the question, are there any jobs that humanoids will be able to do well?

Jo Cribb: Absolutely. And and incredibly potentially desirable. For, I guess, some employers, if you think about particularly in our aged care was the example that was coming up that the vast amount of people that need to be cared for. And if you look at our popular population dynamics, not a lot of people to do that.

Bruce: I guess most things that humans do could be done by a humanoid robot if it involves [00:13:00] manipulation and mobility. So a lot of factory work.

Will Jackson: it involves people, basically. If I'm talking to you, or if I'm serving you a coffee at a bar, or Entertaining the kids in the airport while you're waiting for the plane that's been delayed five hours or entertaining them in a theme park, pretending to be some fantasy character those are human centric tasks or caring for grandma.

Or, looking after the, for the patient with dementia all of these are human centric tasks. And in that case, having a human form and human capabilities makes perfect sense. It's the interface that we're used to. It's what we're familiar with. It's appropriate technology for that application.

Prepare

Dwain: How should people best prepare?

Bruce: The [00:14:00] only thing we do need to do is to make sure that when people are displaced by automation that we train them up and get them involved in the new economies and jobs that occur as a result.

Christoph AI3: Issac Asimov made a very similar point already in the 1980s

Isaac Asimov: Well, it's scary, but not for the reasons they always saw it. They saw the robots as being somehow human, imitation human beings that were vicious and soulless. That's not so. Uh, we now know that robots are simply machines that do what they're told to do, but they replace human beings. It's not that they kill them, but they kill their jobs.

Uh, they'll create more jobs than they kill, but they'll be different jobs. And the people whose jobs are lost may not easily be educational. Educatable. There it is. Okay. Uh, into new jobs. Uh, so that we are going to have to accept. An important role, society as a whole, in [00:15:00] making sure that the transition period from the pre robotic, uh, technology to the post robotic technology is as painless as possible.

We have to make sure that people aren't treated as though they're used up dishrags. That they have to be allowed to live and retain their self respect. Work has to be found for them. Those who can be educated into new jobs should be. Those who can be transferred, fitted in somewhere else, should be. This is not going to be easy, and the transition period will be starting almost at

Dwain: What are some of the things that engineers and computer scientists should be thinking about when they're considering the future?

Bruce: I think they should think about what's going to happen to the people where the automation is going to be introduced. We've done some of our projects we've studied the community adoption of our robots, what it's going to do to the community, because it's not just the people doing the jobs.

It's all of their family and friends in the community they live in. And [00:16:00] the robotics is going to have an effect on the whole dynamics of that community. I think what engineers should do is understand that and actually ask questions about it. In particular, co design, I think, is really important.

When you're designing the robots you need to talk to the people who are going to be using the robots who are going to be present when the robots are there and the managers and you probably need to talk to experts as well. For example, if you want robots in health care, you should talk to the clinical experts who are involved in providing that health care because the robot should be making their jobs easier and not making them harder and improving their situation, improving their well being as well as the. The patients, if you like.

Jo Cribb: I think there is a sense that just because you can do it doesn't mean that there is an end user who wants it. And that And that what seems, exciting from a tech perspective could actually be absolutely [00:17:00] frightening and potentially the subject of backlash. So I think there is a big call to those working right at the front end to continually be testing with those who are non tech.

How would you relate to this? How would this work? And think about how you're developing it, for your end user. Rather than developing it, because through a pure tech lens, I do think we could end up in a space where things do become too frightening. They're regulated and shut down.

And, there's so many of us can see the huge benefits for AI. But I think we need to treat carefully. Yeah, there are some God like qualities to some of this tech.

Well, the key message we are getting from everyone is the ability to learn. Now I know that sounds trite, but many of us do our formal learning. We might go to university and then we kind of say our learning's over. Nothing could be more wrong as we say, we're going to continually have to learn our prompt engineering.

All of us are going to have to, we're going to have to [00:18:00] understand actually how these large language models work so that we can understand how they can serve us well. And also, we're going to have to be able to adapt and change. Many of the very thoughtful thinkers are thinking about convergence.

So we are having climate change solutions, agritech and our digital platforms, our e commerce, everything is going to change and we need to go and to adapt to it. So this curiosity and learning mindset and the ability to put the time and energy in to stay current is going to be key. So, and those who are curious, who are learning will and can adapt will be okay. But as we find in the adult population, that isn't a high percentage of people.

Will Jackson: an announcement that kind of went under the radar, but I noticed it last year. Boston Dynamics teamed up with Animax. Who are Animax? Animax are part of City Neon. City Neon are a theme park and entertainment group. That to me is significant. You're going to start to see [00:19:00] humanoids in our space, and you'll, we're kind of already doing this, but we wouldn't yet dare to do the biped Moving around people is just too dangerous.

I think you'll start to see it in constrained ways. Actually Disney, they've done a nice little biped with their group model. They have some other, I don't know the name of them, some other little drawings that they were using that were tele operated. So that I think is the kind of application you're going to see.

You'll get people who get pretty sniffy about it, so I get, I saw, I interviewed with somebody the other day or I saw a comment and they said, Oh, the critics of your company say you're purely performative, like, oh, they've got this fantastic utilitarian robot that can do everything. I would say they're purely bullshit. You know, it's the purely performative. What does that mean?

[00:20:00]

Market

Christoph Bartneck: does a market for humanoid robot exists right now?

Bruce: Well, there's no market at the moment. There's nothing serious that humanoid robots do. There's a lot of people making them and there's a lot of research, but we haven't got to the point of widespread at scale marketplace for them. Like for example, electric cars. It's at a much, much later phase of diffusion into the market, I think.

Will Jackson: If you want to know, go out and look. So I had somebody came to me the other day and they said, Oh, I've got this great business idea. I'm going to start a kind of marketplace for humanoid robots. And I said, what? There is no market for humanoid robots. What are you talking about? And why would you make a shop for a product that nobody's ever bought? The the, [00:21:00] and the person was like, oh, well, you know, it's all going to be sold.

And I said, well, go out and find me evidence or find for yourself, establish for yourself that This product exists and they were, well, Hey, I spoke to the people from the humanoid robot company and they told me it was all good. They told you, you did, you see it, did you actually see it with your own eyes? Did you see a robot in a factory doing something useful?

Christoph Bartneck: Do people even want humanoids?

Dwain: Would you personally be interested in having a very realistic humanoid robot in your home?

Jo Cribb: Um, see, even I'm, I'm going to put a whole lot of caveats around it. I was saying to you, my, my chat TPD just started giving me emojis and it felt far too intimate.

And that's only a, Do you know, a very little sign. So I do think there's a piece of us leaning into this and working out what I like somebody to, to stick my dishwasher and make my beads. Yes, I would. But do I want someone walking around that looks a bit like me? [00:22:00] Yeah, I'm struggling with that. Yeah, I think we've got the interplay of, I guess, humanity and Social expressions of ourselves and our identity are all tied up in this tech and that is where I think we need to tread very carefully.

Bruce: Yeah, I would have one, yeah, as long as I knew how to shut it down. Because if it started doing the wrong thing, you wouldn't want it to continue, I don't think. But if it loaded my dishwasher and unloaded it, I'd be very happy. If it vacuumed the floor, that would help.

Conclusions

Dwain: so what do we make of all this?

Christoph Bartneck: It seems that we are not yet in danger of robots taking our jobs.

Dwain: Indeed, the chances of a humanoid finding gainful employment seem quite unlikely, except perhaps working theme park.

Christoph Bartneck: It might be worse than that. Humanoids could potentially Add to the unemployment rate.

Dwain: Imagine a job seeker support benefit [00:23:00] humanoid robots who do not have a job, are available for work, and have taken reasonable steps to find a job.

Christoph Bartneck: What is reasonable? It is clear that there are still a large number of technical problems to solve before humanoids can do anything even remotely useful for us.

Dwain: I agree. When you consider what needs to be accomplished in order to achieve humanoid robot that can perform successfully in human environments, for example, do a human job. First, it needs stable bipedal locomotion to negotiate varied terrains designed humans. Next, sensors, actuators, and algorithms have to be advanced enough to provide reliable balance, movement, adaptive manipulation, and so much more. It also needs algorithms light years ahead of what we have today high level reasoning so humanoid can interact people using human language and other human modes communication.

And we haven't even scratched the surface. Humanoids also consume considerable power, especially during dynamic tasks. [00:24:00] So we need huge advancements in battery and energy actuator technology. Finally, and in many ways, most importantly, all this technology must housed in a visually pleasing humanoid aesthetic and successfully marketed at an affordable price point.

Christoph Bartneck: You're right. Mark Rybert, the founder and former long term CEO of Boston Dynamics recently said that the big challenge in robotics right now is having realistic use cases that are money making.

Dwain: Ah yes, didn't he proclaim that the warehouse use case is the only thing that makes anybody any money in robotics?

Christoph Bartneck: Yes, and there was no talk of humanoids working in warehouses.

Dwain: What strikes me is that there was a sense of trepidation among some of the that we interviewed for this episode, specifically regarding humanoid in the home. While the idea of having a humanoid do the dishes and vacuuming floor was desirable, there was less appetite to own a humanoid that looked like the owner, and having the ability to shut it down was [00:25:00] essential.

Christoph Bartneck: There's so much we could talk about here.

Dwain: Well, let's pick this up in our next episode.

Christoph Bartneck: Good idea. So, please join us next time when we talk about the concerns people have about humanoid robots.

Jo Cribb: But we also in an opening up conversation space, I guess, with normal non tech people, what we got was an absolute sense of fear. Absolute sense of fear particularly of AI. And it came through in a different ways. And if you look at Internet New Zealand survey, they did. What do New Zealanders think about AI?

Well, over half of us do not trust AI and this might be because it's a new technology and we're just learning and thinking about it, but a lot of people don't really understand. And I would even say some of our engineers don't really understand what is happening in those large language models. And that is frightening to somebody who is on the outside.

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