

Kristi (00:53):

Chris, so thanks for joining us today. We're excited to hear more about Aurora. But when preparing for this podcast, I read that you participated in the DARPA Grand Challenges in 2004 and 2005, both of which were driverless car competitions, which obviously naturally set you on this path. But I'd love to hear more about your background and how that eventually did lead to Aurora.

Chris Urmson (01:17):

Sure. Well, first thanks for having me. Really appreciate the chance to chat with you and speak with the audience today. Yeah, I guess I've been working in this space for a while. I got to compete in the 2004, 2005 and actually the 2007 Urban Challenge as well, which were all these, what we called back then robot races. Now we talk about self-driving cars. For me, I had been a graduate student at Carnegie Mellon University. I was working on my PhD, and I'd spent time working on NASA projects and we had this robot in the desert that was super cool. Drove it about 30 centimeters per second. And when the DARPA challenge got announced, it was "we're going to have a robot drive from Los Angeles to Las Vegas and it's going to have to drive 50 miles an hour." And frankly, that just sounded cool, right? And so the chance to go and go out and play in the desert with robots and make it work, that was energizing and exciting.

Chris Urmson (02:12):

And then as we got into that, understanding the challenges the military was facing at the time with supply chains and how there had been more deaths... In the supply chain, there had been actually combat deaths in Iraq was meaningful and that we could do something about that. And then over the years, getting the chance to work on really just super interesting, exciting technology that has this breadth. It's everything from mechanical and optical engineering, through software engineering and government relations and public policy and all of that good stuff and working on a problem that people kind of understand. And then it has profound impacts that as we talk now more about where we're going with a Aurora, thinking about the benefits to safety on roads, the benefits to improving accessibility, making transportation more equitable, lower costs, reinforcing our supply chains, making that work more robustly, and the whole time doing this with great people has just been incredibly fortunate.

Kristi (03:16):

Yeah. It's funny, you mentioned the robot race through the desert and it just immediately called to mind some sort of weird cannonball run with robots.

Chris Urmson (03:27):

And you're not wrong, right? It was actually really fun to watch over the three years. So the first year, no one really knew what to expect. And so we were out there with a Humvee and big electronics enclosure on it and the robot was called Sandstorm. But there was another robot there that was inspired by a mollusk, I think they said, right? And so it was completely different. They had a Jeep. There was all kinds of crazy things there. It was kind of fun. And then as the programs, as the years went on, they became

kind of more similar, right? To where the Urban Challenge, it was a bunch of SUV's with lasers and cameras and radars on them and they all were in the same kind of solution space. But it really was just mindblowing back then. We had this robot and when we were developing Sandstorm, we were up where the old pony express trail was. And so we were in a chase vehicle, it driving itself, us following it along these desert paths. And there were times that it was just unbelievably beautiful.

Chris Urmson (04:36):

The desert is beautiful by itself and then you get the right sun angle and the sun is blinking or flashing off of the metal. It was a really cool time.

Kristi (04:49):

Yeah. Definitely sounds very cool. But I do want to ask about Reid Hoffman, right? Who is on your board as well. But for anyone who doesn't know, Reid Hoffman is the founder of LinkedIn and as I said previously, one of the Aurora's board members. But he has previously called you the Henry Ford of self-driving vehicles. And Henry Ford, he had his aha moment when he got to look at the Chicago meat packers assembly line. But what was your aha moment for autonomous vehicles and how did you earn that nickname?

Chris Urmson (05:22):

I think Reid made it up because he thought I'd be embarrassed by it. I think it's where that came from. But for me, I think that there's been a few aha moments over the years. I think the first was that first DARPA or the second DARPA Grand Challenge where we had these vehicles drive 150 miles across the desert and there was just nobody on board, right? There was no remote control and nobody kind of hiding under aluminum foil and steering it sneakily. That was kind of amazing. And then the Urban Challenge, which was a couple of years later, where now instead of just driving down a road, we had to drive on our side of the road and interact with traffic at least kind of the mock traffic that was there. And again, that was a pretty incredible drive, 60 miles. And then when I was at Google, helping found and lead that program, we had what we call the Larry 1000, which was a thousand miles of interesting roads in California. And just the time where we I remember we took a route where we drove across all the Bay bridges in the San Francisco area here, and merging onto the freeway and dealing with some narrow roads. And it just kind of started to work and I think that was exciting. And then the impact that this could have, I really felt when we worked with some members of the blind community, a gentleman, Steve Mann, in particular. And we were clear with him, this was a demonstration and that it was early on and that there's a gap between him trying this out and when we'd actually be able to have a product that he could use, but seeing for him and other members of that community what this would mean to their lives and how it would impact them was another big moment for me and just how transformational this can be and how fundamental it is to all of our lives and kind of the importance and the responsibility of us tackling that problem became clear.

Kristi (07:43):

Got it. Yeah, for sure. That's definitely impactful. So I'm going to switch gears a little bit and ask more of the nuts and bolts of Aurora. So rather than rely solely on conventional LIDAR for your vehicles, Aurora is using a variety of tech, including radar cameras, but also two types of LIDAR systems, conventional LIDAR for near objects and your proprietary FirstLight LIDAR, which I read can see twice the distance of conventional LIDAR systems. Maybe you can explain why that is important.

Chris Urmson (08:17):

Sure. Yeah. So our approach at Aurora is one where we want to build a safe, reliable system in our product, the Aurora Driver, and it consists of software, hardware and all the data service, things like maps and tele assistance that enable a vehicle to drive safely through the world. To see the world reliably, we don't want to just rely on one mode. So you kind of say, oh, well, people have two eyes so that's kind of like cameras so we'll just use cameras. Well, we think that's probably not good enough. We have better technology. We have radar, we have LIDAR. We can combine that with cameras and we'll get an even better result, right? I kind of liken it to it turns out horses have four legs and they run pretty well, but we don't put legs on cars because it turns out that the wheel is actually a better answer right? So in this space, we think combining laser radar and camera really gets us there.

Chris Urmson (09:11):

FirstLight LIDAR is our proprietary kind of LIDAR. And what's really neat about it is because of the way it measures lights, the way it measures the time of flight of the light, it has basically 10 to 20 fold amplification over a conventional LIDAR. So that means for the same amount of light, and you can see further or you can see more robustly. It also because we do this technique called frequency modulated continuous wave, we're much more immune to bright things in the world. So the way a normal LIDAR works is you send out a super bright pulse of laser lights and it's a really short pulse, goes out, bounces off the world, comes back, and then you're looking for a spike that comes back that's bright enough that it's above a threshold. And so it turns out if you look at the sun, sun's pretty bright so it's above the threshold.

Chris Urmson (10:06):

So you can't see your pulse because you've already seen something, or maybe a halogen headlight that you see out there, again, really bright and can kind of trip up these sensors, or another LIDAR. Well, with our FirstLight LIDAR, we're looking for exactly the wave form that we sent out. So that means we're immune to things like the sun, which isn't sending out a wave that looks like that. So we're much more immune to that kind of noise. The other magical thing that comes along with this is we can measure the Doppler Shift. And so what that is, if you've listened to an ambulance go by, you know how the pitch shifts on the siren so you can tell when it's coming towards you and away from you. Well, it turns out you can do the same thing with light because it's a wave, like the wave of sound that is coming off of the ambulance. So we can see that shift. And that means for each point that we measure with the LIDAR, we can tell whether it's moving towards us or away from us and how fast it's doing that.

Chris Urmson (11:05):

And so this is really powerful because it means that we can instantly know whether the thing we're measuring is moving in the world or is stationary. And you can imagine as you're driving down the freeway, driving a big truck, you want to see as far down the road as you can. And so that's the benefit of the self heterodyne measurement technique that's part of FMCW, that 10 to 20 fold amplification. We want to be able to see in conditions where there's bright sunlight or there's headlights and so that noise immunity is a benefit. And then we want to know instantly that thing on the horizon, is it something stopped on the road or is it something moving with us or heaven forbid, it's something driving at us? And so we can know that instantly rather than having to wait a significant fraction of a second to be able to track it. And so all of those things increase the safety and performance of the Aurora driver.

Chris Urmson (11:55):

And again, when you're driving a big truck, a 70,000 pound truck, you want all of those margins to your advantage.

Kristi (12:02):

Yeah, definitely. But, one of Aurora's competitive advantages in the self driving vehicle industry comes definitely from your partnerships with Volvo and Uber in particular. But can you maybe share a little bit about those, and why they're important?

Chris Urmson (12:18):

Yeah, so we have thought hard about our approach to building a business. And it's one where we want to focus on, what are we best in world at? And we think we can be best in world at building the Aurora Driver; that ability for a vehicle to drive safely from one place to another. And we want to work with other amazing companies, because we think together we will move more quickly, and we can help grow their businesses, and that will help us grow our business as transportation is transformed by automation. And so, we're partnered with Paccar and Volvo trucks. These are two of the three top manufacturers in the United States, and between them, they make about 48% of the trucks in the US. So, those are incredible partnerships for us, right? These are great storied companies, that know how to build quality products who have tremendous customer relationships. So, they're a fantastic set of partners for us.

Chris Urmson (13:10):

We're also partnered with Toyota, the world's number one car manufacturer. And again for that, we're with them, we're working on light vehicles, we're working on a Toyota Sienna platform that's being designed to be automated, and for the Aurora Driver. We work with Uber, the world's number one ride hailing platform. So again, that's a business, that's a very complicated, difficult business to operate. I don't want to have to replicate that; why don't we work with Dara and his team to bring the Toyota Sienna to market with them, and serve their customers, and provide an incredible experience there?

Chris Urmson (13:44):

And then, finally we work with FedEx as well. So this is the largest freight carrier in the US, by a number of tractors, a number of trailers. And so, as I think about positioning Aurora to bring this technology to market, bring this product to market, being partnered with two of the three top truck manufacturers in the US, the number one car manufacturer in the world, the number one ride hailing platform in the world, and number one carrier of freight in the US, they're the largest carrier in freight in the US, it feels like we're in pretty darn great position to go and have a huge impact, and create a bunch of value for our shareholders.

Kristi (14:18):

For sure.

Nick (14:21):

Yeah, totally. And it seems like some of the first commercial applications we're going to see of Aurora are in that trucking space, and you mentioned some of your partners there. Can you talk about why there's such demand in trucking? And what are some of the conversations you're having with businesses, as you're working on getting your solutions out there in the trucking industry?

Chris Urmson (14:39):

For sure. As we've spent more time talking with the trucking industry, it's really apparent the need is just real, right? I don't think we go a day without there being a headline about the supply chain challenges, I think somebody called it a supply chain catastrophe that we're facing, and a big chunk of that challenge is just moving stuff through the world. And a big part of that challenge is just the lack of people willing to drive trucks. So in the US, it's estimated that we're short 60,000 truck drivers today, and by the end of the decade, we expect to be short, 160,000. The UK and Japan are facing similar kinds of challenges, and I'm sure other places are as well. I'm just not as well versed in the statistics.

Chris Urmson (15:25):

And so, as we talk to carriers and private fleets, for them, it's very much not about replacing the drivers they have, right? They love their employees. They value them deeply, it's just that they can't get enough of them. And so the Aurora Driver can come in and support their business, work adjacent to their human drivers, enable the people that drive their vehicles to be home at night, so your driver can take the long distance chunks at the trip to begin with, and those people can operate the local trips, so they get to home and see their family each night. And as Aurora, we get to do something useful in the world, we get to improve safety on the roads, and we get to go after this gigantic industry, which is freight, which in the US alone is about \$700 billion. And a big chunk of that is in trucking, so, we're incredibly excited about that opportunity.

Kristi (16:15):

Yeah, by the way, before we got onto record this, I was reading an article in Bloomberg about how, to date, there have been 3000 mentions on earnings calls about supply chains, and one of the reasons cited was lack of truck drivers. So I imagine your phone is ringing off the hook.

Chris Urmson (16:31):

Yeah. We're having some very good conversations with folks. And again, I think it's really important that one of the most exciting parts of this is, it's not about replacing the drivers that are there, it's about providing more drivers that they can get in. And the carriers and private fleets that have this challenge, where they have a shortage, they have massive turnover, and the cost of labor is only going to go up over time. And so, for them, having a reliable supply of safe drivers that they can have again, operate next to the people they have driving their vehicles, I think is going to be transformational for their business.

Chris Urmson (17:10):

And then, you think about longer-term, the opportunities here. So today, a truck is limited by the distance a person can drive in 10 hours because that's kind of the hour of service limitation they have. Whereas the Aurora Driver is going to be able to drive basically 24/7. It's going to have to stop for fuel, and maintenance, but this means that it transforms the logistics network in the US, and it goes from tens of warehouses needed to put the population of the US within a two-day trip, to three to four warehouses. And so, this really allows these companies to think in the long-term about what does their footprint look like? What does their network look like? How do we complement that with what are my vehicles? And how do we ultimately serve their customers better and grow their businesses?

Nick (17:57):

And that's really exciting. And so what is your plan for commercializing this technology? Do you have a business model that can help recoup the high R&D costs of developing all this self-driving technology?

Chris Urmson (18:10):

Yeah, so again, our model is, let's focus on the thing we do best, which is the Driver, and then let's work with others to deploy it. And aligned with that, the way the Aurora Driver's going to come to market is through a driver as a service model. So you think of it as if you're a carrier, say FedEx, one of our announced partners, you go to Peterbilt. You said, "I'd like the 579 tractor, and I'd like it with the Aurora Driver installed on it." So you'll buy that from Peterbilt, and then you'll pay Aurora an ongoing usage fee for using the Aurora Driver. And so, this'll kind of, you think of it like a software as a service type model. And so, for that, we'll provide the maintenance, the hardware, we'll provide ongoing software updates, and the remote teleoperation and services that come along with that.

Chris Urmson (19:03):

And so, this model ends up creating a very asset-light business for us, for the longterm, creates really interesting again software as a service type margins for us. And it allows our partners to leverage their networks as well, effectively. So, we think it's a really exciting model. The only things that matter to us is let's not be in a place where we're competing with our customers, right? So, let's be the supplier of the driver to their businesses, and let's have them run their business, and make it very clear that that's not what we do, and help them again, grow and execute.

Nick (19:39):

Yeah, that totally makes sense. And a lot of other companies that are trying to solve some of these same problems and working in this space are very focused on either the self driving, heavy trucks or driverless taxis, but you're pursuing both at the same time. Why did you decide to go that path?

Chris Urmson (19:54):

Yeah. So fundamentally our experience tells us it's the same problem. And if you think about it, every truck driver who has a commercial driver's license started with a light vehicle license, you don't kind of skip the two, right? And it's because the fundamental skills are basically the same; you are looking out at the world around the vehicle, trying to figure out what's going to happen over the next few seconds, how your behavior is going to influence that, and then picking the right driving actions to move the vehicles safely and efficiently down the road. And so, as we think about this problem, we think it's just dramatically overlapped.

Chris Urmson (20:37):

Now, you have to have that understanding at the beginning, because you can make architectural decisions that make it very difficult for there to be overlap. If you don't have a robust enough representation of the world, say you build a model that really just works on freeways, then you won't be able to handle dense urban driving, right? It just won't translate. If you can't see far enough and you haven't engineered in the ability to do safe, stopping where you pull to the side of the road, then you're not going to be able to get from low speed driving to high speed driving. And so, this is where as, as Aurora, we thought early on, "Let's make sure the Aurora Driver is engineered, and designed as an integrated system that works across platforms." And so, yeah, we're excited about that. As a business, we see a lot of synergies between the two. And it hurts me every time I say that word, but we still see them there, right?

Chris Urmson (21:34):

We see the truck product being our first coming to market. We expect to be building that and operationalizing that business starting in late '23. And then, the ride hailing application will come to market a little later, and it'll basically look a lot like the truck product in that it'll start off the freeway, drive a short distance onto the freeway, drive down the freeway, come off the freeway and drop people off where they're going. And you think of that is like a typical airport to hotel, or airport to business district type trip. And this is quite different than where most of the other players in the robotaxi space are working, right? They're all working in kind of low speed, urban driving thing. And we think this is interesting because, one, if you look at a swath of Uber's cities, right? It turns out that the significant fraction of the trips are this kind of thing that requires you to drive at high speed. And that's unique to what Aurora's building. And then because of our special relationship with Uber, we're going to feather those vehicles into the Uber network in a way where we're not serving every trip; we're just serving those trips we can. And that will be a small fraction of Uber trips to begin with.

Chris Urmson (22:44):

But over time, we'll be able to look at the data we have from Uber that allows us to figure out which feature do we add next to the Aurora Driver, and what return on investment does that a lot for us? So maybe it's crossing railway tracks, or maybe it's making left turns at busy pedestrian intersections. I don't know what it is in this moment from that base feature, but we'll be able to figure out which of those allows us to have the biggest beneficial impact on Uber's business, grow those. As we grow that capability on the passenger side, because it's the same software and the same hardware on both the trucks and the cars, we'll be able to take that more complicated driving behavior, transition it back to the truck, and now, instead of the truck going from a terminal to terminal, it can go from a warehouse to a terminal. Or ultimately, it'll go from a warehouse to a distribution center, to a store and fulfill the whole driving task.

Chris Urmson (23:40):

And again, that can't happen if you don't architect the system upfront to do that, but we ended up getting this nice benefit, bilateral benefit, where we get basically the ride hailing product, and a lot of that comes along almost for free from the trucking product. And then, as we scale out technologically, the ride hailing product, the truck product benefits from that engross as well.

Nick (24:03):

Great, and on the subject of that testing and working through that, as this technology is being proven, it faces a lot of restrictions in terms of how it can be tested on public roads, could you just walk us through a little bit in terms of what is possible to test right now and how you're making progress through that?

Chris Urmson (24:15):

Yeah. So it turns out that in the US, it's actually really a permissive regulatory environment. And the way regulations work in the US is that the federal government regulates the safety of the vehicle. State governments regulate the safe operation of the vehicle. And local governments regulate access to the roadways.

Chris Urmson (24:34):

And in the vast majority of the US today, both the federal government and the states are enthusiastic supporters of the technology. They see the safety benefit. They see the economic benefit. They're quite engaged and proactive. I think in 45 of the 50 US states, if we had a truck we were confident of the safety of, we could operate it without a human driver on board on the road today. So that allows us a lot of flexibility to be out in the world and developing the system.

Chris Urmson (25:08):

As Aurora, one of the insights we had in founding the company was that's not going to actually get you there, that you can drive a bunch of time on the road, but if you think about a human fatality, a person driving a car has a fatal accident about once every 100 ... well, 1.15 times per 100 million miles. So that's a lot of miles. And so, if you think about ... Say it's 1 per 80 million miles-ish, roughly. That's a lot of miles to drive if you want to get the statistically interesting measure of that.

Chris Urmson (25:43):

So we realized that's not going to happen. So we've invested heavily in simulation tools, proprietary virtual development test tools that allow us to more rapidly test and more efficiently test, and be able to take the experiences we get on the real world and take them into the simulation system, and then expound upon them, right? Create variations of them procedurally that allow us to have more confidence in the capability.

Chris Urmson (26:12):

And the inspiration for this comes from the way other engineering applications have evolved. So, if you think back to the old days in mechanical engineering, you'd have an engineer who'd sketch something out. They'd go to the shop. They would machine it for them. They'd go bend it and shake it and heat it and find out what breaks. And then, they'd go design another thing on paper. They'd make it, and they'd iterate the cycle.

Chris Urmson (26:37):

The way mechanical engineering happens today is they sit down at a CAD station. They design it. They test it in simulation, right? They can put thermal tests through it, electrical tests, whatever, mechanical shock and vibe through it. They study that. They refine the part all inside the computer. Then they go out in the real world and check it, and then they can make another pass if they need to, but this means they can iterate dramatically more quickly.

Chris Urmson (26:58):

And this insight was what we came to with Aurora. It was like, that's the right way we should be developing self-driving vehicles and why we've invested so heavily in those tools.

Nick (27:09):

Totally, and I think we mentioned Mr. Hoffman before, but you have a lot of expertise on your board and in your conversations with investors now that this process has started. How does your own governance ... How is that reflected in, I guess, the questions you're getting from investors? And how do you feel like that's had an effect on the confidence levels there?

Chris Urmson (27:29):

Yeah. I think if you look at our board, it's phenomenal. We've been fortunate to attract a great investor base and a great board. Our board today is really all people who are operators. So we have Reid, as you mentioned, part of the PayPal team, founded LinkedIn on the board of Microsoft. We've got Carl Eschenbach, who is the Chief Operating Officer of VMware, a great human being, understands operating businesses.

Chris Urmson (28:04):

We've got Mike Volpi, who was Chief Strategy Officer at Cisco. When Cisco was in their particularly inquisitive phase, that was Mike. He ran their IP routing business, so really understands mixed software, hardware businesses, understands how to lead at scale, so a credible resource for me.

Chris Urmson (28:24):

Brittany Bagley joined us. She's the CFO of Sonos, previously at KKR, so again, just really thoughtful person in the space.

Chris Urmson (28:34):

And then, the three of us who founded the company, my experience building what's now Waymo, and leading that until a few years ago. Sterling was at Tesla. He led the launch of Model X and Autopilot, the first version of that. Drew is one of the world's leading experts in machine learning and robotics, top handful of people on the planet.

Chris Urmson (28:59):

And so, what we find is when we talk to investors, initially they're impressed with that cast of characters. And then, we get a chance to introduce them to my executive team, our executive team, and to part of our engineering staff. And I don't think I've left a meeting where people didn't come away impressed by the depth of experience.

Chris Urmson (29:22):

Yanbing, who leads our software team, was an SVP at VMware, VP of Cloud at Google, right, amazing leader.

Chris Urmson (29:30):

Sandor, CTO of GoPro before joining us, before [inaudible 00:29:35] who understands optics, optical sensors, and manufacturing those at scale.

Chris Urmson (29:41):

We have Khobi and Colette, who led communications and marketing for Tesla when it was growing through the phase we are, so understand how to build a brand. Our CISO, Gerhard was CISO for Google before joining us.

Chris Urmson (29:56):

And so, those are ... That's just an incredible cast of characters. If you go a level deeper, it continues, right? And so, a few weeks ago, we hosted Aurora Illuminated where we had investors and analysts come down and get a chance to meet some of the next layer of our team. And again, it's one of those moments where you feel like a proud Papa, right, where your people are out there talking, and you just can't be more than ... more impressed with how they handle themselves in the work they're doing.

Kristi (30:38):

So the question I usually like to ask teams is, what was your decision-making process like when considering whether to go public via SPAC? Had you considered a traditional IPO? And why now versus maybe just raising another round privately?

Chris Urmson (30:53):

Yeah. So the journey for us started when we made the acquisition of Uber's self-driving car business, ATG. We closed that transaction at the beginning of this year.

Chris Urmson (31:05):

And as part of that transaction, Uber put enough capital into the business so that our runway would stay what it was prior to the transaction, so into ... well into next year.

Chris Urmson (31:15):

At that point, we knew we were going to have to go raise capital. And so, we looked at the markets and we looked at private transactions, and we looked at public transactions. As we engaged with that, it became clear there was going to be more capital available to us in the public markets.

Chris Urmson (31:32):

There's more pathways for raising capital there. That made sense because during the development of this technology, it's relatively capital intensive. I think once the business gets running, it's a very exciting business, but there's a lot of people cost involved upfront.

Chris Urmson (31:50):

And so, at that point, we explored, do we move forward with a classic IPO or with a SPAC transaction. And in both cases, we wanted to make sure the transaction had the hallmarks of a high quality IPO, where we would have tremendous anchor tenants as the investors to go along with it. We'd raise the capital. And we'd be setting our partners up, our capital partners up, in a way where the business is going to grow in value, and they're going to be happy with the structure of that.

Chris Urmson (32:18):

And so, our conversations actually were the inverse of what most SPACs have. So we went out and talked to some of the blue chip growth investors out there, the Baillie Giffords, [inaudible], the T. Rowes of the world, and engaged with them, talked to them about the plan we were developing, engaged with them about the business, engage with them about setting a price for the business. It came out with, okay, this feels like a fair price for the business and the market that's going to be supported with folks who want to be with us for the long term.

Chris Urmson (32:53):

And so, at that point, we understood the economic terms. And then, it was okay, SPAC feels like if we can find the right partner here who's going to be aligned for the long-term with us, then there are some advantages to basically pricing, and certainly of capital earlier in the process versus an IPO.

Chris Urmson (33:16):

And so, we looked through a list of, I don't know, tens of potential SPACs. We engaged with some number that was less than 10 of those. And we ultimately settled on the Reinvent folks because their philosophy for venture capital at scale, their willingness to look at this as a long-term investment as opposed to a quick make ... get rich quick and flip it kind of model, aligned with what we saw the business needed because this is a business where we're going to be growing and building it for hopefully the next century. And so, we wanted folks who were going to be aligned with those incentives and that vision.

Kristi (33:56):

Yeah, it's funny. That was sort of my next question because when I was reviewing this deal, I noticed that the RTPY team, they subjected their founder shares to price hurdles at 15, 17.50 and 20. But in addition to that, their founder shares are effectively locked up for four years.

Kristi (34:15):

And that's a little bit unusual for SPACs. We have seen it before, but it's not always the norm. But it definitely better aligns this with shareholders, for sure. And was this something that you pushed for, or was this something that RTPY in complete agreement with you, and you were both on the same page about it?

Chris Urmson (34:36):

I think we certainly thought it was the right thing to do. And as we engaged with them on it, they were aligned with that. Yeah. And so, the way we structured this to align incentives again for between existing shareholders, the RTPY sponsors and future shareholders is, as you said, they're promote. They actually vest into based on the performance of the stock. So they get 25% of it now, and then at these different price targets, 15, 17.50 and 20, I think. Please check DS4. I think those are the numbers.

Chris Urmson (35:09):

And then, they're locked up for four years with it rolling off at 25% per year. Similarly, though, on the Aurora side, our major investors, myself included, the founders, and most of our major strategic investors have a similar lockup. So that rolls off at 25% per year. And again, this is, we're trying to signal the market, the intent here, right? This is not a business where we're trying to flip it quickly. It's, we think we're building foundational important technology that is going to have a profound impact on the world, that it will do a lot of good in the world, and it will create an immense amount of shareholder value. And we want to go along for the ride, and we want to make sure the market gets the mindset we have. And it was exciting to have a partner that shared that model.

Kristi (36:03):

Yeah, yeah. I agree, it's definitely a good point to make for sure. But I also wanted to ask about... I mean, clearly you're passionate about what you do and the technology you've built, but do you envision a future, obviously long off, not certainly near term, but where all vehicles are self-driving and traffic accidents maybe are a thing of the past? I think essentially what I'm trying to ask is do you think the goal or focus of self-driving is more about safety or is it more about efficiency, or maybe it's both?

Chris Urmson (36:37):

I think the wonderful thing about this technology is you don't have to trade the two. So when people buy vehicles, it's really hard to get them to buy safety because everyone thinks they're a better than average driver, and by the way, the stereo you enjoy every day and the advanced safety feature saves you once every five years or 10 years, and it's really hard to quantify that, the value to you.

Chris Urmson (37:06):

In contrast with what we're building with a self-driving system, with the Aurora Driver, you get all of the values. You get the fact that if you're using it as a way for you to get around, you can have an extra drink at dinner and not worry about it. You can come off a long shift and be tired and get home safely. You get those advantages. You can be watching your movie on the way there or reading a book or engrossed in conversation. So you get that value that's really the thing that I think as a consumer, as a customer, you actually fundamentally appreciate. But because the Aurora Driver is not distracted, not sleepy, paying attention, has this super human set of sensors on it, means that you get safety along for the ride effectively. And as a society, that's a big advantage.

Chris Urmson (38:01):

In the freight moving space, again, the shortage of drivers is profound, and all of these customers value safety immensely. So there, the fact that they can better utilize the asset, they can have access to drivers they can't otherwise get, and they can improve the safety of their fleet all matters to them. And so, yes, I think it's really exciting. And I do think in the longterm that people won't drive cars except for sport, and it's a metaphor others have used. The horse was the way you would get around, and today, you ride a horse because it's fun and you enjoy it, as opposed to, for the vast majority of us, how you get to work. And I expect the same will be true for the automobile, but that that's not a next week or next year thing. The Aurora Driver's going to be operating on the road with human drivers, with people driving vehicles for decades to come, but over time, it'll just make more sense for people.

Nick (39:05):

Okay, great. And that actually leads directly into what I just wanted to ask you as well, which is I'm sure you get asked constantly, is just when are the self-driving cars going to be here? When can I go out and buy one? And I'm sure that's frustrating, but at the same time, could you just sort of walk us through some of the milestones that are coming up? Not just the when but the how we're going to get to self-driving cars being available?

Chris Urmson (39:30):

Yeah. And by the way, it's not frustrating. It would be much worse if you were like, "Why are you working on that? That's so stupid." Whereas, "Hey, how soon can I get one of these?" I think is a great question to have. So first, I think for the foreseeable future, you're probably not going to buy these, that they will be operated as part of fleets, whether it's fleets for freight or whether it's in a ride hailing application, because I think it'll just be a better use of capital. It will be a better experience for you, you don't have to maintain it or whatnot. They'll be professionally maintained and support and serve you in your needs, so I think that'll be probably how it operates. We're pushing to have the Aurora Driver come to market in the freight application at the end of '23, and then it'll scale from there.

Chris Urmson (40:29):

Along the way to that, we'll be sharing progress basically on four axes. We'll be talking about the progress towards closing our safety case, we'll be talking about technological progress, we'll be talking about integration with vehicle partners and their partner programs, and we'll be talking about the progress we're making with our pilot customers. And so I can talk about each of those in a little bit more depth. So the safety case is this structured argument that explains why we think it's safe to have the Aurora Driver on the road, and that'll encompass things like functional safety, which is if you think about safety engineering, that's what you would normally think about. So if something breaks, how do you know it broke? What to do to make sure it's not catastrophic? How do you mitigate the risk from that thing breaking?

Chris Urmson (41:19):

The second part of the safety case is this kind of jargon-y phrase, safety of the intended function, or SOTIF, and that really just means when everything's working, is it working in a way that's safe? So does your car drive down the road instead of the sidewalk? When a vehicle stops in front of it, does it slow down and stop for it? So that's the second pillar, is this SOTIF or safety of the intended function bin.

Chris Urmson (41:46):

And then the third pillar is really operational and organizational safety. So these are things like if the vehicle can operate in certain set of conditions, how you make sure it only operates in those conditions? Do you have a culture where people are able to raise safety concerns and they're dealt with justly, that you address those concerns and you don't retaliate against people that are raising those kinds of issues? Do you have processes in place that make sure when the vehicle goes out for a mission, that it's the right tire pressure or whatever? Whatever the safety things are. And so that bundle we call the safety case and so we'll be sharing the progress we make on that over the coming years.

Chris Urmson (42:25):

We'll share progress on our partner programs, so as we're working with our partners at PACCAR, Volvo Trucks and Toyota, we'll share updates as those vehicle programs move from prototype to development vehicles to pre-production to production. We'll share progress we make with commercial partners. So to date, Aurora has primarily been focused on building core technology, and over the last year, we've really turned from that core technology development to productizing it and bringing it to market with customers. And so as we run pilot programs, like what we're doing with FedEx today, we'll share some of the updates of those pilots as we bring more online and as we have something to say there.

Chris Urmson (43:11):

And then finally, of course, we'll share updates on the technology and the interesting feature sets that we'll bring online and the progress we're making there.

Nick (43:21):

That's all very exciting and I've seen that you've already been making a lot of announcements just in the last few weeks. And today, I saw that you also launched your subscription service. So in the specific next few months as this transaction comes to a close, what are some things that listeners should be looking out for?

Chris Urmson (43:40):

So we're about a month out from closing the transaction, so RTPY is scheduled their vote for November 2nd on this. And then assuming the shareholder approval, then we would start trading as Aurora on the fourth. So between now and then, well, there's only a few weeks and so we'll have a little bit of update I imagined, but nothing concrete to announce today.

Kristi (44:33):

Well, Chris, I wanted to thank you for joining us today. It's been a real pleasure and we look forward to hearing more from you and Aurora in the future.

Chris Urmson (44:50):

Thanks so much for having me. I really enjoyed the conversation, really appreciated the time so thank you.

Cautionary Statement Regarding Forward Looking Statements

This document contains certain forward-looking statements within the meaning of the federal securities laws with respect to the proposed transaction between Reinvent Technology Partners Y ("RTPY") and Aurora Innovation, Inc. ("Aurora"). These forward-looking statements generally are identified by the words "believe," "project," "expect," "anticipate," "estimate," "intend," "strategy," "future," "opportunity," "plan," "may," "should," "will," "would," "will be," "continue," "likely," and similar expressions. Forward-looking statements are predictions, projections and other statements about future events that are based on current expectations and assumptions and, as a result, are subject to risks and uncertainties. Many factors could cause actual future events to differ materially from the forward looking statements in this document, including but not limited to: (i) the risk that the proposed transaction may not be completed in a timely manner or at all, which may adversely affect the price of RTPY's securities, (ii) the risk that the proposed transaction may not be completed by RTPY's business combination deadline and the potential failure to obtain an extension of the business combination deadline if sought by RTPY, (iii) the failure to satisfy the conditions to the consummation of the proposed transaction, including the adoption of the Agreement and Plan of Merger, dated as of July 14, 2021 (the "Merger Agreement"), by and among RTPY, Aurora and RTPY Merger Sub Inc., a Delaware corporation and a direct wholly owned subsidiary of RTPY, by the shareholders of RTPY, the satisfaction of the minimum cash condition following redemptions by RTPY's public shareholders and the receipt of certain governmental and regulatory approvals, (iv) the inability to complete the PIPE investment in connection with the proposed transaction, (v) the occurrence of any event, change or other circumstance that could give rise to the termination of the Merger Agreement, (vi) the effect of the announcement or pendency of the proposed transaction on Aurora's business relationships, operating results and business generally, (vii) risks that the proposed transaction disrupts current plans and operations of Aurora and potential difficulties in Aurora employee retention as a result of the proposed transaction, (viii) the outcome of any legal proceedings or other disputes that may be instituted against Aurora or against RTPY related to the Merger Agreement or the proposed transaction or otherwise, (ix) the ability to maintain the listing of RTPY's securities on a national securities exchange, (x) the price of RTPY's securities may be volatile due to a variety of factors, including changes in the competitive and highly regulated industries in which RTPY plans to operate or Aurora operates, variations in operating performance across competitors, changes in laws and regulations affecting RTPY's or Aurora's business and changes in the combined capital structure, (xi) the ability to implement business plans, forecasts, and other expectations after the completion of the proposed transaction, and identify and realize additional opportunities, and (xii) the risk of downturns and a changing regulatory landscape in the highly competitive self-driving industry. The foregoing list of factors is not exhaustive. You should carefully consider the foregoing factors and the other risks and uncertainties described in the "Risk Factors" section of RTPY's registration statement on Form S-1 (File No. 333-253075), its Quarterly Reports on Form 10-Q for the periods ended March 31, 2021 and June 30, 2021, respectively, the registration statement on Form S-4 discussed below and other documents filed by RTPY from time to time with the SEC. These filings identify and address other important risks and uncertainties that could cause actual events and results to differ materially from those contained in the forward-looking statements. Forward looking statements speak only as of the date they are made. Readers are cautioned not to put undue reliance on forward-looking statements, and RTPY and Aurora assume no obligation and do not intend to update or revise these forward-looking statements, whether as a result of new information, future events, or otherwise. Neither RTPY nor Aurora gives any assurance that either RTPY or Aurora or the combined company will achieve its expectations.

Additional Information and Where to Find It

This document relates to a proposed transaction between RTPY and Aurora. This document is not a proxy, consent or authorization with respect to any securities or in respect of the proposed transaction and does not constitute an offer to sell or exchange, or the solicitation of an offer to buy or exchange, any securities, nor shall there be any sale of securities in any jurisdiction in which such offer, sale or exchange would be unlawful prior to registration or qualification under the securities laws of any such jurisdiction. RTPY has filed a registration statement on Form S-4 with the SEC (333-257912), which includes a prospectus and proxy statement of RTPY, referred to as a proxy statement/prospectus. The Company has mailed a definitive proxy statement/prospectus and other relevant documents to its shareholders of record as of September 30, 2021, the record date established for the extraordinary general meeting of shareholders relating to the proposed transaction between the Company and Aurora. Before making any voting or investment decision, investors and security holders of RTPY are urged to read the registration statement, the proxy statement/prospectus and all other relevant documents filed or that will be filed with the SEC in connection with the proposed transaction because they will contain important information about the proposed transaction. Investors and security holders will be able to obtain free copies of the registration statement, the proxy statement/prospectus and all other relevant documents filed or that will be filed with the SEC by RTPY through the website maintained by the SEC at www.sec.gov. The documents filed by RTPY with the SEC also may be obtained free of charge at RTPY's website at <https://y.reinventtechnologypartners.com> or upon written request to c/o Reinvent Capital, 215 Park Avenue, Floor 11 New York, NY.