

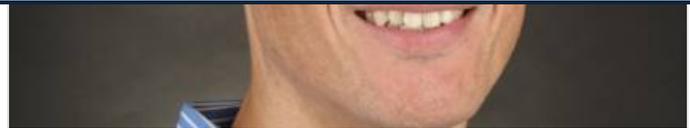
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Its PUCK sensors have been deployed on numerous autonomous test vehicles.



John Eggert, Director, Automotive Sales & Marketing, Velodyne LiDAR, Inc.

just-auto: Tell me about Velodyne.

John Eggert: We invented the rotating mechanical sensor and we are the leader in that market as well. The core sensing engine within that LiDAR is the same as the one in our solid-state approach. So what we're introducing here at the show this week are a rotating version of that core engine - the VLS-128. This is 128 channels, extremely high resolution. Because of the size and form factor, it's probably well-suited for shared vehicle business models, so robo-taxis. So our robo-taxi customers, which we have about 100% of the market pretty much - if you look at the companies in California with self-driving licences, I think maybe 48 companies, we'll sell to 47 of them - and they have told us, "This is what we want you to make for us."

It's a 200-meter sensor.

j-a: So with the very clear images you are producing on the display here are you filling out the rest of the image with Artificial Intelligence?

JE: No, that's the beauty of ours. Ours is just straight-up raw data. Imagine you hit a laser pointer and it hits something across the room. That's all that is. Except we've got 128 of those

j-a: Can you tell me about the technology difference for different LiDAR ranges?

JE: What we have is the longest range sensor on the market today at up to 300 metres. There are two different basic technologies - 1550 nanometer and 905 nanometer - and there are advantages for both. Ours is 905. 1550 theoretically you can throw more power at it - we've built sensors with both technologies by the way - but we selected 905 because of its better performance in less than optimal conditions. So, any kind of moisture out there, the other wavelengths have problems sometimes. That's why we arrived at that. But theoretically the other wavelengths might be able to fire at a greater power. But, you know, we've got the range without that power so we're okay.

j-a: And you're putting the same sensing engine into your non-rotating LiDAR options?

JE: Yes, that's the Velarray that's present on our stand today. In that small form there's never been more powerful LiDAR on the market as far as range. This is a 200-meter sensor as well.

j-a: So this would go on the corner of cars and things like that?

JE: Yes and here we have a special windshield that Asahi Glass has made with an integrated LiDAR sensor. So you get rid of a lot of the challenges with LiDAR as far as keeping it clean. Suddenly it's in a place where people are used to having sensors. So the challenge previously had been transmission loss of the signal through glass but Asahi Glass has developed their

comparable to your non-rotating LiDAR and the US\$7,000 is for the rotating LiDAR?

JE: Valeo's is not non-rotating, it has motors in it moving backwards and forwards scanning. Actually, the rotating ones the price can go from roughly hundreds to low thousands depending on volume.

j-a: When you go to solid state for the consumer end of the market what sort of price range are you looking at?

JE: In my opinion, by the mid-2020s, the budget for LiDAR on a vehicle will be about US\$500. That'll be for all the LiDARs you put on all the way around it. You're not going to have \$5000 worth of sensors on a car. It's just not gonna happen.

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j-a: So how do you see the autonomous market developing overall? I mean you talked about sort of the robo-taxi market and then you talk about the consumer market. How do you see both those markets developing in terms of volume and share and the overall L4 and L5 market?

JE: I think initially we're seeing the biggest push in the robo-taxi market in the next few years, not just in the US. But China suddenly, the gold rush is on, it seems, to tackle that market because it's so big. And we anticipate in the next few years. next three years. you're going to

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j-a: And what is it at the moment?

**not a US\$50 billion market
by the mid-2020s.**

JE: It's in the millions. It's not quite a billion. In automotive, it's not even close to a billion. Yeah, and we have a majority of that. So I think it's a \$50 billion market. So there's obviously room for a lot of people to make money in LiDAR.

J-A: And do you have the manufacturing capacity to supply?

JE: For capacity we're well ahead of it. I mean, we've grown up an order of magnitude in capacity in the last two years due to the mega-factory in San Jose. We want to build a million sensors in that plant. We don't have demand for a million this year but soon we will.

j-a: How much extra capacity do you anticipate having to add in the future?

JE: Well, we have a partnership with Autoliv. They are scaling our sensor for mass production globally for automakers. So they're leading the way in doing RFQs for OEMs right now.

j-a: Do you think OEMs can get to L4 and L5 without LiDAR?

JE: Good luck with that.



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