

Robocar LiDAR Startup Has A Novel Pitch: You Can Buy Our Sensor Now



Ouster

An Ouster test vehicle equipped with OS1 LiDAR sensors [+]

As self-driving vehicles move closer to reality there's intense competition to supply the artificial intelligence and sensors they need, particularly for vision technology. A new player joining that space has a particularly bold claim: A laser LiDAR sensor with performance matching the best of what's on the market at a much lower price and it's available now.

San Francisco-based Ouster, emerging from stealth mode this week, is selling the spinning 64-laser OS1 LiDAR from its [website](#) for \$12,000 each. The company also raised \$27 million from investors including [Cox Enterprises](#) and Ford Executive Chairman Bill Ford's [Fontinalis Partners](#) boost production of the optical sensor which Ouster says is lighter, smaller and more efficient than Velodyne's \$75,000 HDL-64. That model Velodyne has sold for a decade is the high-end standard for 3-D, 360-degree pulsed laser imaging.

"The fact that we have a device that's on the market ... is a really big deal very few other companies can claim. Most companies are making the claim that they'll have something at some point, but they don't have anything now," Ouster CEO and co-founder Angus Pacala told *Forbes*. "We've really tried to avoid hyping the company or the products before they're available ... to reverse this trend of brinksmanship when it comes to LiDAR."

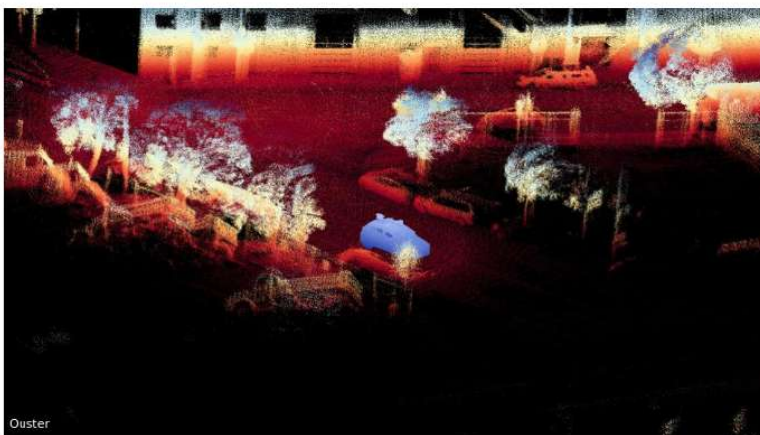
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The ghostly "point cloud" images generated by LiDAR, short for light, distance and ranging, give self-driving cars an ability to see that's super human, detecting road conditions and hazards more than a 100 meters away and under any lighting conditions. Combined with cameras, radar and even small sonar sensors, the technology that's been used for 3-D mapping for decades is generally seen as essential for autonomous vehicles to function safely – assuming cost and performance requirements are met. The technology is also at the heart of a bitter legal fight between Alphabet Inc.'s Waymo and Uber that began in February 2017.



A point cloud image generated by Ouster's OS1 LiDAR.

Velodyne, the current leader in LiDAR for autonomous vehicles, is currently expanding production at its San Jose, California, factory with a goal of producing at least a million units annually, to meet fast-growing demand from auto and tech companies that want to begin operating large fleets of robotic vehicles in the next two to three years.

That demand is a huge opportunity for suppliers of the technology. As a result LiDAR system sales should reach \$2.5 billion in 2026, more than 10 times the level in 2016, according to an [estimate](#) IHS Markit Senior Analyst [Akhilesh Kona](#).

That's why since 2016 investments in existing and new LiDAR makers, including Velodyne, Ibeo, Quanergy, Oryx Vision, Luminar, Innoviz, LeddarTech, AEye, Strobe and Princeton Lightwave, total at least \$800 million, based on a *Forbes* estimate. Aside from Velodyne, most of the startups are making only small batches for testing and evaluation or are in various stages of preparation for production.

(For more on Velodyne, see "[How A 34-Year-Old Audio Equipment Company Is Leading The](#)")

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(For more on Velodyne, see *"How A 34-Year-Old Audio Equipment Company Is Leading The Self-Driving Car Revolution"* from the September 5, 2017 issue of *Forbes*.)

Ouster's goal is to make 1,000 of its OS1 sensors per month starting in January at its factory in San Francisco's Mission district, and boost that to a 10,000-unit monthly rate in late 2018, said Pacala. A Stanford University trained engineer, he previously co-founded Quanergy, which specializes in solid state, non-spinning LiDAR. Shipments of Ouster's OS1 have already begun to customers Pacala declined to identify, citing confidentiality agreements.

"We spent the past 12 months researching the broader perception space, with a specific focus on LiDAR, and feel strongly that Ouster's team, technical approach and focus on manufacturing at volume positions them to capture a market leadership position today and power the autonomous systems of the future," Chris Thomas, a founder and partner of Fontinalis Partners, said in a statement. (Despite Bill Ford's connection, the fund is not affiliated with Ford Motor, a Velodyne investor.)

Ouster says its sensor is designed for large-scale production, able to fit any vehicle platform given its compact size. (It's about half that of a coffee mug, according to Pacala). Resolution is just as detailed as Velodyne's much larger HDL-64 (roughly the size of a Kentucky Fried Chicken bucket).

While the Velodyne model is a benchmark, the company is boosting sales of its own much smaller "Puck" LiDAR units, with between 16 and 32 rotating lasers. In November Velodyne said a new 128-beam model is going into production with more than 10 times the range and performance of the HDL-64. CEO David Hall declined to discuss pricing, beyond plans for discounts to customers who purchase large quantities of the new sensor.

The OS1's "internal operation is fundamentally different" than that of Velodyne, Pacala said, without elaborating.

Unlike testing for crashworthiness or tailpipe emissions, there's not yet an objective, public, outside source of performance analysis for LiDAR and other advanced optical sensors. Whether Ouster has game-changing tech or not will be determined in the months ahead if auto and tech customers who start buying its \$12,000 device clamor for more.

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Velodyne LiDAR

The new Velodyne VLS-128, right, has twice as many lasers [+]

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