Future of Mobility

Chris Jacobs
Vice President, Autonomous Transportation and Safety, Analog Devices, Inc.

Today we speak to Chris Jacobs, vice president of the autonomous transportation and automotive safety business unit at Analog Devices.

The future of autonomous transport is upon us. In the role as vice president of the autonomous transportation and automotive safety business unit, Chris leads the organization that is bringing next-generation inertial MEMS, radar, and lidar solutions to market. These high performance sensing technologies are foundational to the high levels of autonomy that will be demanded in the transportation systems of tomorrow.

How important is the adoption of lidar systems in automotive?

Lidar is growing in importance in automotive. It is one of the primary perception sensors in today’s robo-taxi test vehicles. Additionally, lidar systems have appeared in high-end luxury retail cars such as the Audi A8, where a short range system is used in a semi-autonomous driving function limited to speeds up to 60 km/h.

Cars with autonomous or semi-autonomous driving functions will require a multiplicity of perception sensors to have adequate redundancy in the sensor types for safe operation. The main perception sensors today are cameras, with radar now becoming more ubiquitous and lidar coming in the near future. Cameras have the lowest cost and are already widely deployed in cars. The range of camera systems is limited, particularly in bad weather. Radars are ramping up in volume in mass market automotive and they are robust against weather out to ranges greater than 200 meters. If we assume that a minimum of two sensor modalities are required to enable autonomous modes of driving, then it is likely that lidar will be an important and necessary sensor to accompany radar for long-range sensing. In addition to its higher base cost, there are significant technical challenges with lidar systems beyond ranges of 150 meters. The lidar solutions proposed by Analog Devices attempt to mitigate these technical challenges.

Autonomous vehicles are driving a significant change in transportation with many challenges in various technical aspects. How much is Analog Devices involved in this market?

Analog Devices has created a business unit to specifically address these technical challenges and to develop innovative technologies and products, from component to system level, to grow and strengthen its position in this market.

Analog Devices has a long history of supplying inertial MEMS-based sensors (micro-electromechanical systems) to the automotive market and has a trusted position in the supply chains of numerous automotive Tier 1s. The excellent stability and robustness of this technology has enabled ADI to develop state of the art MEMS devices to support high performance and highly reliable navigation and vibrational sensing for autonomous vehicles.

Analog Devices has also been present in the supply chain for automotive radar for several years, where its DSP, data converter, and RF PLL products have been widely deployed. By leveraging its capabilities in RF and mmWave design and product development, ADI has introduced a 24 GHz radar chipset for automotive and is sampling a 77 GHz to 79 GHz radar chipset on an advanced CMOS manufacturing mode that meets or exceeds all of the operation requirements for high performance imaging radar applications.

Analog Devices’ world-leading data converter, power management, and signal condition technologies are also making their way into first and second generation lidar systems. Expect more application-specific products to originate from Analog Devices that can more comprehensively address the range, cost, and overall electrical and optical performance of future lidar systems.

What future challenges do you see affecting autonomous design and how do you plan to evolve your suite of products to meet those challenges?

One of the big challenges, particularly for retail cars, is how to mount and place all of these high performance perception sensors on to the vehicle without compromising the industrial design of the vehicle (a primary concern with car OEMs). One particular challenge is how to fit a high performance imaging resolution scales directly with the number of transmit/receive channels (or size). ADI has radar technology in development that directly addresses this problem and is working closely with leading OEMs to realize this.

Additionally, as the industry moves from driver assistance to driver replacement, the need to constantly monitor the health of the vehicular system is critical. ADI’s state-of-the-art vibrational sensing and algorithmic technology can serve to detect potential issues with the vehicle before they become a safety risk.
About the Author

Chris Jacobs joined ADI in 1995. During his tenure at Analog Devices, Chris has held a number of design engineering, design management, and business leadership positions in the consumer, communications, industrial, and automotive teams. Chris is currently the vice president of the autonomous transportation and automotive safety business unit at Analog Devices. Prior to this, Chris was the general manager of automotive safety, product and technology director of precision converters and the product line director of high speed converters and isolation products.

Chris has a Bachelor of Science in computer engineering from Clarkson University, a Master of Science in electrical engineering from Northeastern University and a Master of Business Administration from Boston College. He can be reached at chris.jacobs@analog.com.

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