FutureView: Multi-Sense Technology Can Hasten Widespread Deployment of Advanced Automotive Safety Systems

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3D Sensor Chips That Simultaneously "Range and Recognize" Offer Automakers, Tier One Suppliers Unique Alternative to Complex, High-End Sensor Systems

Charles E. Shalvoy, the new CEO of electronic perception pioneer Canesta, Inc., said that automakers and their Tier 1 suppliers have the opportunity to hasten -- by as much as half a decade -- the widespread deployment of advanced safety systems on all model vehicles, especially those at the low end, by aggressively focusing additional development around a new type of low-cost 3D sensor chip that both ranges, and recognizes images, simultaneously.

According to Shalvoy, a tiny, easy-to-install, and robust "multi-sense" chip can variously eliminate the need for RADAR, LIDAR, ultrasound, stereoscopic ranging, or other expensive and complex technologies in certain emerging or government-mandated advanced safety systems. Moreover, a single sensor could actually be shared among several different applications. Beneficiaries of the technology might include "intelligent" airbag deployment, adaptive cruise control, blind spot detection, automated or assisted parking, back-up warning systems, pedestrian detection, and lane departure warnings.

Safety applications such as these -- some of which are beginning to appear as options on high-end vehicles -- have been the subject of considerable research and development for years by every automotive manufacturer and key Tier 1 suppliers. Shalvoy made his remarks in anticipation of the upcoming World Congress of the Intelligent Transportation Society (ITS) where Canesta will be showcasing the technology.

"One of the greatest challenges facing automakers today is expanding the safety features of automobiles, particularly in response to new government mandates, consumer scrutiny, and competitive pressures," said Shalvoy. "But with current technology, offering a broad range of such features is often prohibitively expensive, which either confines

them to the lab, or limits their availability to high-end models, or as expensive options." According to Shalvoy, global benefits from advanced safety systems will not truly be realized until they are available -- as standard items -- in every vehicle coming off the production line. "The safety is in numbers," he said.

What contributes most to the challenge, said Shalvoy, is that giving vehicles an "electronic perception" of the world around them today takes a combination of multiple sensors -- each typically expensive in its own right -- and complex mathematics, to "fuse" data from different types of sensors into a coherent perception that the vehicle can use to alert the driver, or take corrective action.

For example, an "intelligent" airbag system, such as those mandated by U.S. Federal Motor Vehicle Standard 208 ("FMVSS208"), might combine seat-specific weight sensors with stereo 2D overhead camera chips to develop a "sense" of where the front seat occupants are, that they are not a bag of groceries, and whether the occupant is a child, an adolescent or an adult. Complex software is required to correlate the raw data from each of these sensors, and it may take additional devices to discriminate between, say, a 70-lb dog and a 70-lb child. "If you take this example, and multiply it by all of the other desired advanced safety systems, you have a vehicle that is sprouting sensors like the rooftop of the National Security Agency, with onboard processing that they would envy," Shalvoy said, only partly in jest.

The alternative, Shalvoy said, is to build consolidated systems around a few ultra-low-cost shared sensors that have a "multi-sense" capability, particularly simultaneous ranging (i.e., the distance to an object or to features of that object) and recognition (extracting the shape or form of an object from a digital image). "If you combine ranging and recognition in a single, small, chip-based sensor, you end up with a practical 3D imaging system that potentially can dispense with almost every other type of approach currently being researched -- whether RADAR, LIDAR, ultrasound, infrared, or other -- and equally as important, you can share sensors between systems. For example, a single 3D sensor chip flush mounted on the vehicle could provide all necessary information for adaptive cruise control, pedestrian detection, lane-departure alerts, back-up alerts, vehicle-assisted parking, and even lane following."

With such an approach, and the benefit of Moore's law applying to chip-based sensors as well, advanced safety systems could become everyday. "The sensors exist, and are now into their third generation," said Shalvoy. "With the Tier 1s and the manufacturers significantly expanding their development work in this direction, I believe that everyday deployment of a complete suite of advanced safety systems can be accelerated by as much as five years, or more." Moore's law, which has been proven accurate over 40 years of chip development, states that the number of transistors on the most complex chips doubles every 18 months, with a commensurate reduction in costs.

The benefit for automakers and their suppliers is huge; Strategy Analytics, a leading industry observer, believes that by 2010, expenditures for sensors for occupant detection, parking assist, and adaptive cruise control will be in excess of $800 million. "Imagine what could be accomplished if you can leverage this five to ten times, with a few chips," said Shalvoy.

Chris Webber, of Strategy Analytics, believes that Shalvoy's Canesta is on to something. "In automotive safety applications, system developers are presently looking at costly and complex fusion of disparate technologies ... if proven successful, CanestaVision(TM) could provide significant cost and implementation benefits."

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Shalvoy, who joined Canesta recently as president and CEO with strong credentials in semiconductors and systems, is firmly focused on capturing and maintaining this market advantage. But the real prize, he says, is the dramatic improvement in automotive safety that will be the legacy of everyone who works to bring such systems to every driver, in every vehicle, in the shortest time possible. "The benefit to individuals and their families in terms of lives and livelihood is incalculable," he said.

About Canesta

Canesta is the inventor of a revolutionary, low-cost electronic perception technology that enables machines and ordinary electronic devices to perceive and react to objects or individuals in real time.

When sight-enabled with Canesta's unique CanestaVision(TM) electronic perception chips and software, consumer, automotive, industrial, military, and medical products can gain functionality and ease of use not possible in an era when such devices were blind.

Canesta believes future applications of electronic perception technology are virtually as broad as the imagination. They may include intelligent automobile airbag systems that can sense the size and position of an occupant to control deployment and avoid injury, a low-false-alarm security system that could detect the difference between an intruder and normal activity, such as a pet moving or child visiting the bathroom at night, or robotic tools that can successfully operate in a dynamic, rather than static environment.

Canesta was founded in April 1999, and is located in San Jose, CA. The company has filed in excess of forty patents, 15 of which have been granted so far. Investment to date exceeds $44 million, from Carlyle Venture Partners, JP Morgan Partners, Korea Global IT Fund (KGIF), Venrock Associates and others.

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