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# ANALYZING MOVEMENT

# Laser-Equipped Drone Helps Improve Safety and Efficiency on Highway 4 Improvement Project


## Emerging Drone Technology Moves Construction and Engineering into the Future

In September 2017, the Contra Costa Transportation Authority (CCTA) and Alta Vista Solutions showcased two emerging technologies on a construction project aimed to improve commutes on Highway 4. Engineers are piloting drones equipped with light detection and ranging (LiDAR) lasers--a surveying tool that uses a laser to create high-resolution geographical data. The combination of the two emerging technologies has never been done in construction before and opens untold possibilities for unmanned aerial vehicle (UAV) technology and related jobs in the future. CCTA featured the system in action by providing a live feed of a drone flight.

With assistance from engineering firm Alta Vista Solutions (Alta Vista), who proposed the new method, CCTA is flying the LiDAR scanners to measure the volumes of earth that need to be moved during this $74-million project to rework the Balfour Road interchange. The drones ensure that the cut-and-fill earthwork goes efficiently. With LiDAR's pinpoint accuracy, CCTA can now make needed calculations and monitor site conditions faster, eliminating the unavoidable guesswork involved in manual surveys. Putting LiDAR on drones gathers 15 gigabytes of precise, high-quality data per month, cutting down drastically on time spent surveying. The drones also improve safety by taking workers out of live traffic.

Drone capabilities enable CCTA to track construction progress firsthand as work on Highway 4 continues. "We are always looking for new ways to increase safety and efficiency on construction projects," says CCTA director Randy Iwasaki. "Drones give us aerial views of the site that were hard to come by before, making it safer for surveyors to do their job and helping us manage the large volumes of dirt that are being used to improve this intersection. This technology also allows us to monitor environmentally sensitive areas without disturbing the habitat."

"This will change engineering and surveying" says Ed Greutert, principal engineer at Alta Vista Solutions. "Innovations like combining LiDAR and UAVs are opening doors in infrastructure and making us efficient, effective, and safe in ways we couldn't achieve before." Mr. Greutert also addresses fears of job loss as automation increases. "Using technology to do the surveying work can lead people to ask if this is the next step to the robot apocalypse—are drones going to take our jobs?" he speculates. "Not quite. It's going to change jobs. It's going to create new jobs in technology—and in the Balfour Road case, help people get to work faster."

CCTA has faced challenges in being the first to test these technologies together. “This has never been done. LiDAR on a UAV hasn’t worked until now—there are huge possibilities if we can be creative enough to really tap into them,” Mr. Greutert notes. Handling the unprecedented quantity of data generated has also posed a challenge. However, in recent months, the team has succeeded in processing the hundreds of gigabytes collected. “There are always challenges to pioneering new technology,” Mr. Iwasaki says. “But with the benefits this technology can provide in terms of keeping workers safe and managing a complicated construction project, I believe we’ll start to see more widespread use of drones on construction sites within a few years – especially as we discover new applications that can help save time and money. Right now, CCTA is excited to be leading efforts in this new frontier.”

*The Contra Costa Transportation Authority (CCTA) is a public agency formed by Contra Costa voters in 1988 to manage the county’s transportation sales tax program and oversee countywide transportation planning efforts. CCTA is responsible for planning, funding and delivering critical transportation infrastructure projects and programs that connect our communities, foster a strong economy, increase sustainability, and safely and efficiently get people where they need to go. CCTA also serves as the county’s designated Congestion Management Agency, responsible for putting programs in place to keep traffic levels manageable. More information about CCTA is available at ccta.net.*

*Alta Vista is a California-based engineering firm that has been recognized as the 20th fastest-growing engineering firm in America by Inc. 5000 and was named by Zweig Group as one of America’s Hot Firms. Alta Vista has quickly differentiated itself by performing customized quality management strategies for some of the most complex infrastructure projects in the world. Over the past decade, Alta Vista has worked with public and private organizations to complete large-scale engineering projects that better serve their regions. Known for engineering services that include engineering, inspection, testing, unmanned aerial systems, quality management, and structural health monitoring, Alta Vista has grown and diversified and has been acknowledged in 2017 by ENR Magazine and other media outlets for using innovative solutions and technologies to deliver infrastructure projects faster, better and more cost effectively. For more information about Alta Vista, visit altavistasolutions.com.*

# Cepton Introduces Lightweight 3D LIDAR Sensing Solution for UAV Mapping

## SORA 200 3D LIDAR brings UAV mapping to new heights for partner LIDAR USA

Cepton Technologies, Inc., a provider of 3D LIDAR sensing solutions for automotive, industrial and mapping applications, has announced the launch of SORA 200, its lightweight 3D LIDAR sensor, at the annual Commercial UAV Expo. SORA 200 delivers long-range, high-resolution and low-cost mapping capabilities to unmanned aerial vehicles (UAVs). The launch of SORA 200 follows Cepton's recent unveiling of its HR80 series of high-performance 3D LIDAR products for ground applications.

Cepton is partnering with LIDAR USA, a total LIDAR geospatial solutions company, to bring SORA 200 to market. LIDAR USA is Cepton's first reseller and system integrator in the UAV mapping industry.

"To meet the increasing demands of UAVs, LIDAR sensors must be long-range, lightweight and high-resolution," said Dr. Mark McCord, co-founder and VP of engineering at Cepton. "SORA 200 allows for highly efficient 3D map data production at increased altitudes and velocities in various environments. With 200-meter range and a weight of just 550 grams, SORA 200 is the lightest high-performance UAV LIDAR on the market today. We are thrilled to partner with LIDAR USA on this product to bring a new solution to the UAV mapping industry."

Cepton's micro-motion LIDAR technology removes expensive, ungainly spinning parts common in traditional LIDAR units, resulting in smaller and more reliable sensors that do not compromise on resolution or range. Use of off-the-shelf materials reduces delivery wait time and overall cost.

"For years, the UAV mapping industry has been waiting for a long-range, lightweight and low-cost 3D LIDAR solution," said Jeff Fagerman, CEO of LIDAR USA. "No one has been able to produce anything like SORA 200. We are very excited that Cepton is fulfilling this market need."

**Product highlights include:**

- Lightweight: At 550 grams, the SORA 200 can be deployed in situations where payload weight matters. Its light weight means that UAVs enabled with SORA 200 can fly for longer trips.
- Long-range: With its scanning range extending up to 200 meters, the SORA 200 allows UAVs to fly at higher altitudes and cover more ground.
- High-frame rate: With a 200-hertz frame rate, UAVs equipped with the SORA 200 can operate faster while maintaining high-density map data acquisition.

*Cepton is a 3D sensing solutions provider that is shipping next generation LIDAR products for the automotive, industrial and mapping markets. Cepton's LIDAR technology delivers unrivaled performance and resolution at low cost, to enable perception for the smart machines of tomorrow. For more information, visit www.cepton.com.*

*LIDAR USA, a Fagerman Technologies, Inc. geospatial solutions company, is committed to bringing fast, accurate, high-resolution LIDAR solutions to the UAV market. See www.LIDARusa.com for more details.*


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