USTAR Research: The Bright Side of LIDAR

Lasers are pulses of light, and don't make a sound. Entering the quiet Engineering building at Utah State University (USU), it's hard to sense the amazing research going on behind the lab doors.

The research in question involves a revolutionary technology that would be at home in a futuristic sci-fi thriller. Imagine a plane flying over a burning mountain, sending back a real-time 3D rendering of the entire landscape to assist fire fighters in containing the blaze. Or imagine that same plane flying over a war zone relaying back 3D images of strategic points of interest, enabling generals to reduce risk to troops. This is the future of LIDAR technology according to the staff of USU's Center for Active Sensing and Imaging (CASI).

LIDAR stands for Light Detection and Ranging. In the past LIDAR has been used for anything from handing out speeding tickets to assisting engineers on construction projects. An early version of the technology that CASI utilizes has been used on UDOT's current I-80 project to speed bridge replacement.

In the midst of the calm and quiet atmosphere is a friendly man excitedly going about his work. Meet Bob Barson, CASI's Executive Director. Barson was brought onto the CASI project because of his 20+ years of industry experience and his desire to help build the technology foundation of Utah. CASI's efforts stem from two applications: LASSI (Laser Assisted Stereo Scopic Imaging) and LARS (Laboratory for Atmospheric and Remote Sensing).

Bob Barson

LASSI works by bouncing lasers off of hard surfaces to build 3D models while proprietary software optics apply a photographic image to create the 3D rendering. The result? An exact 3D copy of the object that LASSI has scanned – depth, breadth, colors and all.

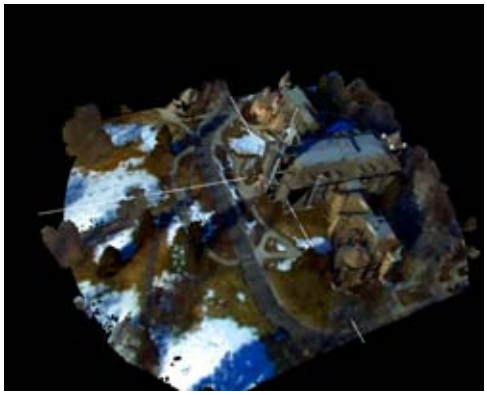
Querying Barson about the applications of this technology will lead to a smile and a list long enough to leave even the best auctioneer out of breath. These applications include traffic management, pipeline and land development, and the entertainment industry. "If someone wants to create a 3D rendering of a golf course they've got to spend a quarter of a million dollars and several months hiring surveyors and programmers to build it out. With LASSI you'll pay significantly less and have perfect 3D models in under an hour," Barson says.

LARS is no less exciting. The technology shoots a laser into the air and reports back on the particles floating around. It has already been used in California on several farms to measure dust and equipment emissions. In its current form LARS only reports back on size and number of particles in the air. However, CASI is currently doing research to advance the technology to the point where LARS will be able to tell you what specific types of particles are floating around as well.

"Imagine if fire fighters were able to tell how stable a burning building is by measuring the atmosphere around it, or imagine if Law Enforcement were able to detect meth labs by merely pointing a device around a neighborhood," Barson says.

One of the reasons Barson was brought aboard was to help bring the fruits of CASI to commercialization, an effort that is not without complexities. "This is a new technology and we find we have to push it and explain how cool and cost effective it is. On top of that, when people do find out about it they're unwilling to use it because it isn't 100 percent yet. We are still doing research."

Nonetheless, CASI has been used in several commercial applications already, including developing a 3D model of a development division just northwest of Bear Lake.



3-D image of USU's Old Main Building
(White areas are patches of snow)

The Center was founded in 2007, building upon USU's known strengths in advanced imaging, LIDAR and related technologies. At the time, CASI had a research strategy and successfully licensed technology, but limited funding to secure new equipment and to further develop and commercialize that technology. Working in conjunction with the university's Technology Commercialization Office, USTAR, the state-funded program aimed at assisting Utah's research universities in commercializing new innovation, helped CASI move forward. CASI put in a proposal, which the university vetted in a competitive screening, and USTAR accepted it. Since the beginning of USTAR's involvement, the technology has gone from being restricted to

stationary tripods to being capable of performing from moving vehicles such as cars, trucks and planes.

Barson summarizes his experience with USTAR in one sentence: “It was a great match.” USTAR was able to help CASI purchase the equipment necessary to build LASSI as well as to enhance LARS. USTAR is also proving instrumental in helping the team develop their business strategy. It is anticipated that a new business will arise from these efforts in a matter of months.

“We were able to help them develop their business plan, seek funding, and do some market analysis for their product,” says Christian Volmar, an associate director for USTAR. Volmar’s business consulting has helped the team determine which markets CASI should enter and how they should go about it. He agrees with Barson that the relationship is a good fit. “CASI has a great product and USTAR has some resources that will help take that product to the market. The partnership between CASI and USTAR is designed to foster future growth and allow CASI to make the most of future opportunities.”

“This will prove to be a win-win-win for the university, for the research team, and for USTAR,” USU’s vice president for Strategic Ventures and Economic Development Ned M. Weinshenker said. “The collaborative effort is effectively expanding the market opportunity.”

The Center for Active Sensing and Imaging Team

The lead researchers on the CASI team are Allen Q. Howard Jr., Alan Marchant, Paul Israelsen, Robert T. Pack, Gail Bingham, Thomas D. Wilkerson, and Brad Petersen. The principle focus of the Center for Active Sensing and Imaging (CASI) at USU is the development of technology using LIDAR for remote sensing and imaging of terrestrial hard targets such as buildings and terrain and atmospheric soft targets like aerosols and particles. The technology applies to a wide range of markets such as land development, architectural surveys, mining, utility corridor survey and mapping, real-world 3D imaging for games and films, environmental remote sensing and monitoring, wind farm siting, and commercial and military intelligence gathering.

The Utah Science Technology and Research initiative (USTAR) is a long-term, state-funded investment to strengthen Utah's "knowledge economy” and generate high-paying jobs. Funded in March 2006 by the State Legislature, USTAR is based on three program areas. The first area involves funding for strategic investments at the University of Utah and Utah State University to recruit world-class researchers. The second area is to build state-of-the-art interdisciplinary facilities at these institutions for the innovation teams. The third program area involves teams that work with companies and entrepreneurs across the State to promote science, innovation, and commercialization activities. For more information, go to www.innovationutah.com.

Oct. 2, 2009