

## Education



**J. Dennis Credit**, the new dean of the SDSU College of Business Administration, discusses the need for a partnership between the college and the business community.  
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## Finance



**Teresa Halleck**, CEO of San Diego County Credit Union, gives 'breakthrough banking products' part of the credit for SDCCU's membership increase.  
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# Drone City

**TECH:** Elements in Place To Keep S.D. at Forefront Of Robotics Revolution

■ By BRAD GRAVES

San Diego is becoming a force to be reckoned with in the field of robotics and remotely operated vehicles.

"I've heard people throw around the term 'Drone City, USA,'" engineer **Tim McConnell** told a San Diego audience recently. "I don't know. We'll see if it sticks."

McConnell made the observation during a program organized in August by ComNexus, a local technology group, which took stock of San Diego's place in the robotics world. There is a lot going on. In addition to its unmanned aircraft builders, the region houses businesses specializing in software to control walking and flying robots, a business that builds robotic "farmhands" and a business specializing in remotely operated swimming machines.

Robots are here to stay, said McConnell, director of engineering with **3D Robotics Inc.**, a Berkeley based firm which has substantial operations in Otay Mesa and Tijuana.

"This is really the birth of a huge new industry," said the San Diego-based executive. "This isn't going to be a flash in the pan. These things aren't going away. You're going to see robots becoming more and more capable. [There will be] lots of things happening in the future.

"I really want us to be leading that space here in the San Diego and Tijuana area. The possibilities for innovation and growth

➔ *Robotics page 36*



Photo courtesy of SeaBotix



Photo courtesy of Northrop Grumman

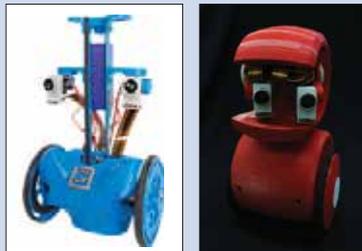


Photo courtesy of Brain Corp.

From top, SeaBotix designs and builds underwater remotely operated rovers for military and civilian use. Northrop Grumman's Fire Scout is an unmanned helicopter. Brain Corp.'s vision is to build robots that learn.

## Planned Hotels Would Be Boost for Oceanside

**TOURISM:** City Will Get Much Needed Meeting Space

■ By LOU HIRSH

A \$150 million resort development being planned in downtown Oceanside includes what would be that city's first full-service hotel, as it seeks its share of a growing influx of North County coastal visitors and related economic benefits.

Pending approval of financing plans scheduled for review by the Oceanside City Council on Sept. 10, developer **S.D. Malkin Properties Inc.** plans to build a two-hotel destination

➔ *Malkin page 38*

## Targeted Medicine Changes Clinical Trials

**HEALTH:** Sequencing and Analytics Part of Process

■ By BRITTANY MEILING

Recent trends in biotech research point to faster, more efficient and less costly drug development for pharmaceutical companies.

Back in the year 2000, mapping out the human genome was a near fantasy for scientists. Fourteen years and \$1 billion later, the whole human genome is sorted and mapped by the way of 3 billion genetic letters.

For the past decade scientists and biotech firms have been attempting to make use of

➔ *Medicine page 37*

## Bond Market Snaps Up Sandag's Latest Offering



Photo courtesy of Sandag

The Greenline Trolley was financed with recently issued bonds.

**FINANCE:** Sale Brings In \$54M Above the Face Value

■ By MIKE ALLEN

A yield-hungry market recently gobbled up \$350 million in bonds issued by the San Diego Association of Governments that pays an average of 3.85 percent over the 34 years the debt will be in place.

Indeed, demand for AAA-rated municipal bonds was such that Sandag, the regional transportation planning agency, received an additional \$54 million in premiums mainly from institutional investors such as insurance companies and mutual funds, said **Andre**

➔ *Bonds page 39*

## Special Report:

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## Robotics:

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are just huge.”

Eugene Izhikevich added to those thoughts later in the evening.

“I want to turn San Diego into a robotics hub,” the chairman and CEO of San Diego-based **Brain Corp.** told a dinner gathering.

With funding help from **Qualcomm Inc.**, Brain Corp. is writing software that will allow robots to learn behavior in the same way that an animal responds to training. The process sidesteps million-dollar efforts to write code for a robot, said Izhikevich, a computational neuroscientist.

San Diego has several attributes that can make it a robotics hub, Izhikevich said.

They include the talent of University of California, San Diego, whose faculty excels in robot-related disciplines such as computer vision, computational neuroscience and cognitive neuroscience. UC San Diego Chancellor **Pradeep Khosla**, now beginning his third year at the university, is a robotics expert. Khosla came to San Diego after a long stay at Carnegie Mellon University in Pittsburgh. Izhikevich credits Khosla with making Pittsburgh a robotics hub.

Secondly, San Diego has Qualcomm, whose executives are interested in robotics and whose mobile-device technologies are well suited for it. These include Snapdragon processors, which offer high performance with low power consumption, he said.

San Diego’s “secret weapon,” Izhikevich said, is the potential to manufacture robots on the other side of the international border in Tijuana. There would be no need to manufacture in China, with its time difference and the chance that intellectual property might be pilfered. Executives could cross the border to take care of business at a factory and be home in time for dinner, rather than taking a two-month trip to China, the executive said.

The robotics field could easily be in the same place that the personal-computer business was during the 1980s, Izhikevich said. That was the time when **Michael Dell** worked out of his dorm room and when hundreds of small companies served the market. Just as in the PC business, there could be decades of consolidation ahead.

Izhikevich’s business, **Brain Corp.**, does not disclose revenue and currently has 30 full-time employees, plus a number of consultants with doctoral degrees. The business, whose product is the Brain

## What’s behind the growing robotics cluster

### SCIENCE

From UC San Diego’s engineering and neurosciences know-how to Qualcomm’s processor juggernaut, the region has an abundance of technological talent.

### DEFENSE

Most robotics applications have military roots.

### LOCATION

Efficient manufacturing potential is just across the border.

Illustration by Rich Babiarz and Michael S. Domine



OS, expects to grow to 60 full-time employees within the next six to 12 months, Izhikevich said. Among its new hires will be software engineers.

The business is housed under Qualcomm’s roof but plans to move into its own quarters shortly.

Other prominent robotics and remotely operated vehicle companies currently at work in San Diego are:

- **Northrop Grumman Corp.**, which produces military aircraft able to operate autonomously — that is, without a human in the loop. Northrop Grumman (NYSE: NOC) writes software for the aircraft in Rancho Bernardo and manages its unmanned aircraft programs there.

- **General Atomics Aeronautical Systems Inc.**, located nearby in Poway, which produces remotely piloted military aircraft such as the Reaper and its predecessor, the Predator.

- Point Loma-based **SeaBotix Inc.**, which produces small vehicles that can swim or crawl underwater, operating at

the end of long tethers. Among other tasks, they can make video inspections of surfaces far beneath the water, or manipulate remote objects with a claw.

- **Vision Robotics** of Sorrento Valley, which makes complex robots that do farm work. One machine prunes grapevines, using stereo vision to determine the position of the branches, while another thins lettuce seedlings. Vision Robotics has also pursued the concept of a mechanized orange picker.

- **3D Robotics**, which makes small drones resembling helicopters and fixed-wing aircraft, as well as the software to run them. The business is going after commercial markets. McConnell told his audience that flying robots could inexpensively inspect pipelines, high-voltage lines or the nation’s bridge infrastructure.

- **5D Robotics Inc.** of Carlsbad, which has been working out software for U.S. Army robots.

The creation of an industry cluster in

a community often involves the presence of an important customer, said **Mary Walshok**, dean of UC San Diego Extension and associate vice chancellor of public programs at the university.

San Diego became a wireless center because of the U.S. Navy’s interest in remote signal processing in the mid-20<sup>th</sup> century, said Walshok, co-author of “Invention & Reinvention: The Evolution of San Diego’s Innovation Economy.”

Navy work led to the formation of a company called Linkabit, which eventually spawned a number of wireless and technology companies including Qualcomm, she said.

The development of drones and robots — which also have military roots — seem to be following a very parallel path, Walshok said.

Brain Corp.’s Izhikevich said he is sure the robotics cluster will grow in San Diego.

“All the stars align here,” he said.

## From Your Chicago Title San Diego Team, Your Partners in Success



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