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A $100K Gift from Cognex Supports Research Connecting Deep Learning and   3-D Image Reconstruction

UC San Diego alumni at Cognex-San Diego. (L-R: John McGarry, Chris Neuhauser, Ali Irturk, Isaac Phillips, Janarbek Matai, Howard Tai, Gordon Schmidt, David Zhou, and Ali Khodamoradi (an intern from Kastner lab at UC San Diego).

The University of California San Diego has received a $100K gift from Cognex Corporation, a leader in machine vision. The gift will allow teams of professors and graduate students at the UC San Diego Jacobs School of Engineering to explore research at the intersection of deep learning and 3-D image reconstruction. Generally speaking, 3-D image reconstruction describes the process of capturing the shape and appearance of real, three-dimensional objects.Applying deep learning principles to 3-D image reconstruction could lead to advances in robotics, medical imaging, autonomous vehicle navigation, tele-medicine, and more.

The gift, which contributes to the Campaign for UC San Diego, will support research in the labs of professors Manmohan Chandraker and Ryan Kastner in the Computer Science and Engineering Department at the UC San Diego Jacobs School of Engineering.

With this support, Cognex joins the membership of the UC San Diego Center for Visual Computing, which is an industry-focused research center at the Jacobs School of Engineering. The Center for Visual Computing draws together world-class faculty, students and industry partners working in computer graphics, augmented and virtual reality, computational imaging and computer vision. Computer science professor Ravi Ramamoorthi directs the Center.

"The generous support from Cognex will be instrumental in helping us realize our goal of using deep learning to overcome some of the toughest challenges in 3-D image reconstruction," said UC San Diego computer science professor Manmohan Chandraker. "Our group is addressing these challenges through deep neural networks that incorporate domain knowledge, such as the physics of image formation and functional object parts, to recover 3-D geometric and semantic properties."

Chandraker also noted that Cognex's high-speed precision 3D scanning systems are ideal for acquiring large-scale data needed for training such deep networks.

Cognex has a history generously supporting the UC San Diego Jacobs School of Engineering.

"We are very pleased to be able to continue our financial support and technical collaboration as part of our mission of enhancing computer vision for industry," said John McGarry, Sr. VP R&D at Cognex Corporation. "Over the past several years Cognex has benefited from its relationship with the faculty and graduates of the UC San Diego Jacobs School of Engineering."

Cognex has provided, over the past 5 years, approximately $500,000 to support Kastner's computer science research group, which is a world leader in hardware acceleration and FPGA (Field-Programmable Gate Array) design. This support has helped Kastner's group develop hardware design methodologies for mapping high throughput image processing applications to FPGAs.

"The funding provided by Cognex has been instrumental in our research efforts to develop smarter image sensors," said Kastner. "The collaboration allows us to develop novel hardware platforms around the latest Cognex image sensors. This provides our research group members invaluable real-world experience, and has created a pipeline of talent and research for Cognex."

There is a tradition of collaboration between the Kastner lab and Cognex. A number of Cognex Advanced Product Group members including Senior Engineering Group Manager Ali Irturk and Senior Engineer Janarbek Matai are Ph.D. graduates of the Kastner Research Group.

"Working in the Kastner lab helped me build expertise and confidence as a researcher in embedded systems. In addition, my experiences in the Kastner lab helped me develop a wide range of professional skills that shape who I am today," said Ali Irturk (Ph.D. '09 computer science). Irturk went on to join Cognex as a Principal Engineer where he played important roles in forming the Advanced Product Group at Cognex Corporation in San Diego and in successfully leading research projects within the group.

"In the Kastner lab, I developed into an expert in embedded systems. My experiences prepared me well for cutting-edge academic research and for solving challenging engineering problems. This expertise helps me today to transform research ideas from concepts to working prototypes," said Janarbek Matai (Ph.D. '15 computer science), who is a leading expert in FPGA design with high-level synthesis (HLS).

Matai conducted research in FPGA design of complex algorithms during his computer science Ph.D. at UC San Diego, where he focused on designing FPGAs with high-level synthesis by exploiting computational patterns and templates. He participated in collaborative work between the Kastner group and Cognex that demonstrated the feasibility of designing FPGAs with high-level languages. Matai was subsequently hired by Cognex to continue his work.

In addition to employing Ph.D. graduates from the Jacobs School of Engineering, Cognex also employs a number of alumni from Jacobs School undergraduate and master's programs, including the Master of Advanced Study program in Wireless Embedded Systems, which is one of several master's programs at the Jacobs School designed for working engineering professionals.

"The multi-disciplinary instruction in the Jacobs School's Wireless Embedded Systems master's program was helpful in broadening my set of engineering skills. The program, together with previous experience on multi-disciplinary industry projects, has prepared me to be well suited for fast paced research and development work environments," said Cognex senior software engineer Chris Neuhauser (B.A. '06 math, B.A. '06 electrical engineering, M.A.S. '13 Wireless Embedded Systems).

Current Jacobs School alumni who work for the Advanced Product Group at Cognex also include senior software engineer Isaac Phillips (B.S. '11, M.S. '14 computer engineering), software engineer David Zhou (B.S.'13 electrical engineering), Howard Tai (B.S. '15 mechanical engineering), and senior software engineer Gordon Schmidt (B.S. '97 computer engineering).

Cognex is a machine vision leader. Cognex designs and manufactures products that incorporate machine vision technology including barcode readers, sensors and machine vision systems used in factories, warehouses and distribution centers to guide, identify and assure quality of items during manufacturing and distribution. Cognex is headquartered in Massachusetts and has an advanced R&D team in San Diego.

The gift from Cognex was directed to the Jacobs School of Engineering Dean's Excellence and Innovation Fund, which enables the school to meet its highest priority needs, respond quickly to emerging opportunities and invest in promising areas of high potential. Learn more

about giving to the UC San Diego Jacobs School of Engineering.