Center for Visual Computing

UC San Diego
JACOBS SCHOOL OF ENGINEERING

Revolutionizing the way we capture, image and display the visual world.

At the UC San Diego Center for Visual Computing, we are researching and developing a future in which we can render photograph-quality images instantly on mobile devices. A future in which computers and wearable devices have the ability to see and understand the physical world just as humans do. A future in which real and virtual content merge seamlessly across different platforms.

The opportunities in communication, health and medicine, city planning, entertainment, 3-D printing and more are vast… and emerging quickly.

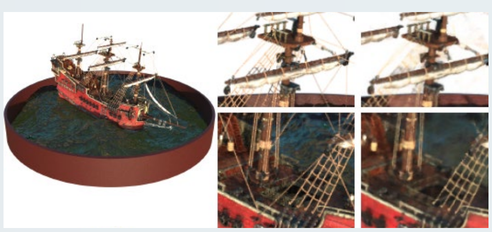
To pursue these kinds of research projects at the Center for Visual Computing, we draw together computer graphics, augmented and virtual reality, computational imaging and computer vision.

Unique Capabilities and Facilities

Our immersive virtual and augmented-reality test beds in UC San Diego's Qualcomm Institute are an ideal laboratory for our software-intensive work which extends from the theoretical and computational to 3-D immersion.

Join us in building this future.

Unbuilt Courtyard House by Ludwig Mies van der Rohe. This rendering demonstrates how photon mapping can simulate all types of light scattering.

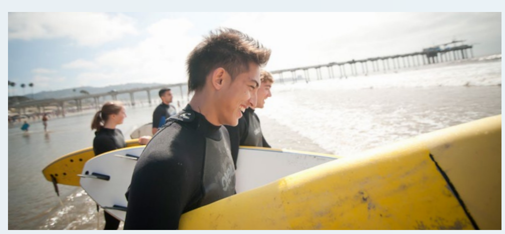


MOBILE VISUAL COMPUTING AND DIGITAL IMAGING

- New techniques to capture the visual environment via mobile devices
- Improved computational imaging and computer vision in the wild
- Advanced rendering on a variety of mobile platforms

INTERACTIVE DIGITAL (AUGMENTED) REALITY

- Achieving photograph-quality images at interactive frame rates to enable the rendering of digital reality in real time
- Seamless rendering and mixing of real and virtual content in real time



UNDERSTANDING PEOPLE AND THEIR SURROUNDINGS

- Computer vision systems with human-level understanding of gestures, scene semantics, activities and groups of people
- Medical, biological and city-planning applications

COMPUTER SCIENCE AND ENGINEERING

Ravi Ramamoorthi

Theoretical foundations, mathematical representations and computational models for the visual appearance of objects, digitally recreating or rendering the complexity of natural appearance. His work on spherical harmonic lighting and irradiance environment maps is widely used in movie production and video games.

Manmohan Chandraker

Leader of collaborations with the automobile industry aiming towards low-cost, real-time visual systems for navigation, recognition and prediction in traffic scenes. Theoretical frameworks and practical systems for applications in autonomous driving, robotics, security and human-computer interfaces.

Albert Chern

With backgrounds in both numerical analysis and differential geometry, Chern studies the interplay between differential geometry, algebraic topology, differential equations and computational mathematics. His research resulted in successful and novel applications in fluid dynamics, geometry processing, as well as classical numerical PDE challenges.

Henrik W. Jensen

Photon mapping algorithm for simulating global illumination in complex, three-dimensional scenes used in architecture, design and visual effects for film. First to render translucent materials such as snow, marble, milk and human skin. Academy Award winner for technical achievement in 2004.

David Kriegman

One of the most widely cited experts on the subject of face recognition, with applications in social networking, robotics, human-computer interaction and homeland security. Uses machine learning, geometry and physics applied to computer graphics, medical imaging, electron microscopy and coral ecology.

Tzu-Mao Li

Li's research focuses on the interactions between three domains: visual computing, programming systems, and statistical learning. His work added 3D understanding to computer vision models; used data to improve camera imaging pipeline quality; and made light transport simulation faster by using information implicitly defined by rendering programs.

Hao Su

Leader in using machine learning to understand geometry data for computer vision, graphics, and robotics. Theoretical and algorithmic research to understand structures, shapes and scenes. Recent work on large-scale 2-D/3-D dataset construction and deep learning algorithms for heterogeneous representations are foundational.

ELECTRICAL AND COMPUTER ENGINEERING

Xiaolong Wang

Wang studies data structure for learning visual representations and its connection to 3D and semantic structures. He uses structure information from the data itself as a supervisory signal for learning visual representations; and explicitly models data structure for human activity analysis, scene affordance reasoning and learning object interaction.

Nuno Vasconcelos

Leader in fundamental and applied problems in computer vision, image processing, machine learning, and multimedia. Focused on development of intelligent systems that combine image-understanding capabilities with additional information to enable sophisticated recognition, parsing, retrieval, classification, indexing, browsing, modeling, and compression of visual content.

COGNITIVE SCIENCE

Zhuowen Tu

Intersection of computer vision, machine learning, neural computation and cognition, and neuroimaging. Focused on statistical learning/computing models for structured, large-scale, and multi-modal data prediction. His research has broad applications, notably for medical imaging.

QUALCOMM INSTITUTE

Tom DeFanti

Leader of teams that have developed the CAVE virtual reality (VR) systems and large-scale 10/40/100 Gbps networks. Co-PI of the Pacific Research Platform that connects 20 major universities for data-intensive computing. Building machine learning ecosystems.

Jürgen Schulze

Making interactive 3-D visualization systems easier to use, including visual display of the data and input paradigms. He uses high-end clustered graphics systems, such as virtual reality CAVEs, to immerse users in the data and 3-D tracked input devices, smartphones and tablets to interact with virtual reality systems.

CONTACT US

Ravi Ramamoorthi
CENTER DIRECTOR
RONALD L. GRAHAM PROFESSOR
Computer Science and Engineering
ravir@cs.ucsd.edu
+1 (858) 822-1483

Anthony Radspieler Jr.
DIRECTOR
Corporate Research Partnerships
viscomp-directors@eng.ucsd.edu
+1 (858) 534-6254

v 2104