



# The Eugene Aas Chair

Professor Yu-Xiang Wang

Prepared for



Fall 2019

**UC SANTA BARBARA**  
College of Engineering



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# UC Santa Barbara

Welcome to UC Santa Barbara – where the land meets the sea, where brilliant minds meet each other, and where academic excellence and social engagement unite. At UC Santa Barbara, we offer a dynamic environment that prizes academic inquiry and interpersonal connection to inspire scholarly ambition, creativity, and discoveries with wide-ranging impact. We offer more than 200 majors, degrees, and credentials, and are a home to many national institutes and centers offering advanced research opportunities and a multidisciplinary environment for students and researchers alike. Across our campus, you'll find independent thinkers and consensus builders, Nobel Laureates and leaders chasing noble causes. But no matter how you define us, we are above all Gauchos — diverse in our pursuits, yet connected in our collective drive toward excellence.

## College of Engineering

The College of Engineering has been ranked as the #1 public university in the world for engineering research. Our exceptional programs are consistently ranked as top in the nation for areas of research impact, number of citations, and faculty awards. In addition, the College of Engineering prides itself on its interdisciplinary approach to research to more effectively and efficiently achieve progress. Our research addresses the grand challenges of our time, advancing technology that benefits society on a global scale: biomedical applications, energy and resource sustainability, electronics and photonics technology, and the future of networks and big data.

## Computer Science Department

Since its founding in 1979, the Computer Science Department has seen a meteoric rise in rankings and influence. The new NRC ranking places the Department among the top 10 in the nation.

Our world-renowned faculty and exceptional students conduct exciting research in all areas of computer science. From harnessing the power of machine learning to improving the energy efficiency of computing, our faculty and students are making impactful contributions in all frontiers of computer science. Our faculty are highly awarded innovators, and enable us to provide an outstanding education to our students at all levels and broaden participation in computer science.

# The Eugene Aas Chair

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UCSB Foundation Trustee Mark Bertelsen '66 and his wife, Susan '67, made a gift to establish an endowed chair in computer science at UC Santa Barbara. The Bertelsens are volunteer leaders and generous benefactors of the campus. Together, the Bertelsens's philanthropy exceeds \$2 million, which has helped to foster entrepreneurial education in the College of Engineering and support the Center for Information Technology and Society (CITS) .

The Bertelsens, both UCSB graduates, chose to name the chair in memory of Susan's father, Eugene Aas. The Eugene Aas Chair in Computer Science is used to attract and support the research of a leading junior faculty member working in the forefront of the discipline. It continues to provide financial support to the chairholder for research and instruction.

As Chancellor Henry T. Yang has stated, "We are grateful for the philanthropic leadership of Mark and Susan Bertelsen and their numerous and generous contributions to advancing our university, including the guidance Mark has provided as a former chair and ongoing member of our UCSB Foundation Board of Trustees."

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# A Letter from Rod Alferness Dean of Engineering

Fall 2019



On behalf of the College of Engineering, I would like to express my gratitude for your support of the College and the Eugene Aas Chair in the Department of Computer Science. Your generous support for the College sustains our legacy of excellence in research, innovation, and education at UC Santa Barbara.

It is one of our top priorities at UCSB to recruit and support some of the brightest and most dedicated students and faculty members interested in expanding engineering knowledge. It is through dedicated philanthropy, such as yours, that we are able to maintain and advance our success. Your continuous support and leadership allow us to sustain our reputation as a globally recognized institution, as well as provide the best possible research environment for our faculty and students.

Once again, my colleagues and I are grateful for your commitment to the College of Engineering and the University. As the College continues to tackle the most pressing challenges of today's society, rest assured that it is because of dedicated alumni like you that we will succeed.

With gratitude,

Rod C. Alferness, Ph.D.  
Richard A. Auhll Professor and Dean

# Professor Yu-Xiang Wang

## Eugene Aas Chair

Yu-Xiang Wang is an assistant professor of computer science at UCSB. Prior to joining UCSB, he was a scientist with Amazon Web Services's AI Research Lab in Palo Alto, CA from 2017 to 2018.

Yu-Xiang received his PhD in Statistics and Machine Learning in 2017 from the world's first Machine Learning Department in the School of Computer Science of Carnegie Mellon University. Before that, he received his Master's and Bachelor's degrees in Electrical Engineering from National University of Singapore in 2011 and 2013 respectively.

Yu-Xiang's research interests revolve around the intersection of machine learning, statistics and optimization with special focus on statistical theory and methodology, differential privacy, large-scale machine learning, reinforcement learning and deep learning.



# Current Research

Yu-Xiang's research focuses on the theoretical foundation of machine learning algorithms - a subfield of Artificial Intelligence (A.I.) that empowers computers to learn from experience. Applications of machine learning include recognizing objects in image and videos, providing movie recommendations, personalizing health care and much more. Yu-Xiang's research explains how machine learning algorithms work and, more importantly, under what circumstances they fail to work. Answers to these questions allow us to interpret what blackboxes are doing and to be more confident using them in high-stake applications.

One specific research program Yu-Xiang is developing focuses on reinforcement learning (RL). This is a type of machine learning algorithm that learns by taking actions and receiving feedback from its environment. Recently, RL has been highly successful in video games, e.g., Atari games, Texas Hold'em, and even Starcraft. However, training such A.I. agents often requires a simulator that allows it to interact continuously for millions of repetitions. In real-life applications of an RL simulator do not exist, therefore every round of interaction is a costly experiment. To address this problem, Yu-Xiang's research explores designing more data-efficient RL algorithms. Yu-Xiang's work also focuses on inventing algorithms for offline evaluation, which use previously collected data to estimate the performance of a new strategy, for example: a new medical treatment, economic policy, or inventory planning system, without actually deploying them. Through this, researchers can be certain that the new strategy is better than the old one before taking the costly leap of faith.

Finally, the recently established "UCSB Center for Responsible Machine Learning" will systematically investigate the various societal problems that arise as society experiences the technological "Third Industrial Revolution." The technology that machine learning and A.I. enables, such as self-driving cars, augmented reality, smart home devices, and social media, have fundamentally changed how people interact with each other and the world around them. The center will stimulate interdisciplinary collaboration to tackle challenging questions and to drive positive social change.



# Thank You For Leading The Way!

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