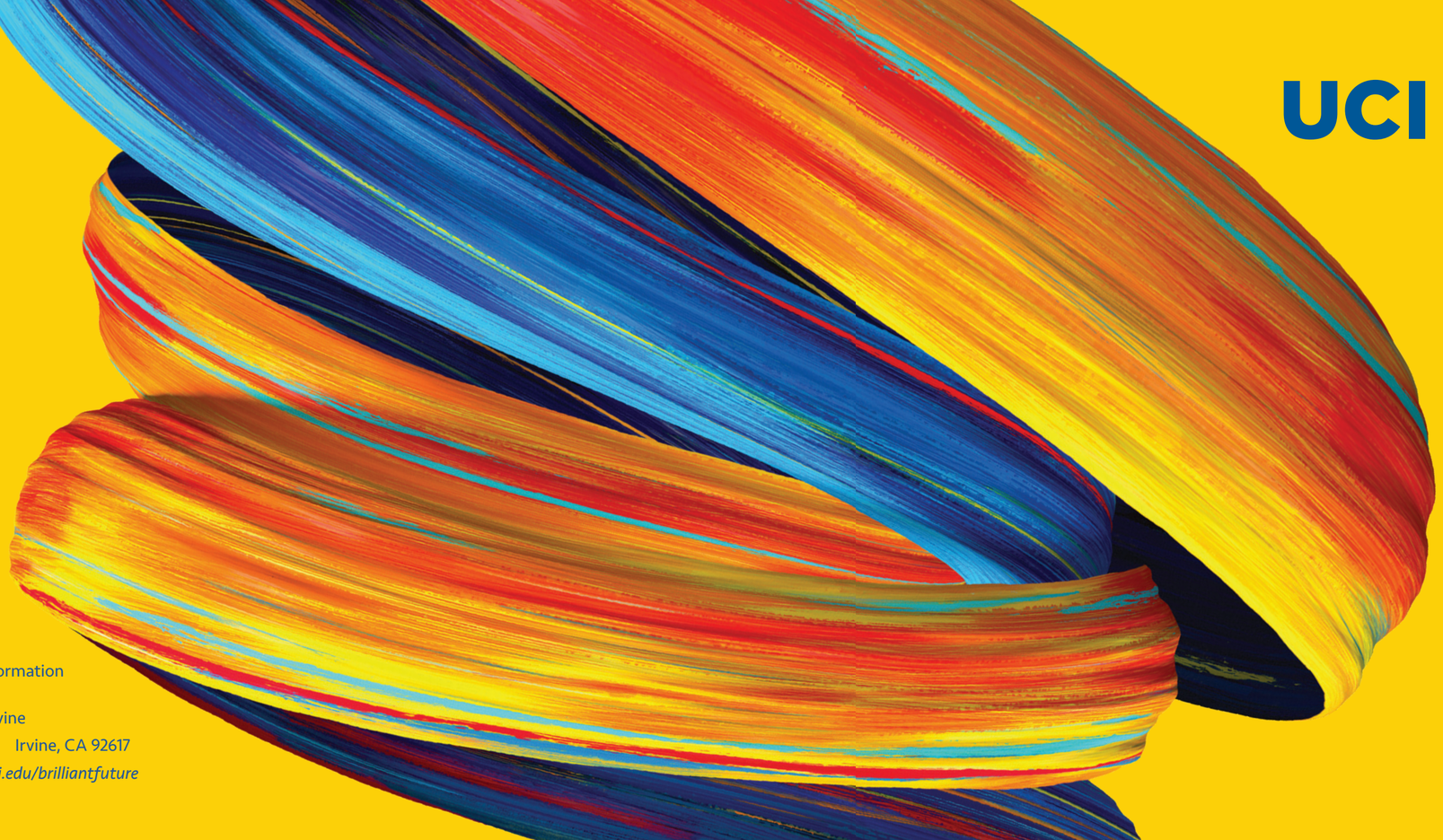


UCI Donald Bren School of Information & Computer Sciences

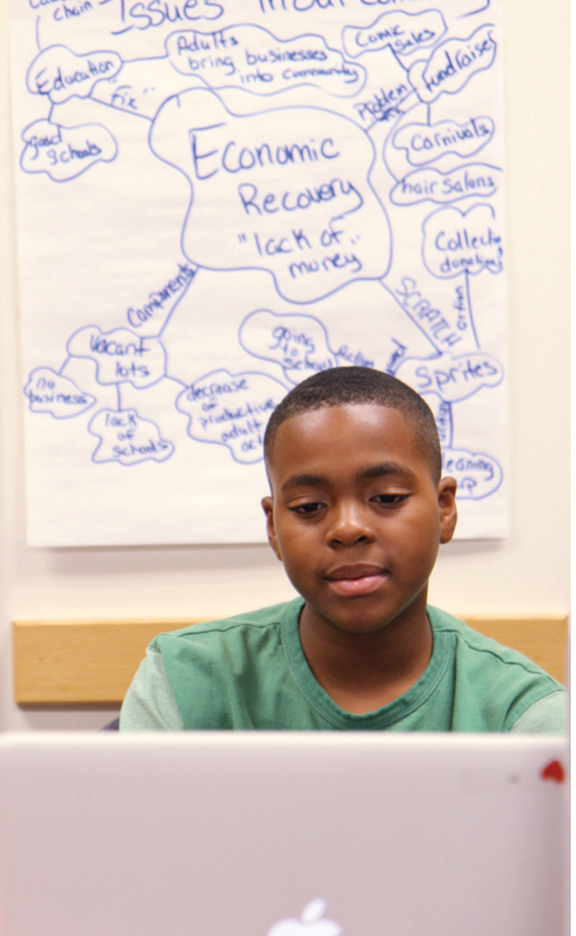
THE CASE FOR SUPPORT

Donald Bren School of Information
and Computer Sciences
University of California, Irvine
6210 Donald Bren Hall • Irvine, CA 92617
(949) 824-7427 • *ics.uci.edu/brilliantfuture*

BRILLIANT FUTURE
THE CAMPAIGN FOR **UCI**

"Virtually every human activity relies on computing and the analysis of data... the intellectual breadth in our School enables us to interface with all these different disciplines directly and effectively."

- Marios Papaefthymiou
Dean, Donald Bren School of Information and Computer Sciences



As one of the largest computing schools in the nation and the only one in the UC system, the Donald Bren School of Information and Computer Sciences (ICS) is uniquely positioned to prepare future leaders of the information and computing revolution that is transforming our world. The School's national prominence and the University's foresight to invest in the future are reflected in the unprecedented growth of ICS since its founding in 2002. With its student enrollment tripling within the past five years, ICS now educates more than 3,500 undergraduate and 800 graduate students. The School has 97 tenure-track faculty in three academic departments — Computer Science, Informatics, and Statistics — and offers seven undergraduate, six doctoral, five master of science, and four professional master programs.

Here at ICS, computer scientists, informatics experts and statisticians work side by side, combining a range of expertise rarely found under one roof. Drawing on analytical talents and a knack for creative integration, our faculty and students fluidly move across the spectrum to invent new computing technologies and explore their use in a broad variety of application domains. ICS is home to a remarkable breadth of research and education programs with core strengths in fields of national priority, including artificial intelligence and machine learning, cybersecurity, data science, software engineering, human-computer interaction, health informatics, to name a few.

A founding School tenet that permeates its research and education initiatives is that people must be at the center of information technology creation. ICS researchers look beyond the next new technology, studying the interactions between information technology and people, exploring the impact — positive or negative— of technology/tech to our society, and exploring technology through a socially conscious lens.

Through its multiple centers and institutes, ICS fosters diverse collaborations with campus and community stakeholders, reshaping domains as far-reaching as education, art and entertainment, business and law, the environment and biological systems, and healthcare and medicine.

Technology/tech will drive solutions for our increasingly digitized world well into the 21st-century. A new phase of investment and expansion will enable us to expand our School's strengths in these areas of critical importance to the nation and the globe:

1. Research, educate and practice socially beneficial artificial intelligence (AI)

2. Create solutions for a safer digital world

3. Advance digital wellness and learning media for youth

4. Expand, support and diversify the country's next generation of technology/tech leaders

We invite you to join us in our endeavor to transform our world for the better through innovation in computing technology.

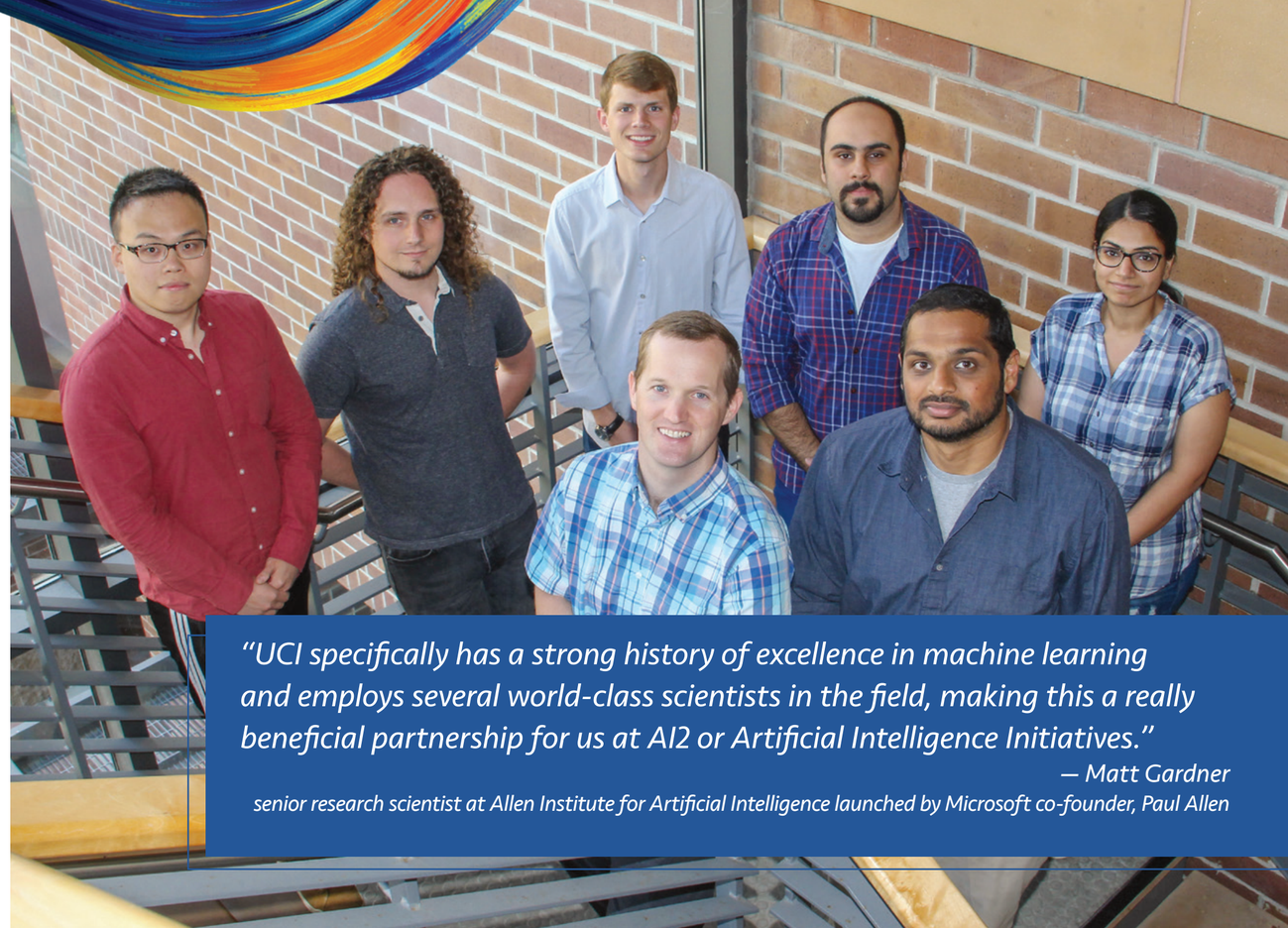
The AI Initiative researches, educates and practices socially beneficial AI

Artificial Intelligence Initiatives

Artificial Intelligence (AI) and Machine Learning (ML) technologies have infiltrated virtually every corner of society, from search engines and automated translation systems, to self-driving cars and video recognition systems, and in domains ranging from commerce and finance to biomedicine and law enforcement. The ubiquity of mobile computing — and the rise of algorithms that dictate what we watch, hear and experience — is raising alarming concerns about the consequences of humans becoming increasingly disconnected from their personal decision-making and privacy.

Government, industry, and citizens are all grappling with these daunting challenges that will impact the economy of our country and the fabric of our society. In response, the White House initiated an Executive Order establishing the *American AI Initiative*, directing the Federal Government "to prioritize research and development of America's artificial intelligence capabilities."

The AI Initiative brings together stakeholders across the community and campus to answer the unprecedented challenges we face ahead. Inclusive of engineering, business, health, law, education, and social sciences, the Institute will provide UC Irvine with a unifying architecture to advance socially beneficial AI. Combining its historical strengths in machine learning and socially conscious computing, ICS is in a unique leadership position to bring together the interdisciplinary expertise necessary to address these areas of national urgency:



"UCI specifically has a strong history of excellence in machine learning and employs several world-class scientists in the field, making this a really beneficial partnership for us at AI2 or Artificial Intelligence Initiatives."

— Matt Gardner

senior research scientist at Allen Institute for Artificial Intelligence launched by Microsoft co-founder, Paul Allen

"For every area of impact you want to make — whether it be improved cancer diagnosis and care for a loved one to improved national security — you can work backwards to identify AI-centered solutions."

- Paul Dourish
Chancellor's Professor of Informatics

ICS is equipping the workforce with training and education in AI

Socioeconomic Implications of AI

Leading efforts in access and accountability for AI systems, Computer Science and Informatics faculty together with UCI colleagues from multiple schools work to develop ethical artificially intelligent systems in healthcare, education, governance or criminal justice. Our research collaborations answer how AI systems can be developed to avoid problems of bias, uneven access and invasion of privacy. For example, computer science professor Sameer Singh works to identify and correct discriminatory lending practices by applying natural-language processing techniques to loan application documents.

One critical area will be equipping the workforce, including K-12 educators, for the impending labor market changes prompted by rapid AI advancements. As the information revolution unfolds, an increasing number of jobs performed by humans will be performed by AI technologies, while many new jobs will be created in emerging fields. ICS is leading the way in developing programs that enable professionals to adapt to such a dynamic landscape, with the AI Initiative partnering with other schools on campus to organize symposia and executive education programs in artificial intelligence, machine learning, and data analytics. We are also expanding curriculum and enrollment at the undergraduate and graduate levels, adding courses like "Artificial Intelligence Frontiers: Technical, Ethical, and Societal" to complement more technical AI courses.

Our faculty are at the forefront of the e-medicine revolution

AI-Improved Health Diagnostics and Care

We are at the beginning of a new era of health, with a seismic shift underway from reactive inpatient care responses to illness, to prevention-focused, outpatient long-term well-being. With immense power to unleash improvements in cost, quality and access, initial forecasts project the AI-health market will grow more than 10 times over the next five years (Accenture 2019 Analysis).

Our School's deep expertise in artificial intelligence, with almost 100 faculty and doctoral students in machine learning and data analytics, combined with the university health system, gives UC Irvine the rare and necessary complement to teach machines how to improve and expedite everything from administrative to clinical healthcare services. Below are a few ways in which the Institute is making an impact on care:

Medical Imaging and Diagnosis

Our faculty are at the forefront of this e-medicine revolution. Bringing together ICS researchers, colleagues in the Samueli College of Health Sciences and health sciences companies, we are developing and implementing new technological interventions addressing numerous chronic and other health conditions. For instance, Prof. Pierre Baldi, of the AI Initiative, a lead and deep-learning expert, is collaborating with medical professionals to develop measurably improved diagnostic imaging techniques for a broad variety of health conditions from cardiovascular disease to colorectal cancers and glioma in the brain.

Predicting and Improving Health Outcomes

Increasingly, healthcare organizations also employ statistical analysis to measure and predict care and efficiency outcomes. Leveraging our undergraduate and professional programs in data science, the AI Initiative can readily connect algorithm and software platforms to analysis of medical data. In fact, data science faculty from our Statistics department are frequently included in hospital clinical trials to help predict diseases, provide proper medication and implement quality improvement programs. For example, Prof. Dan Gillen, chair of the Statistics Department and epidemiology expert, develops survival analysis methods for renal disease and cancer patients.

Neuroscience (Natural Intelligence vs. AI)

Understanding intelligence and consciousness in brains and machines is at the center of humankind's quest to understand ourselves and the universe. ICS researchers play a vital role in this quest, working with neuroscientists at UCI MIND (Institute for Memory Impairments and Neurological Disorders) further our understanding of the human mind and improve relatively primitive AI systems.

Inclusive Patient-Tailored Applications

AI faculty are transforming the way patients interact and access care providers. From digital apps tailored to doctors and patient usage needs to building new technologies for the blind and disabled, ICS is personalizing care for all.

Consumer and Business Applications

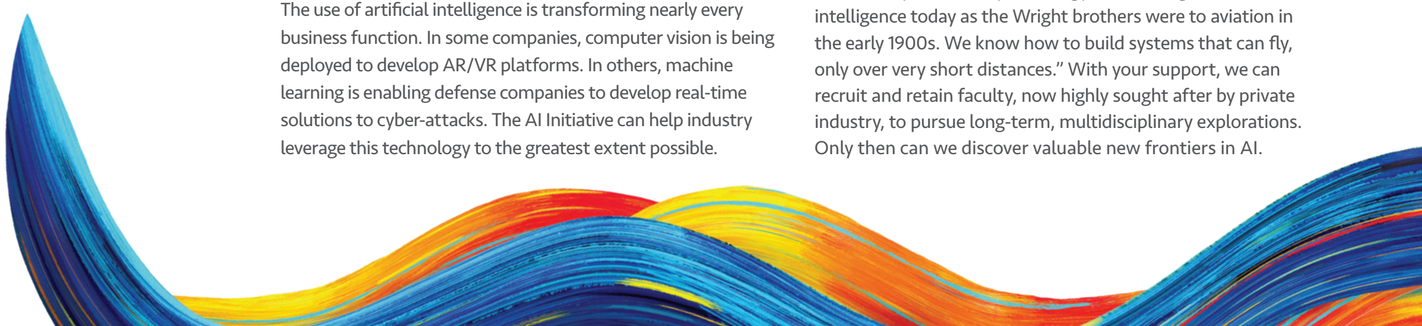
The use of artificial intelligence is transforming nearly every business function. In some companies, computer vision is being deployed to develop AR/VR platforms. In others, machine learning is enabling defense companies to develop real-time solutions to cyber-attacks. The AI Initiative can help industry leverage this technology to the greatest extent possible.

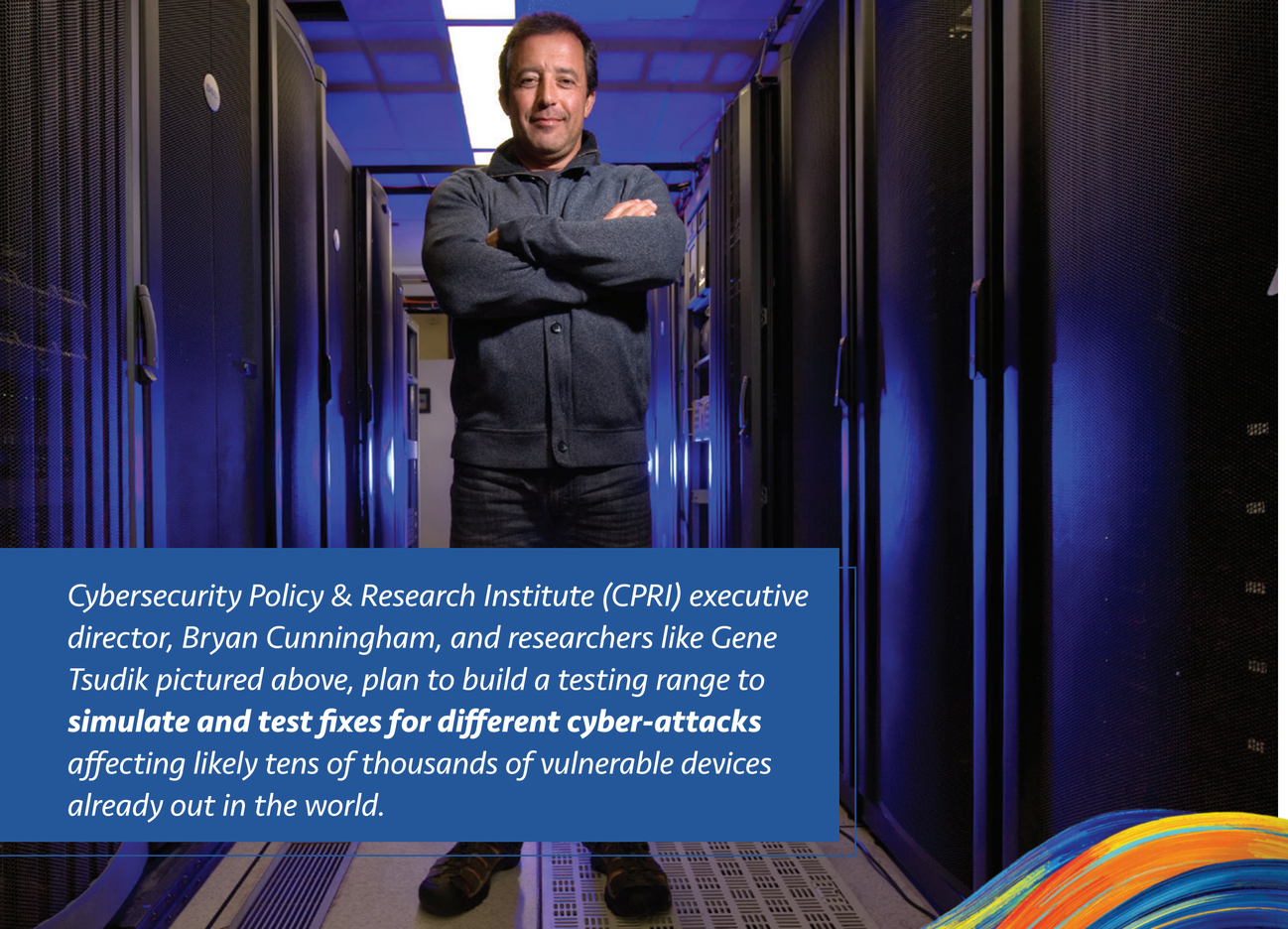
New Frontiers in AI

AI has advanced to the point where we are seeing computers do things that sounded like science fiction a few short years ago. What if we convened the brilliant minds of our multi-school and sector partnerships to explore new possibilities that humans haven't imagined yet?

We envision an AI Initiative that will serve as a national hub for the cutting-edge, disruptive technological revolution of artificial intelligence. We invite industry, community and academic experts to partner with us in this effort. We aspire to build a resource-rich, open-source environment through shared data sets, the design and deployment of AI systems in testbed environments and doctoral research collaborations.

Institute lead, Pierre Baldi, sums up the importance of discovery with a simple analogy — "AI is to general intelligence today as the Wright brothers were to aviation in the early 1900s. We know how to build systems that can fly, only over very short distances." With your support, we can recruit and retain faculty, now highly sought after by private industry, to pursue long-term, multidisciplinary explorations. Only then can we discover valuable new frontiers in AI.





Cybersecurity Policy & Research Institute (CPRI) executive director, Bryan Cunningham, and researchers like Gene Tsudik pictured above, plan to build a testing range to ***simulate and test fixes for different cyber-attacks*** *affecting likely tens of thousands of vulnerable devices already out in the world.*

creating solutions for a

safer digital world

Cybersecurity Policy & Research Institute

In a world where everything is connected, everyone — individuals, corporations, governments and other institutions — faces unprecedented vulnerabilities when it comes to privacy and security. High-profile breaches in both the public and private sectors, including breaches against financial and healthcare institutions, underscore the magnitude of this crisis. ICS is a founding partner of the UCI Cybersecurity Policy & Research Institute, a collaboration among six schools on campus and the Division of Continuing Education. With our unique ability to address the problem from both a technical and a policy perspective, we seek to deepen our investment and focus on high-impact, multidisciplinary research to combat cyber threats and protect individual privacy and civil liberties.

Training and Education: CPRI helped develop cybersecurity-related training and educational programs, including cybersecurity curricula for high school students, both to create expertise and to inspire them to attend community and four-year colleges to enter this job-rich field.

Community Outreach: In collaboration with academic and law enforcement partners, the Institute has developed a law enforcement training program using forensic techniques.

Research: The Institute pursues high-impact multidisciplinary research projects with support from federal agencies, high-tech industry partners, and private foundations.

Policy Analysis & Development: CPRI also conducts policy analysis and development on critical cybersecurity-related topics, and hosting public conferences and public meetings on emerging issues.

Connected Learning Lab (CLL)

Advance digital wellness and learning media for youth

If ever there has been an elusive domain difficult to make progress with technology, learning might be it. Despite billions of dollars of investment in educational software and the promise of distance education, actual improvements in learning are slow and difficult to come by. To tackle this nagging issue, ICS teamed up with the Schools of Education and Social Sciences to form the Connected Learning Laboratory to study and design learning technologies that are equitable, innovative and learner-centered. Our researchers are in K-12 schools, working with educators and students, reinventing camps, designing games and other educational tools, and studying how to bring in peers, mentors and caring adults to build supportive learning environments for young people of all backgrounds.

Digital Equity

New technology is exacerbating inequality in learning and health. From STEM mentorship programs for underrepresented students to creating savings apps to help kids track expenses, CLL is closing the gap.

Digital Wellness

Fears abound about how social media, smartphones, and digital games are leading to depression, anxiety, addiction, narcissism and other mental health problems. What is under-discussed and investigated is how such technologies can foster social connection and engagement in ways that can build mental wellness among young people.

Learning through Making and Play

Young people learn best when they are engaged in hands-on, interest-driven and social forms of learning. New playground designs, learning games, electronic textiles, Minecraft summer camps, and paper computing — the CLL faculty are developing innovative new learning tools and environments that are both engaging and enriching.

Connections for Wellness:

Faculty from Psychological Sciences and Informatics are teaming up with youth, online influencers, and digital creators to develop innovative ways of supporting youth mental health through online and social media. Research indicates that vulnerable and marginalized youth can benefit from positive peer support online. CLL researchers investigate how can we better support and amplify these kinds of positive online spaces for teens.

Student Excellence Programs

Expand, support and diversify the country's next generation of tech leaders

The excitement and impact generated by computer science has led to unprecedented numbers of students clamoring for education in our School. Our capacity limits represent an opportunity lost, both for talented students and the labor force. Our field faces the largest gap between employer demand and degrees produced of any sector in the nation. In fact, the Bureau of Labor Statistics projects that 73 percent of all newly created jobs in the U.S. this decade in STEM related fields will be in computing, whether due to retirements or new job listings. Graduating about 1,000 students annually, the Bren School will contribute significantly to our digital economy.

Scholarships and STEM Outreach

ICS is committed to not only growing the national pipeline of technology/tech leaders, but also ensuring our students add diverse perspectives and the highest level of technical acumen to the field. In fact, we are among the two most academically competitive schools in the university — with 4.0+ student GPA's and 1488 average SAT scores. We are also among the most diverse computing programs in the country — nearly double the diversity figures of peer institutions — with almost 30 percent female students and approximately 50 percent

Department Highlights

1. Computer Science is UCI's 2nd largest undergraduate major

2. The Game Design program in **Informatics** is ranked 3rd in the state by Animation Career Review (ACR) in 2019

3. Statistics received 3 of the 13 National Science Foundation Graduate Research Fellowships awarded to statistics students across the nation in 2019

Top 16
Computer Science
Graduate Program
for public universities
— U.S. News & World Report

50% **ICS students**
are minority, female, or first-gen

moving beyond traditional classroom learning

minority and first-generation college graduates. Our ability to recruit this rare combination of academically excellent and highly inclusive group of students depends on our private support for merit and need-based scholarships and fellowships.

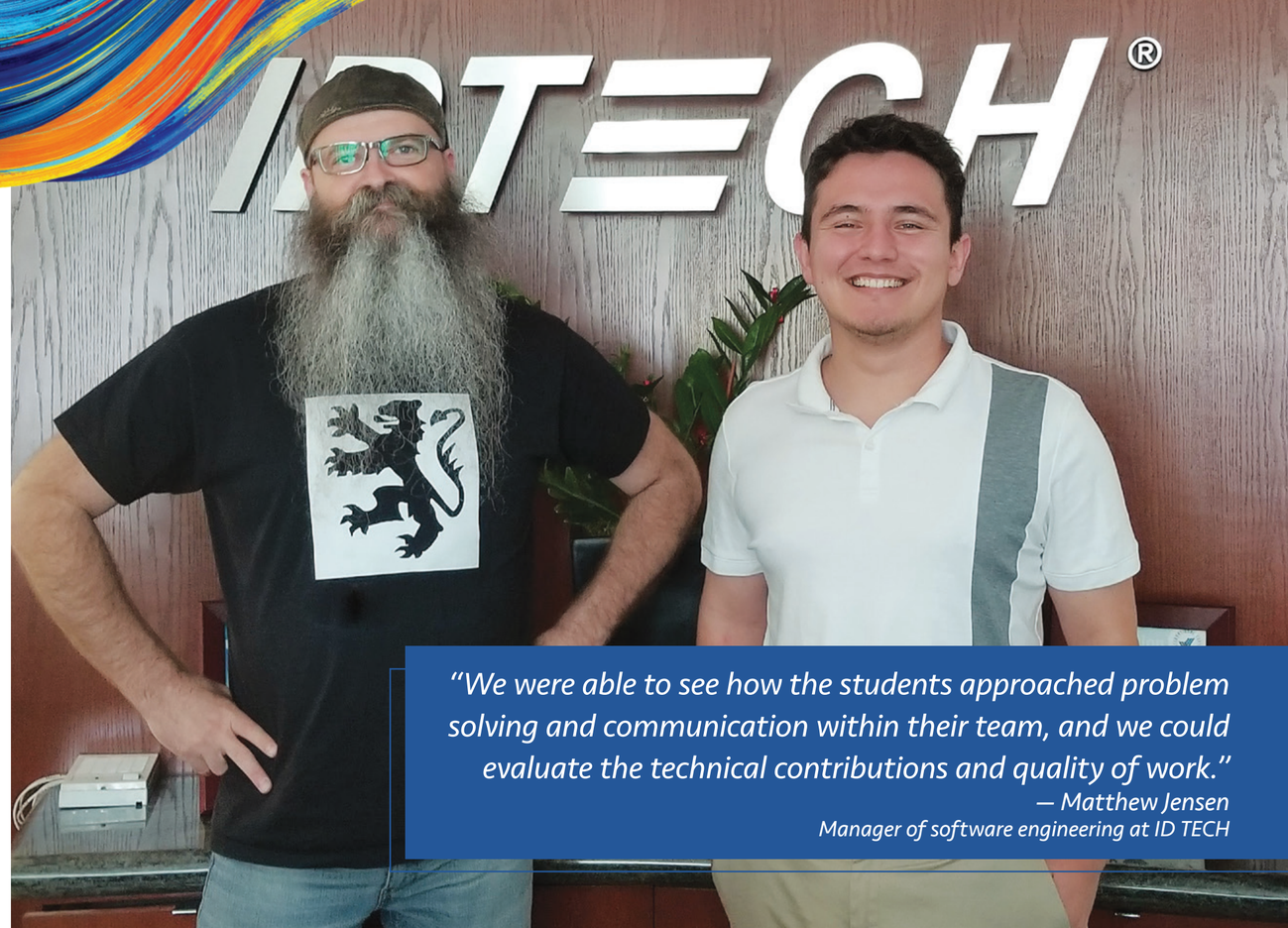
Student support also enables ICS undergraduates to introduce a younger generation of K-12 students to STEM through our multicounty educational outreach programs. Promoting computing in fun and interactive ways reinforces leadership skills for our students and expands access to STEM careers for the youngest of children.

New Learning Environments

We aspire to create spaces that engage the community, foster teamwork and facilitate industry collaboration. By outfitting or naming makerspace studios or public spaces in ICS buildings, or the new interdisciplinary sciences building, you complement our students' classroom curriculum with the design resources and equipment needed for group projects or technology showcase events. As a corporate partner, you might also consider establishing a named space to grow your company's recruitment visibility with assigned space for tech talks and soft skills seminars.

Student Clubs, Competitions and Capstones

Moving beyond traditional classroom learning, extracurricular experiences — such as international competitions, technical conferences, hackathons, student clubs and industry-enabled applied projects — equip students with leadership and program management experiences, enhancing their value in the marketplace. Your support could also expand participation in capstone design projects, providing our students with résumé-building project experience and access to corporate mentors who often hire them as interns or full-time employees.



"We were able to see how the students approached problem solving and communication within their team, and we could evaluate the technical contributions and quality of work."
— Matthew Jensen
Manager of software engineering at ID TECH