

# INNOVATING THE FUTURE:

THE CAMPAIGN FOR THE PAUL G. ALLEN SCHOOL  
OF COMPUTER SCIENCE & ENGINEERING

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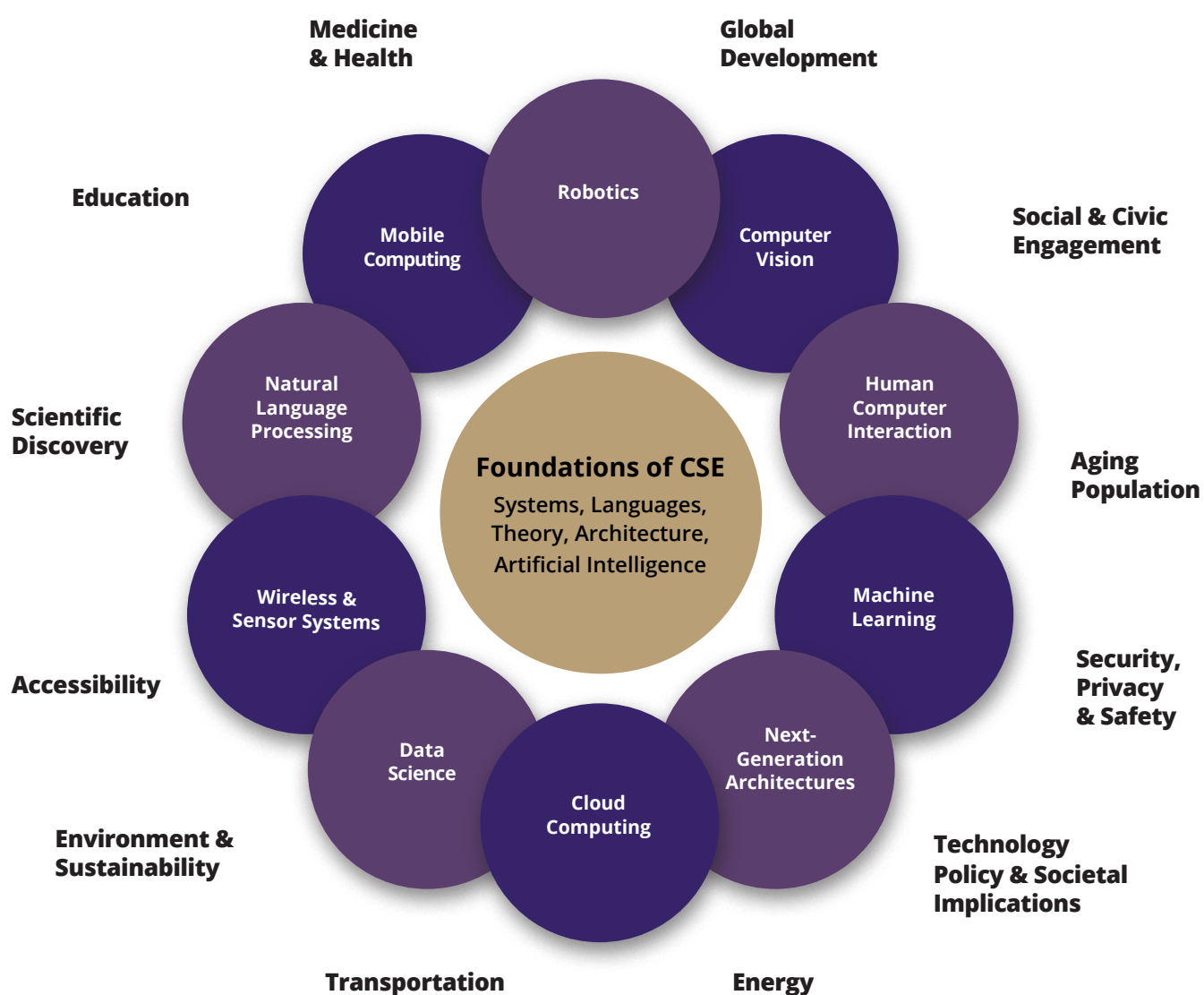
UNIVERSITY *of* WASHINGTON



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## The Allen School's 21st Century Vision of Computer Science: A Field Unique in Its Societal Impact

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Cover image: Lee Organick, with the Molecular Information Systems Lab (MISL), holds a DNA sequencer flow cell. MISL explores the intersection of information technology and biology — for example, the storage of digital data in synthetic DNA.



"We are entering a new golden age of innovation in computer science, and UW students and faculty will be at its leading edge. My hope is that the school will have the same influence on them as it did on me — that they will continue to dream big, breaking through technological barriers and using their skills to solve some of the biggest problems our world faces."

– Paul G. Allen (at the dedication of the Allen School, March 9, 2017)

## The Allen School: At the Forefront of Computing Innovation for Societal Impact

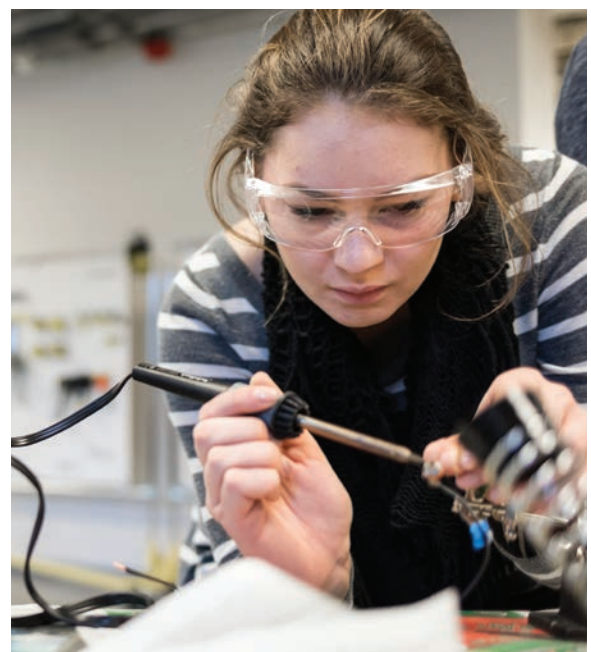
Computer science and computer engineering are driving solutions to the most important challenges of the 21st century. From education to energy, from global health to scientific discovery, the Paul G. Allen School of Computer Science & Engineering is harnessing the power of computing to transform entire industries and improve quality of life for people everywhere.

With your partnership, we can make an unparalleled education and research experience available to more students.

As every field becomes information-driven, computer science has emerged as a cornerstone of the modern university and of the modern world. Our faculty and students continually push the boundaries of our discipline, placing the Allen School at the vanguard of computing innovation for positive change. Our commitment to mentorship, collaboration, interdisciplinarity and close interaction with leading technology companies makes the Allen School one of the

best places in the world to become a computer scientist or computer engineer who makes lasting contributions to society.

Now, as we enter our second half-century, we are positioned to dramatically expand our impact. With your partnership, we can make an unparalleled education and research experience available to more students — and advance the University of Washington as a global destination for the innovators and leaders of tomorrow.





## A History of Transformational Investment

“This is an investment in students who will become the innovators and creators of tomorrow.”

– Brad Smith,  
Microsoft President  
and Chief Legal  
Officer, announcing  
Microsoft’s  
commitment to the  
Bill & Melinda Gates  
Center

Throughout our history, the Allen School’s leadership has invested philanthropic and internal resources strategically to help propel UW to the forefront of the field as a leader in computer science teaching, research and entrepreneurship.

The opening of the Paul G. Allen Center for Computer Science & Engineering in 2003, together with endowed support for faculty, students and programs, enabled us to grow our leadership in a multitude of ways:

- **Educating more students for high-impact careers.** Since 2003, enrollment has nearly tripled, and we are continuing to grow. More than three-fourths of our undergraduates are Washington residents, and the vast majority remain here after obtaining their degrees.



- **Recruiting exceptional faculty.** Our people have made the Allen School a leader in core areas such as programming languages, software engineering, systems, networking, and computer architecture, as well as in cutting-edge areas such as computer vision, machine learning, data science, privacy and security, and game science.
- **Becoming a research powerhouse.** The Allen Center enabled a new era of research partnerships across the campus and beyond, and catalyzed exciting new lines of research in mobile health, brain-computer interfaces, accessible technologies, robotics, and digital services for underserved communities — to name only a few.
- **Cementing entrepreneurship as a core aspect of our culture.** Our faculty and students have created dozens of startup companies, and our alumni have gone on to build countless more.
- **Fueling the growth of our region's technology industry.** We are one of the nation's leading providers of graduates to Microsoft, Amazon and Google — roughly one-third of our students head for one of these companies — and we are the predominant supplier of graduates to the region's startups, growing technology companies and engineering centers.
- **Promoting diversity.** We've worked hard to make computer science accessible and welcoming to students from underrepresented groups, through K-12 outreach, the College of Engineering's STARS program, and other initiatives. As one example of our successes, we were honored in 2015 with the National Center for Women & Information Technology's inaugural NEXT Award for Excellence in Promoting Women in Undergraduate Computing.



## Two Landmark Events in Our 50th Anniversary Year

In 2017 — our 50th anniversary year — we celebrated two milestones that position us for an even brighter future.

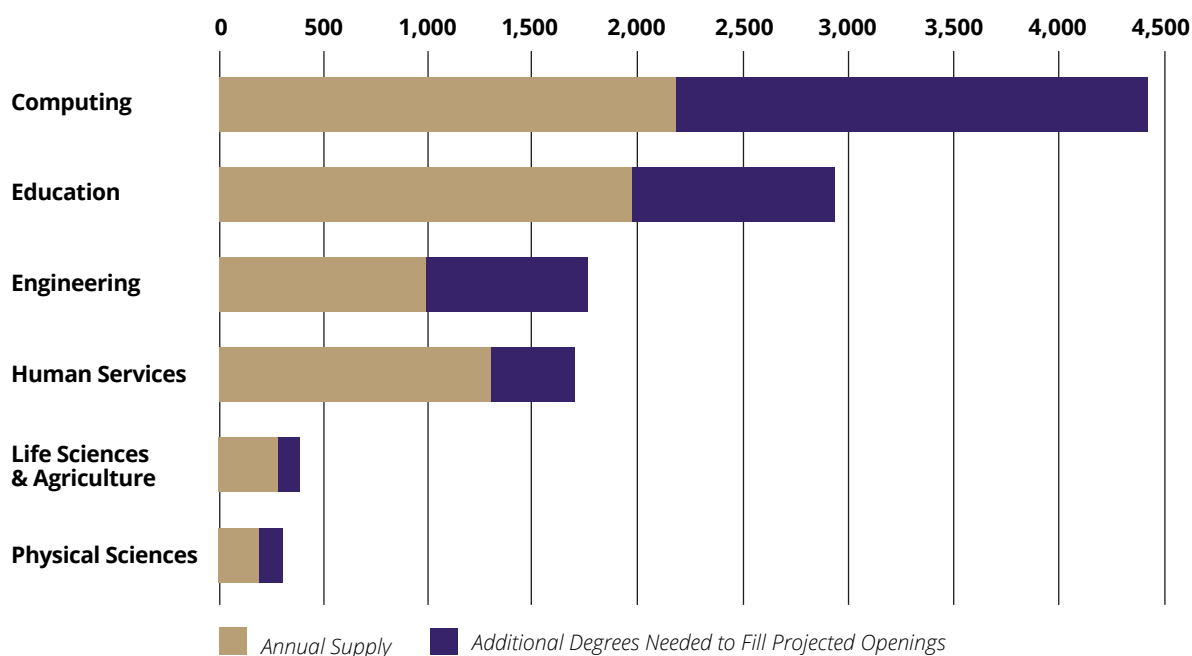
First, Paul Allen and Microsoft partnered to create a \$50 million endowment that gives us the flexibility and resources to pursue new opportunities for discovery and impact. In response, the university elevated CSE from a department to a school. The creation of the **Paul G. Allen School of Computer Science & Engineering** recognizes our evolution into one of the nation's leading programs, links us in perpetuity with a visionary who has left an indelible mark on science, technology and society, and will catalyze further innovation in computing education and research.

Second, we completed the fundraising for a second building: the **Bill & Melinda Gates Center for Computer Science & Engineering**. The Gates Center doubles our space and dramatically expands our capacity to provide an unparalleled educational experience, conduct leading-edge research, and engage in even more robust collaborations across the campus, the region and the globe. As high school students, Paul Allen and Bill Gates roamed the UW campus in search of computing facilities; having the Paul G. Allen School housed in adjacent Allen and Gates Centers is of immense symbolic as well as practical importance.

## Our Next Challenge: Sustaining Excellence with Growth

The excitement and impact generated by computer science and computer engineering have led to ever-increasing numbers of students clamoring for education in our field. More incoming UW freshmen select CSE as their first-choice major than any other field.

Projected WA Bachelor's Supply/Demand Gaps, 2020-2025



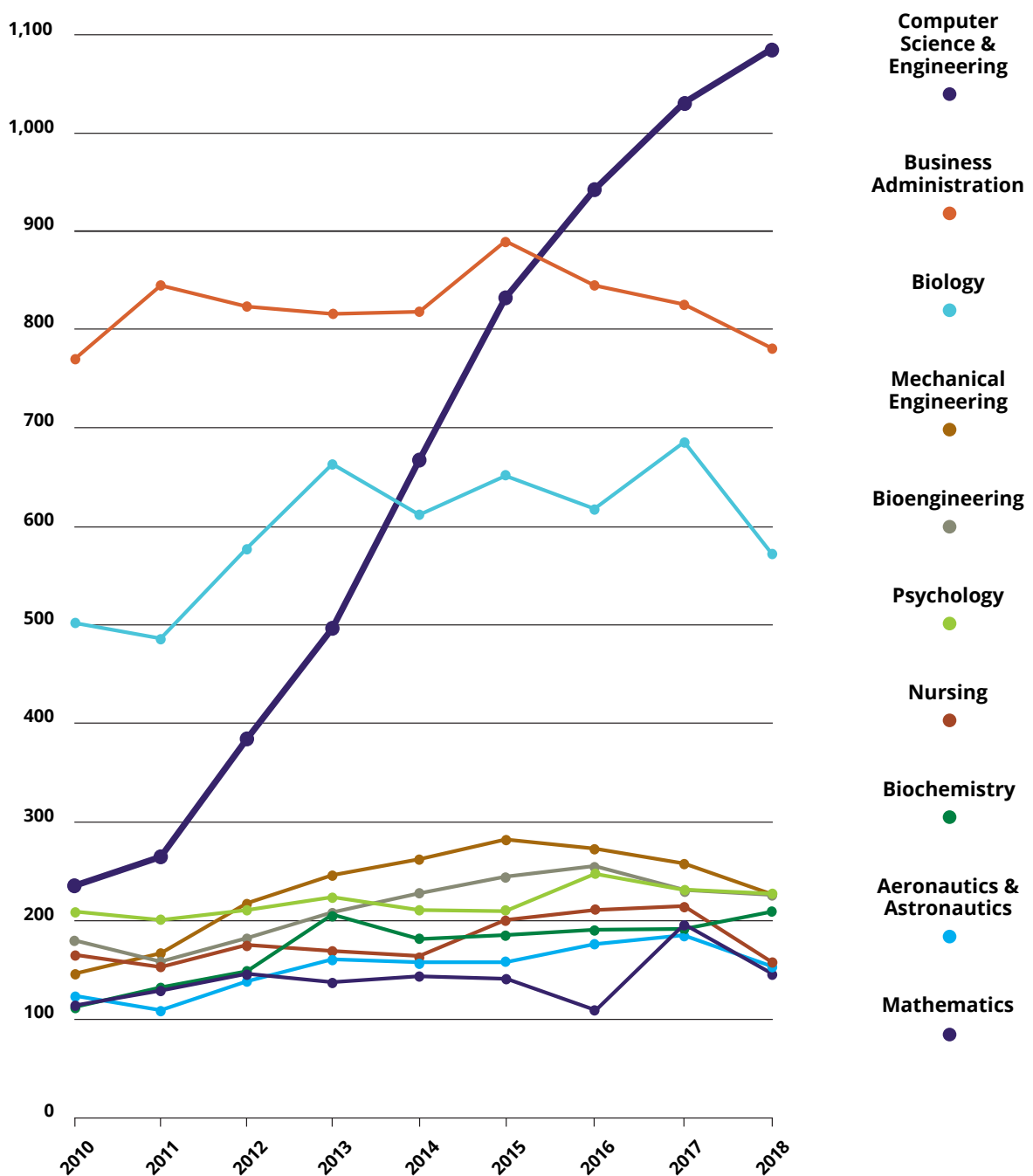


**The growth in student interest is matched by the growth in employer demand for computer science graduates.** The Bureau of Labor Statistics projects that, nationally, 66% of all newly created jobs in the U.S. this decade in science, technology, engineering and mathematics will be in computing, as will 60% of all available STEM jobs, whether newly created or due to retirements. In the state of Washington, the bachelor's-level workforce gap — the difference between the number of degrees granted and the number of jobs available — is as large in computer science as in all other high-demand fields combined.

In addition, the centrality of computer science to all fields means that the need for collaboration between the Allen School and faculty and students from other areas of the UW will only increase. Support for these endeavors through expansion of Allen School programs is essential.

In short, to address the needs of our students, our economy and our society, we must continue to grow — and we must do so in a way that enhances our excellence and culture.

### Top 10 First-Choice Majors of Confirmed Incoming UW Freshmen





"We have a deep commitment to both access and excellence. We want our doors to be open to the full range of visionaries, and we want to help them become the best in their fields so that they can have a positive impact on our world."

– UW President  
Ana Mari Cauce



## The Campaign for the Paul G. Allen School: Investing in Our People

With the Paul G. Allen School established and the Bill & Melinda Gates Center completed, the next phase of our campaign focuses on marshaling support for the people and programs that will enable us to expand our educational offerings, intensify our societal impact through research and entrepreneurship, and address the needs of Washington's students, employers and economy.

**Our goal: To lead the nation in advancing computer science for the benefit of society by educating tomorrow's innovators while developing solutions to humanity's most pressing challenges.**

### INNOVATION FOR SOCIETAL GOOD

- **Ensuring Healthy Communities.** Computing and data science are now fundamental to the practice of medicine and to managing threats to public health, and the Allen School is at the forefront of innovative health care solutions. Shwetak Patel and his students are harnessing smartphones' sensing capabilities to create non-invasive, easy-to-use mobile tools for the early detection and management of conditions such as newborn and adult jaundice, chronic respiratory illness and anemia. A team led by Su-In Lee is combining machine learning with big data to help physicians deliver the most effective treatment to cancer patients based on their individual molecular profiles.
- **Extending Accessibility for All.** In addition to the dramatic difference that assistive technologies can make in the lives of people with disabilities, research focused on accessibility is leading to solutions that benefit everyone. Directed by Anat Caspi, the Taskar Center for Accessible Technology engages students in its mission of developing, translating and deploying open-source technologies to benefit individuals living with mobility or speech impairments. Richard Ladner is internationally recognized for his innovations that benefit deaf, hard of hearing, blind, low-vision and deaf-blind individuals. Jennifer Mankoff uses 3D printing to create personalized assistive technologies for people with disabilities, while Katharina Reinecke focuses on the development of culturally aware, intelligent user interfaces.



• **Safeguarding the Virtual and Physical Worlds.** As the physical and digital become more intertwined, the Allen School is leading the way in ensuring the safety and security of individual users as well as critical infrastructure. Franziska Roesner led the development of new tools that counteract unwanted third-party tracking on the internet and improve user control over what information is shared with smartphone applications, before turning her attention to the privacy and security of augmented reality platforms. Tadayoshi Kohno and his team were among the first to expose the dangers of car-hacking — launching a national conversation — and he continues to be a leading voice on cybersecurity for emerging technologies. Zachary Tatlock is focusing on ways to ensure the reliability of distributed software systems that billions of people rely on for critical services such as banking, health care and transportation.

• **Accelerating Cross-Disciplinary Scientific Discovery.** Founded by Ed Lazowska and now directed by Magdalena Balazinska, the UW eScience Institute is leading the development and application of advanced computational methods and tools for data analysis, from machine learning to data visualization and beyond, for use in a wide range of fields. The Center for Game Science — a leader in engaging citizen scientists through gameplay that advances scientific discovery, led by Zoran Popović — partnered with the Allen Institute for Brain Science on Mozak, a game in which players produce 3D models of neurons to advance our understanding of the structure and the function of the brain. Mozak could lead to important breakthroughs in the fight against neurodegenerative diseases such as Alzheimer's and Parkinson's.







## SHAPING THE TECHNOLOGIES OF TOMORROW

- **Augmented and Virtual Reality.** The UW Reality Lab — co-led by Brian Curless, Ira Kemelmacher-Shlizerman and Steve Seitz — is dedicated to advancing virtual and augmented reality in close partnership with industry. Building on the Allen School's leadership in cutting-edge AR/VR education and research, the Reality Lab brings together an interdisciplinary team of faculty and students to support game-changing initiatives in this rapidly expanding field. As just one example, in 2016, the school introduced the nation's first augmented reality capstone course.
- **Low Power/Zero Power Computing and Communication.** Shyam Gollakota and Joshua Smith are developing battery-free sensors and devices that will enable new “smart” applications and truly ubiquitous connectivity. Employing a technique called backscatter, the researchers have harvested ambient radio signals to power a battery-free cellphone, produced 3D-printed objects capable of communicating over WiFi without electronics, and achieved a breakthrough in wide-area communication that could lead to new advances in precision agriculture, medical monitoring, and whole-home sensing.
- **Leading-Edge Computer Architecture.** The Allen School joined forces with Microsoft Research to establish the Molecular Information Systems Laboratory at the UW to pursue groundbreaking research at the intersection of computer architecture, programming languages and molecular biology. Luis Ceze and the team are developing a next-generation storage system for digital data using synthetic DNA. Having already set a world record for the amount of digital data stored in and successfully retrieved from DNA and demonstrated random access on a large scale, the lab has turned its attention to developing new capabilities for processing visual information within DNA molecules. Recent arrival Michael Taylor is pioneering new approaches to rapid hardware and custom chip design. One promising line of research is ASIC Clouds, a new kind of datacenter that uses specialized chips to reduce the energy consumption of planet-scale computation.
- **Advancing Artificial Intelligence.** Our expertise in this exciting field spans Natural Language Processing, Computer Vision, Machine Learning and Robotics. Our faculty are harnessing the potential of these leading-edge technologies for societal good, from detecting and addressing bias, to gauging truth in media, to supporting independent living through assistive robotics. In 2017, Siddhartha Srinivasa moved his lab to UW from Carnegie Mellon to advance his groundbreaking work in robust human-robot interaction, and a cross-disciplinary team of UW students and faculty won the inaugural Amazon Alexa Prize for developing a socialbot that advances the state of the art in conversational AI. Several Allen School faculty hold appointments with non-profit and industry R&D labs such as the Allen Institute for Artificial Intelligence, Amazon, Apple, Facebook, Google, and Nvidia — enabling high-impact collaborations and expanded research opportunities for our students.



“You’ve created something truly special here, a purple gem of a program in an Emerald City of opportunity for your graduates.”

– Rich Barton,  
Executive Chairman  
and Co-Founder,  
Zillow Group, and  
Allen School 2017  
graduation speaker



## THE POWER OF PEOPLE

The Paul G. Allen School endowment created by Mr. Allen and Microsoft will provide flexible “seed funding” to catalyze new game-changing initiatives in education and research. As a complement to this investment, we aim to increase endowed funding and current-use support in order to:

- Keep an Allen School undergraduate education accessible to Washington’s outstanding students regardless of their means
- Attract the top graduate students from across the nation and around the world
- Recruit and retain leading faculty and rising stars with the potential to shape our field, and
- Provide sustained support to programs that enhance our ability to deliver the best computer science and computer engineering education available anywhere.



In short, with the Allen Center and the new Gates Center providing a “home” for our faculty and students, we must now increase investment in the people who power our excellence. To that end, we seek funding for the following:


- **Endowed professorships and chairs.** These prestigious positions provide critical support for faculty members’ work, serving as powerful tools that allow the Allen School to recruit and retain outstanding educators and researchers while creating an enduring legacy to support excellence and impact far into the future.
- **Endowed graduate fellowships.** High-caliber graduate students are critical to the success of the Allen School’s teaching and research efforts and to our standing as one of the preeminent computer science programs. They are also integral members of our community who mentor our undergraduates and collaborate with faculty on research with real-world impact. Competition for outstanding graduate students is fierce at both the national and international levels. Our ability to provide financial support — along with the prestige of a named fellowship — often makes the difference for top students considering an offer from the Allen School and from peer institutions.
- **Undergraduate scholarships and program support.** Widely recognized as a leader in recruiting and retaining women in undergraduate computer science — we grant nearly one-third of our computer science bachelor’s degrees to women, roughly twice the national average — we are committed to growing the number of economically disadvantaged, first-generation and under-represented minority students in our program. Support for scholarships and for innovative student programming, including K-12 outreach, curriculum development, mentoring, and community engagement, will be critical to moving our discipline forward to reflect the diversity of the people we serve.











“With the convergence of big data, massive computing power, and advanced machine learning, today’s computer science graduates have the opportunity to speed innovation and transform our world for the better — perhaps more than any other profession.”

*Harry Shum,  
Executive Vice  
President, Artificial  
Intelligence and  
Research, Microsoft  
Corporation, and  
Allen School 2018  
graduation speaker*

## **Join Us: Impact on Our Students, Impact on Our World**

Computer science and computer engineering are changing the world, and the Paul G. Allen School at the University of Washington is at the center of this revolution.

We have come so far with the support we have received to date. Now, the Campaign for the Paul G. Allen School will enable us to dramatically expand our research to address society’s greatest challenges while preparing more of Washington’s students for leading-edge jobs in a broadening array of fields. With your investment, we can leverage our momentum to produce the innovations and leaders of tomorrow — and secure our place among the very top echelon of computer science education and research worldwide.

## **Thank you**

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