

COMPUTE

SPRING 2021



**Elaine Cohen named
College of Engineering's
First Female Distinguished
Professor**

**New Utah Center for
Inclusive Computing**



**SCHOOL OF COMPUTING
UNIVERSITY OF UTAH**

WELCOME

In July 2020, I became the Director of the School of Computing. In recognition of the importance of the computing field to economic growth of the state and nation, I entered this role with the following priorities: (1) create a welcoming and inclusive program that attracts students who represent the diversity of the users of the technology our graduates will develop; (2) broaden the research and education programs to align with the expanding and interdisciplinary role of computing; and, (3) strengthen relationships with industry, state government, and educators to increase community impact.

As affirmation that inclusion is at the forefront of our priorities, we are launching the Utah Center for Inclusive Computing (UCIC). UCIC establishes a new staff role of Diversity and Outreach Coordinator, creates a team of student ambassadors, and provides a hub for outreach to the community. More significantly, it provides resources to revamp the introductory programming course sequence and design different pathways into our programs, recognizing that one-size-fits-all programs do not suit every talented student who considers a computing degree.

The School of Computing continues to grow and expand the programs it offers, in spite of a uniquely challenging year for higher education as a result of the Covid-19 pandemic. In Fall 2020, even at a time when student population was shrinking at other institutions, enrollment in School of Computing courses grew by 6%. We were able to continue in-person classroom experiences for freshman and sophomores in our programming sequences through small recitation sections, and otherwise faculty and students adapted to streaming virtual classrooms. In Fall 2021, the university plans to return to in-person classes, which will enable the School of Computing to renew the vibrant campus culture of our program. We look forward to working with the community to make the 2021-2022 academic year another year of growth and impact.



Mary Hall
Director, School of Computing

Editorial Board

Sheri Carp
Chris Coleman
Mary Hall
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Distinguished
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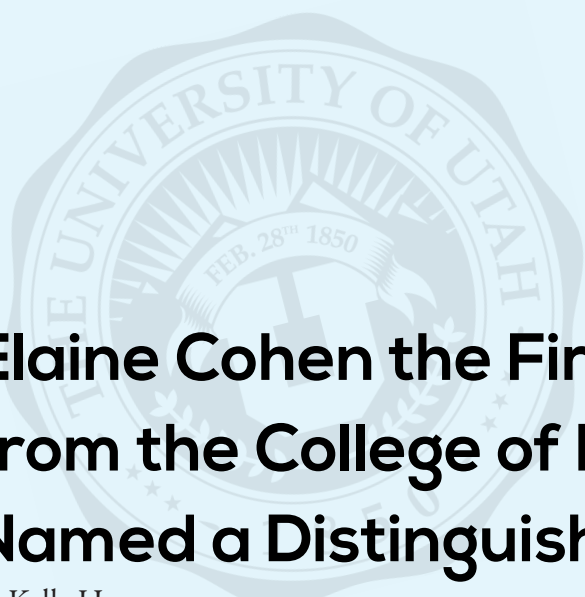
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Elaine Cohen the First Woman from the College of Engineering to be Named a Distinguished Professor

By Kelly Hermans

After serving 47 years as a faculty member, publishing seminal research in her field, collecting prestigious awards, co-founding a company, leading numerous committees for professional societies and government agencies, and striving to bring underrepresented groups into computer science, Elaine Cohen—the first woman in the College of Engineering to get tenure in 1985—is now the first woman from the college to earn the top rank of distinguished professor.

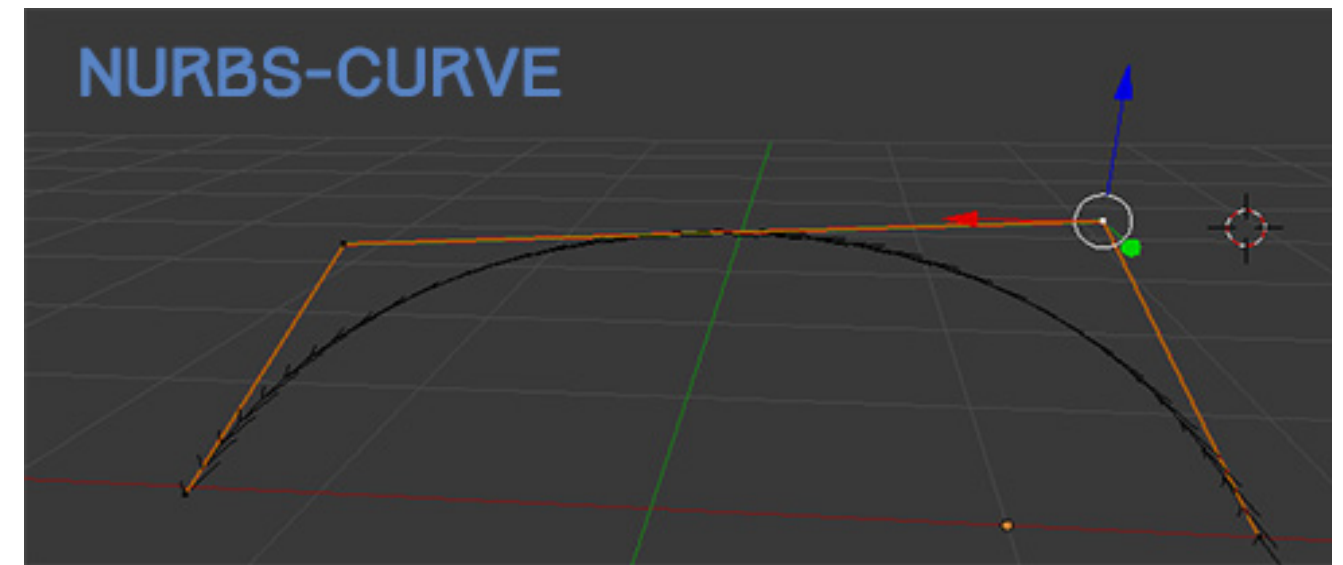
“I’m deeply honored,” Cohen said with an unassuming grin. She added that it felt good to know she received glowing references from her peers, including her nominator, School of Computing Professor and Director Mary Hall. “As for being the first woman,” Cohen added, “I’m delighted.”

Cohen’s work focuses on modeling, graphics, and visualization problems that require geometric computation and analysis. She received her bachelor’s

from Vassar College and her master’s and doctorate from Syracuse University, all in mathematics. She joined the University of Utah in 1974 as a research assistant professor, eventually rising to full professor in 1991. A decade later, she received the university’s distinguished research award. And since then, she has earned numerous accolades for her work, including being named a Solid Modeling Association Fellow and Pioneer, and winning their top Bézier Award.

Cohen’s trailblazing started early: she still remembers her programming job in Princeton University’s physics department, the summer after her sophomore year. “The only women in the whole building were the secretaries and me,” she said. “I worked with the men, and I had coffee with the women.”

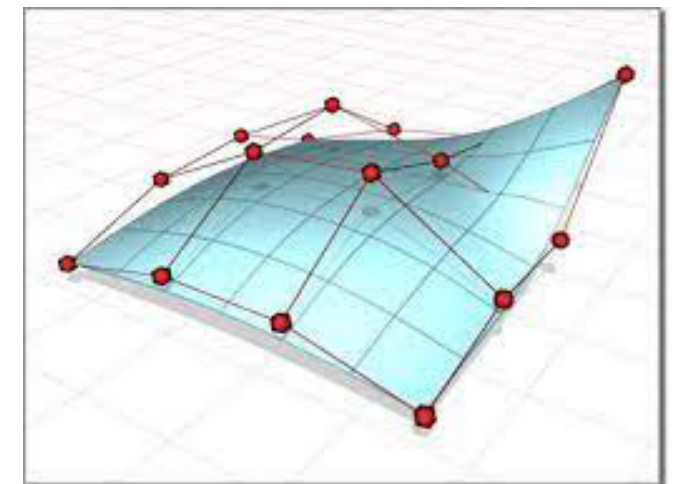
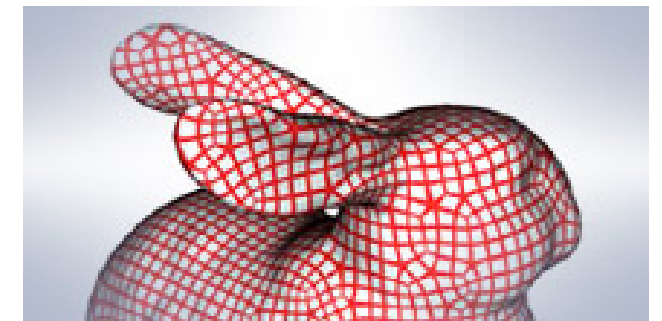
Now, the school’s newest distinguished professor is more optimistic about gender equity in her field. “One of the pleasures nowadays is looking around and seeing how well the School of Computing has



done at recruiting really smart women who are doing well,” Cohen said. “It’s just wonderful. I hope this serves to inspire them so that they too can make it—maybe younger than me,” she joked, “but make it.”

Hall affirmed Cohen’s impact in solid modeling and in the university community, calling her an inspiration. “Elaine Cohen has opened so many doors for women faculty in the school as well as the College of Engineering,” Hall said. In the nomination letter, the director highlighted Cohen’s reputation as a pioneer in an interdisciplinary field that straddles computer science and manufacturing engineering. In simple terms, Cohen works on computationally representing shape to help predict performance in real-world applications—for instance, allowing for analysis of airplane design to assess characteristics like strength and durability. According to Hall, Cohen is perhaps best known for her work on non-uniform rational basis splines (NURBS), which represent curves and surfaces: “Her 1980 seminal paper in Computer Graphics and Image Processing has become the basis for significant follow-up research results,” the director wrote. “Notably, her research predicted the importance of NURBS-based volumetric design with a student MS thesis.”

Together with her husband, School of Computing Pro-





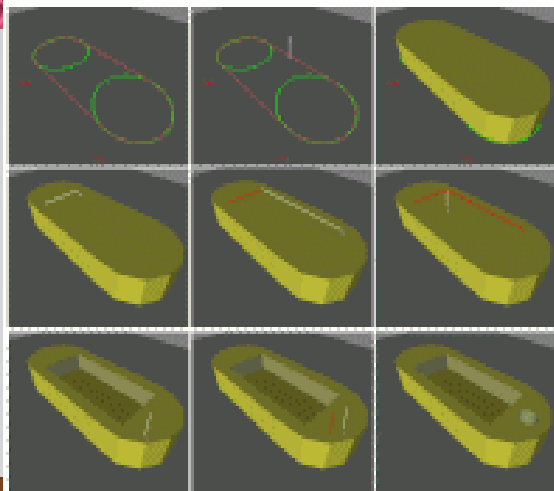
fessor Emeritus Rich Riesenfeld, Cohen co-founded the Alpha_1 research group and developed one of the first spline-based geometric modeling kernels in the world. “For 30 years, Alpha_1 was a testbed research system that enabled modeling and systems research using NURBS for design, graphics and visualization, computer-aided manufacturing (CAM) and analysis, and non-photorealistic rendering research,” Hall wrote. “Based on this work, Cohen had a profound impact on local industry by co-founding an innovative, successful spin-off CAM company.”

Cohen’s former PhD student, Gershon Elber ’92, said the professor’s rare combination of academic and commercial success means she “without a doubt” deserves her latest honor. “Elaine has been one of the most influential persons in the history of computer-aided geometric design,” said Elber, now a renowned computer science professor at the Technion in Israel. Cohen’s unique mix of theoretical mathematical skills and precision plus practical geometric vision is unmatched in their field, he said.

The University of Utah typically names no more than six distinguished professors each year, and currently lists about 120 people with the ranking. To earn it, faculty must exemplify the highest goals of scholarship—and they also have to display a high dedication to teaching. Cohen ticks both boxes, and she has the testimonials to prove it. Elber trumpeted her as a role model and a patient mentor. “I am doing what I am doing thanks to Elaine,” he said. As further testament, Elber has continued working with Cohen over the years: they have over 20 shared publications and are now working together on a project sponsored by the Defense Advanced Research Projects Agency, or DARPA.

Another Utah alum, Bruce Gooch—founder of the expressive computer graphics program at Texas A&M—echoed Elber’s sentiments in a 2016 inspiring teachers video sponsored by education company Pearson. “Elaine gave me the skills and responsibility to pursue research in computer science,” Gooch said. She’s the person, he added, who showed him that code can be creative.

Indeed, Cohen’s commitment to teaching and



mentorship is outstanding, Hall wrote. In addition to funding and advising over 40 students, Cohen has worked to attract underrepresented groups to computer science. In North America last year, only 21% of undergrad degrees in the field went to women, Hall said, and at the university, only 13% of majors identify as women. Cohen said she’s tried to close that gap because it’s important to give back—after enjoying success, “It’s nice to be able to pay it forward.” Her outreach efforts have included mentoring young women, working with local schools to get computing into Salt Lake City classrooms, speaking at high-profile events such as the first Grace Hopper Celebration of Women in Computing, and starting a summer computing program for high schoolers. That program, which she led over a 10-year period, evolved into the School of Computing’s successful GREAT Camp, now run by her former PhD student and current faculty member David Johnson. Thanks to community-engagement efforts like these, Cohen received a 2005 Outstanding Achievement Award from the YWCA of Salt Lake City.

The distinguished professor said she’s fueled by curiosity, the sheer fun of the work, rewarding collaborations with students and peers, and the goal of making an impact. Through her research and teaching, she’s certainly achieved that goal. “One of the pleasures of being a faculty member and being able to do good research is that you can enjoy it,” Cohen said. “To a person with a hammer, everything looks like a nail. Some of the reward in collaborative research is looking at my collaborators’ problems with fresh eyes and being able to pound the nail and make a difference.”



We would like to recognize faculty members Joe Zachary and Charles (Chuck) Hansen for their valuable contributions to the School of Computing, and wish them congratulations on their retirement!



Joe Zachary



Charles Hansen



U Image Library

Recognizing the importance of inclusion in engineering and in computing, the University of Utah's School of Computing will be launching the Utah Center for Inclusive Computing (UCIC) in an effort to boost the percentage of students from groups currently underrepresented in computing.

The focus of the center will be to develop and implement programs that create a welcoming atmosphere for computing as a discipline and encourage more students to pursue computing-related undergraduate degrees.

"Given how important computing is to job growth in Utah, it is critical that the computing workforce be representative of the people of the state." said

Mary Hall, Director of the School of Computing.

While the percentage of female undergraduates in computing has tripled in the U's College of Engineering over the last decade, the ratio of female to male students continues to be a concern. And Utah ranks among one of the lowest states in the U.S. in female participation in the STEM workforce. Also, students identifying as Latinx make up 13% of the students at the U but only 8% of the undergraduate majors in the U's School of Computing.

To increase the percentage of students from groups that have been historically underrepresented in computing, the center will focus on three pressing needs: boosting recruiting efforts in first-year computing classes;

retaining these students in their computing curriculum all through graduation; and better preparing high school students in math and computer science before they enter college. UCIC will partner with community leaders who will help

There is an acute, local demand to increase the diversity of students receiving computing-related degrees to meet workforce needs, as Utah has one of the fastest growing tech sectors in the nation.

guide the activities of the center and develop new programs to meet the needs of all involved.

The center will initially be funded through a two-year \$700,000 grant from the Northeastern University Center for Inclusive Computing, renewable for a third year for a total of \$1 million.



U Image Library



U Image Library



National Science Foundation and Office of Science and Technology (OSTP) veteran, professor Manish Parashar, a distinguished professor of computer science at Rutgers University, will become the new director of the U's Scientific Computing and Imaging (SCI) Institute on Jan. 1, 2021.

"We are thrilled to have a leader like professor Parashar take the helm at the Institute," said Dan Reed, senior vice president for Academic Affairs. "He brings an unparalleled depth and breadth of experience in cyberinfrastructure and computer and computational science that will advance SCI as it continues to innovate, grow and build research collaborations across the entire University of Utah campus."

The SCI Institute is a campus research center where over 185 faculty, staff, and students – most from the U's College of Engineering – work together to shape the future of advanced computing. Since its founding, more than 100 undergraduates and 400 graduate students and postdoctoral fellows have worked on SCI research projects.

"I also want to acknowledge the tremendous contributions of Professor Chris Johnson, SCI's founding director," Reed said. "Chris built SCI into an internationally recognized center of excellence in scientific computing, imaging, and visualization."



Over more than two decades, the SCI Institute has established itself as a recognized leader in visualization, scientific and biomedical computing and image analysis. Computer Science Rankings place the university at No. 2 in visualization work internationally.

"SCI has established itself as a pioneer and an international leader in computational and data-enabled science and engineering research and education—from developing new methods and technologies for data-driven scientific exploration to pioneering new structures for multidisciplinary research," Parashar said. "SCI is well poised to take on a leadership role in this scientific revolution."

"I look forward to working with the outstanding faculty, staff and students at SCI to a future of even greater achievements and transformative impact on science and society."

Parashar is currently on loan to the National Science Foundation (NSF) and office director of its Office of Advanced Cyberinfrastructure, and he leads the NSF's strategic vision for a National Cyberinfrastructure Ecosystem for 21st Century Science and Engineering. He also is on detail to the Office of Science and Technology Policy (OSTP) and currently serves as assistant director for Strategic Computing. Parashar co-led the committee that developed the National Strategic Computing Update on the future of computing. At OSTP, Parashar is leading the development of the national strategic plan for the Future Advanced Computing Ecosystem. He will continue his role at NSF, spending time each week at the university, until the end of his temporary NSF appointment.

He replaces interim SCI Institute Director Mike Kirby, who will continue to lead the university's Informatics Initiative (UI2).

Tucker Hermans receives 2021 Sloan Research Fellowship

Congratulations to University of Utah School of Computing assistant professor **Tucker Hermans**, who has received the prestigious 2021 Sloan Research Fellowship, given to researchers "whose creativity, innovation, and research accomplishments make them stand out as the next generation of scientific leaders."



The awards are open to scholars in eight scientific and technical fields: chemistry, computational and evolutionary molecular biology, computer science, Earth system science, economics, mathematics, neuroscience, and physics. Candidates must be nominated by their fellow scientists, and winners are selected by independent panels of senior scholars on the basis of a candidate's research accomplishments, creativity, and potential to become a leader in his or her field. More than 1000 researchers are nominated each year for 128 fellowship slots. Winners receive a two-year, \$75,000 fellowship which can be spent to advance the fellow's research. Hermans was one of two University of Utah researchers to receive the award this year along with U chemistry assistant professor Luisa Whittaker-Brooks.

"I was truly shocked when I read the news that I would be receiving the Sloan Fellowship," Hermans said. "I look up to everyone I know in my field who has received this award, and I couldn't believe I was being recognized at the same level as them. I am really honored to receive this distinction."

Hermans earned a doctorate in robotics and a master's in computer science, both from the Georgia Institute of Technology. He was a postdoctoral researcher in robot learning at Technische Universität Darmstadt in Germany and later a senior research scientist for NVIDIA in Seattle. He joined the U in 2015 as an assistant professor in the School of Computing. He received the National Science Foundation's CAREER Award in 2019 and is an IEEE Senior Member.

His research is focused on autonomous learning, planning, and perception for robot manipulation, and he is working on enabling robots to autonomously discover and manipulate objects. He is the director of the Utah Learning Lab for Manipulation Autonomy at the U.

The Fellowship is funded by the the Alfred P. Sloan Foundation, a not-for-profit dedicated to improving the welfare of all through the advancement of scientific knowledge. Founded in 1934 by industrialist Alfred P. Sloan Jr., the foundation disburses about \$80 million in grants each year in four areas: for research in science, technology, engineering, mathematics, and economics; initiatives to increase the quality and diversity of scientific institutions and the science workforce; projects to develop or leverage technology to empower research; and efforts to enhance and deepen public engagement with science and scientists.

Rajeev Balasubramonian named IEEE Fellow



Professor Rajeev Balasubramonian has been named an IEEE Fellow as of January, 2021. He is being recognized for his contributions to in-memory computation and memory interface design.

The IEEE Grade of Fellow is conferred by the IEEE Board of Directors upon a person with an outstanding record of accomplishments in any of the IEEE fields of interest. The total number selected in any one year cannot exceed one-tenth of one-percent of the total voting membership. IEEE Fellow is the highest grade of membership and is recognized by the technical community as a prestigious honor and an important career achievement.

Rajeev Balasubramonian received his Ph.D. in 2003 from the University of Rochester. His primary research interests include memory systems, security, and application-specific architectures. Prof. Balasubramonian is a recipient of an NSF CAREER award, an IBM Faculty Partnership award, an HP IRP award, an Intel Outstanding Research Award, and various teaching awards at the University of Utah. He has co-authored papers that have received three best paper awards and two IEEE Micro Top Picks.

“This recognition is shared by nearly two dozen students from the Utah Arch lab; I’m always amazed by their energy, creativity, and attention to detail,” says Balasubramonian. “I’m also very grateful for the support and insight of several colleagues at Utah and beyond.”



The IEEE is the world’s leading professional association for advancing technology for humanity. Through its 400,000 plus members in 160 countries, the association is a leading authority on a wide variety of areas ranging from aerospace systems, computers and telecommunications to biomedical engineering, electric power and consumer electronics.

Dedicated to the advancement of technology, the IEEE publishes 30 percent of the world’s literature in the electrical and electronics engineering and computer science fields, and has developed more than 1300 active industry standards. The association also sponsors or co-sponsors nearly 1700 international technical conferences each year. If you would like to learn more about IEEE or the IEEE Fellow Program, please visit www.ieee.org.

Chris Johnson received the Leonardo Award

Christopher R. Johnson, co-founder of the University of Utah’s Scientific Computing and Imaging (SCI) Institute and former director of the U’s School of Computing, was named this year’s recipient of the Leonardo Award from The Leonardo museum in Salt Lake City.

The award is given each year to the individual “who crosses the boundaries of known science . . . and blends scientific genres to improve and create new avenues of understanding.” Former University of Utah president and chemical engineering Distinguished Professor, David Pershing, presented the award during a virtual ceremony in September. Opened in 2011, The Leonardo is a non-profit museum that celebrates the intersection of science, technology, art, and creativity.

After receiving doctorate degrees in biophysics and computing in 1989 from the University of Utah, Johnson quickly established a career as one of the world’s preeminent researchers in scientific computing and visualization. In 1998, he became co-director of the U.S. Department of Energy’s Advanced Visualization Technology Center and later was director of the National Institutes of Health’s Center for Bioelectric Field Modeling, Simulation, and Visualization. In 1992, he co-founded SCI with U biomedical engineering professor Rob MacLeod and became the institute’s first director. SCI has become a world-renowned research center on the development of new scientific computing and visualization techniques, tools, and systems. SCI collaborates with researchers from many departments on campus including biomedical engineering and health sciences. He was director of SCI for more than 20 years before stepping down in 2018.

“Chris has had a very illustrious career,” U President Ruth Watkins said during the virtual ceremony. “He embodies the visionary thinking that the Leonardo showcases. Chris has pioneered innovations in scientific computing and data visualization.”

Johnson joined the U in 1990 as a research assistant professor in internal medicine working in biomedical computing. Shortly after, he joined the computer science department and was later named assistant professor, associate professor and professor. He was director of the School of Computing from 2003 to 2005 and is currently a Distinguished Professor in the school. He also holds faculty appointments in the U’s departments of Physics and Biomedical Engineering.

The Leonardo Award is just the latest in a slew of honors for Johnson’s work. He was given the National Science Foundation Presidential Faculty Fellow award from President Clinton in 1995, the DOE Computational Science Award, the Governor’s Medal for Science and Technology from former Utah governor Michael Leavitt, the IEEE Computer Society Charles Babbage Award, and the IEEE Computer Society Sidney Fernbach Award “for outstanding contributions and pioneering work introducing computing, simulation, and visualization into many areas of biomedicine.” He also is the recipient of the U’s highest award, the Rosenblatt Prize. Johnson was elected an IEEE Fellow and was inducted into the IEEE Visualization Academy.



Spotlight on Students

Congratulations to the following School of Computing students and alumni for their outstanding accomplishments!

Sunipa Dev (PhD '20) was selected as a 2020 NSF Computing Innovation Fellow.

Mark Van der Merwe, B.S. Computer Science; Honors, Spring 2020; has received both a CRA Outstanding Undergraduate Researcher Honorable Mention, and an NSF Graduate Research Fellowship.

Han-Wei Shen (PhD '98) has been inducted into the 2020 IEEE Visualization Academy, the highest honor in the field of visualization.

Nithin Chalapathi, B.S. Computer Science 2021, has been named a Computing Research Association Outstanding Undergraduate Research Award Finalist.

Igor Durovic, Oliver Flatt, and Sam Zachary won the 2019 ICPC Rocky Mountain Regional and qualified for the 2020 CPC World Finals, which is currently (re)scheduled for June 2021 in Moscow.

Yanqing Peng, a PhD student, has received a 2020 Google Fellowship for Structured Data and Database Management, joining 2019 Google Fellow recipients **Chinmay Kulkarni** (Systems and Networking) and **Zhuoyue Zhao** (Structured Data and Database Management.)

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