COMPUTE

WINTER 2024-25

THIS IS YOUR BRAIN ON AI

Kahlert School of Computing Researchers Join Revolutionary Project Combining Robotics, AI, and Surgery

2024 Organick Lecture Series

With UC Berkeley Professor and University Alum Alexei Efros

Remembering Steven G. Parker

1968-2024

KAHLERT SCHOOL OF COMPUTING
THE UNIVERSITY OF UTAH

A key theme in this issue is the use of AI in the medical field. In our cover story, three Kahlert School of Computing professors – Alan Kuntz, Tucker Hermans, and Daniel Brown – are developing a surgical robot capable of performing delicate surgeries, which would make routine procedures safer and more affordable while expanding access to lifesaving surgeries during a worldwide shortage of surgeons.

From the mountains of the Wasatch Front to the Oval Office, Professor Valerio Pascucci is collaborating on a new Biden Cancer Moonshot project. The Biden Administration pledged up to $23 million to create an imaging system that would allow doctors to scan a tumor during surgery and determine within minutes, while the patient is still under anesthesia in the operating room, whether any cancerous tissue is left behind.

We also look to the future as our students are given unique opportunities to connect with academic and industry leaders. Between Alyosha Efros headlining our annual 2024 Organick Lecture Series, the return of the school's Distinguished Lecture Series after a pandemic-era hiatus, and our collaboration with the Department of Science on their Frontiers of Science lecture hosting AI researcher Peter Norvig, students are not only able to hear the leaders speak, but are granted the opportunity of quality face-time as they prepare for graduation. We also highlight the ten NSF Research Experience for Undergraduates (REU) students that visited our campus this summer to learn about Trust and Reproducibility in Intelligent Computation.

The future of the Kahlert School of Computing looks bright as the construction of our new home, the John and Marcia Price Computing and Engineering Building, continues. We look forward to welcoming our students, faculty, staff, and alums to the new building in late 2026.

Lastly, as we ring in a New Year, we must stop and think about those we have lost in the previous year. In this issue, we remember our former colleagues Steven G. Parker and Frank Stenger, who have contributed so much to our students and community.

Mary Hall

Mary Hall
Director, Kahlert School of Computing

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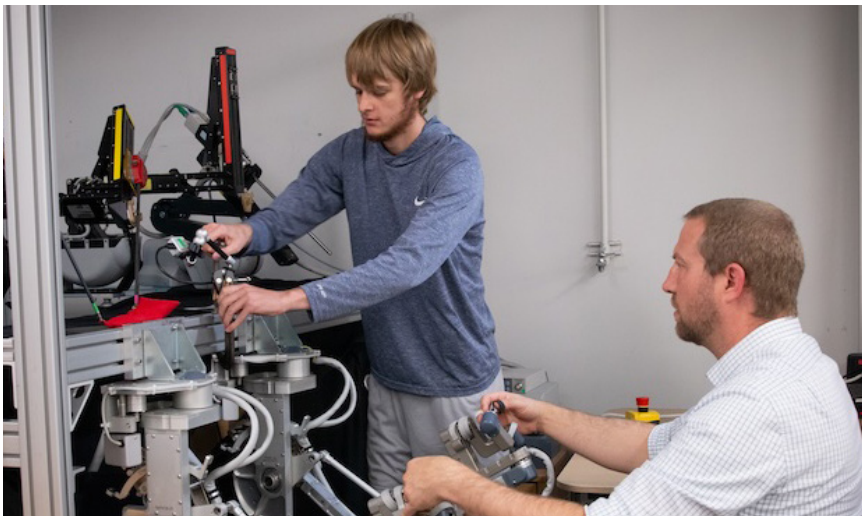
SURGICAL ROBOTS

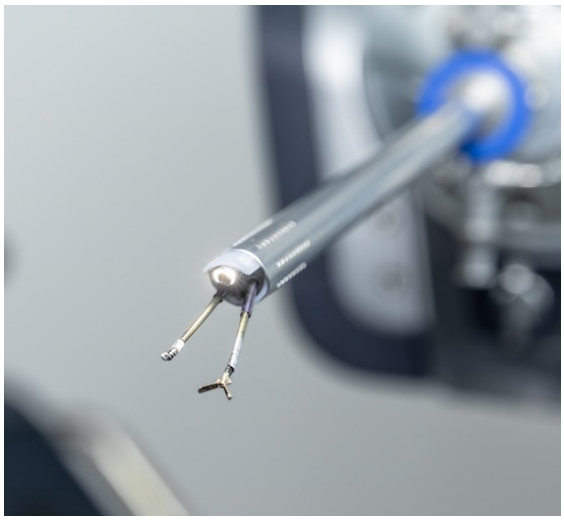
Kahlert School of Computing Researchers Join Revolutionary Project Combining Robotics, AI, and Surgery

A surgical robot capable of performing an entire surgery without human intervention: That's the goal of a landmark, multi-institution project that has received an up-to-$12 million award from the Advanced Research Projects Agency for Health (ARPA-H).

Assistant Professor Alan Kuntz leads a team of University researchers who will take part in this innovative initiative, focusing on the artificial intelligence and machine learning techniques that would enable a robot to master these intricate, high-stakes tasks.

Kahlert School of Computing's contingent also includes Associate Professor Tucker Hermans and Assistant Professor Daniel Brown.





Left: *Alan Kuntz (right) manipulates the teleoperation controls of a decommissioned surgical robot while lab member Jordan Thompson adjusts a camera. By correlating a surgeon's maneuvers with what the robot sees, Kuntz and his colleagues will train such robots to autonomously perform certain procedures.*
Right: *Virtuoso close-up. These snake-like robots are currently tele-operated by human surgeons during minimally-invasive procedures, but the team's research could enable them to work on their own.*

The project is led by Vanderbilt University Professor Robert J. Webster III and also includes robotics experts from Johns Hopkins University (JHU), the University of Tennessee, Knoxville, as well as surgeons from Vanderbilt University Medical Center (VUMC) and JHU. The team also includes hardware and software experts from Virtuoso Surgical, a surgical robotics company co-founded by Webster and Duke Herrell, professor of urology and Director of VUMC's Minimally Invasive Urologic Surgery/Robotics Program.

"Fully autonomous surgical robots will transform medicine," Webster said. "Not only will they make routine procedures safer and more affordable, but they will also address the worldwide shortage of surgeons and expand global access to lifesaving surgeries."

Current surgical robotic technologies rely on one of two automation techniques. The first is known as model-based automation in which procedure sequences and start-stop conditions are pre-programmed. Another method draws on machine-learning algorithms requiring enormous datasets of procedures and task sequences. While each approach has led to advances in surgical robotics, both lack scalability, generalizability and adaptability.

"We will create brand new machine-learning algorithms beyond anything that exists today," Webster said. "The key to making them practical is to simultaneously look at how human surgeons perform their work. What basic set of maneuvers do they use? How do they sequence those maneuvers? The answers to these questions enable effective learning on a tractable amount of data."

The team's robots — developed at the Vanderbilt Institute for Surgery and Engineering (VISE) — are the size and shape of a needle, and are deployed through a sequence of flexible concentric tubes. Kuntz, Webster, and collaborators have previously demonstrated the ability of similar robots to safely thread their way through maze-like bronchial branches and lung tissue to a tumor target in a live animal; the next step is creating a system that can perform more general surgical tasks that require manipulating and cutting tissue. By having human surgeons teleoperate the researchers' robotic systems while the human performs surgery, the robot can "shadow" the human's decision-making, learning more generalized skills.

"Our algorithms are watching the commands the surgeon sends to the robot and what they were looking at through the robot's camera at the time," said Kuntz. "By looking at the history of those commands, the algorithms can infer how what the surgeons did changed based on what they saw. The robot can then apply these learned strategies to new surgical decisions that it hasn't encountered before." The Kahlert team of professors Kuntz, Hermans, and Brown represents one of the world's leading research teams in this concept; autonomy learned from surgeon demonstration.

From left to right: *Assistant Professor Alan Kuntz, Associate Professor Tucker Hermans, Assistant Professor Daniel Brown*

"We will further enable the robot to understand its own uncertainty, knowing what it doesn't know," Kuntz elaborates, "so that it can ask a human surgeon for input, clarification, or to take over when it is unsure of how to proceed. That's a key building block for robust autonomy."

Webster said one of the related progress milestones will involve having the robot make situationally aware statements like, "I think I should cut here, with the goal of removing this volume of tissue." A human surgeon would then confirm or adjust the action. These interactions will be aggregated to continue to improve robotic performance to the point of fully independent autonomy.

Within three years, the research team hopes to demonstrate a robotic surgical device capable of removing tumors from the trachea and prostate without the intervention of a surgeon. The team also foresees this research applying to uterine fibroids, bladder tumors, spine procedures, and brain cysts, among other clinical applications. As described in the ARPA-H proposal, these would initially be demonstrated in simulated conditions and not on live patients.

"Creating a system that can learn from human surgeons—and continue to improve performance—will be a game changer," Herrell said. "Our vision is not to replace surgeons, but to vastly expand the work they do to improve patient's lives and long-term health outcomes."

Modified from an article by Evan Lerner originally published on the Price College of Engineering website.

REMEMBERING STEVEN G. PARKER

Steven G. Parker
1968-2024

Steven G. Parker, University of Utah alumnus, faculty member, and Vice President of Professional Graphics at NVIDIA, passed away on May 2, 2024. He was 55 years old.

Though he was unable to attend due to illness, Parker had been awarded an honorary doctorate at the University of Utah Commencement Ceremony earlier that day.

Speaking at the ceremony, Richard B. Brown, H. E. Thomas Presidential Endowed Dean of Price Engineering, described Parker as "one of the most talented computer science researchers in the world." Despite never graduating high school, Parker's ACT scores earned him admittance to the University of Oklahoma, his home state. His natural aptitude in electrical engineering — and interest in computer graphics — led him to the University of Utah, where he pursued both master's and then doctoral degrees, graduating in 1999.

Parker's research interests in complex visualizations were brought to life within the University's Center for the Simulation of Accidental Fires and Explosions (C-SAFE), a project supported by the Department of Energy's Advanced Strategic Computing Initiative that aimed to better model and predict these chaotic events.

Parker's work in this area earned him numerous professional accolades as he continued to advance fundamental computer graphics techniques in service of more accurate visualizations. Key among these was "ray-tracing," which models the path light takes from a source to the user's perspective after bouncing off of three-dimensional objects in their field of view.

While the basic math behind ray-tracing was understood by Renaissance artists, Parker and his colleagues took advantage of the U's burgeoning computational capacity to develop the first interactive ray-tracing simulation. With the path of light rays calculated in real time, Parker's techniques allowed for simulations in which users could move their perspectives, getting a more photorealistic three-dimensional representation with dynamic lighting effects.

In addition to research simulations, this innovation in ray-tracing was revolutionary within the entertainment industry. In 2005, Parker had established the U's Center for Interactive Ray-Tracing and Photo Realistic Visualization, which produced a spin-off company known as RayScale. NVIDIA Inc. acquired the company in 2008 and set up an NVIDIA Research Center in Utah, with Parker as director.

Although no longer on the U faculty, Parker maintained his affiliation with the U, serving on the Engineering National Advisory Council for six years and providing influential support where and when needed by the college. He and his wife, MeriAnn, have made major donations to support the Scientific Computing and Imaging Institute and the John and Marcia Price Computing and Engineering Building.

"His dedication to pushing the boundaries of technology resonate with the university's vision of making a positive impact on society through education and research and aligns with the university's ethos of innovation," said Brown.

Modified from an article by Evan Lerner originally published on the Price College of Engineering website.

STEVEN G. PARKER MEMORIAL SCHOLARSHIP IN COMPUTING

A scholarship has been created in Steven's memory.

If you are interested in placing a donation in Steven's memory, please scan the QR code to the right, or visit ***ugive.app.utah.edu/designation/5664.***

2024 ORGANICK LECTURE SERIES

The 2024 Elliott Organick Memorial Lecture Series hosted UC Berkeley professor and University of Utah alumnus Dr. Alexei "Alyosha" Efros on October 24. Alyosha's presentation, "We Are (Still!) Not Giving Data Enough Credit", was given at the Robert H. and Katharine B. Garff Building Auditorium.

Alyosha's presentation centered on Visual Computing , which has been primarily focused on algorithms, with data treated largely as an afterthought. Only recently, with the advances in AI, did the field start to truly appreciate the singularly crucial role played by data. But even now, the presentation aruged, we might still be underestimating it. Efros provided historical examples illustrating the importance of large visual data for both human and computer vision. As the presentation continued, Efros shared some of his recent work demonstrating the power of very simple algorithms when used with the right data, including visual in-context learning and visual data attribution.

On October 25, Alyosha hosted a town hall format lecture for Kahlert School of Computing students, where undergraduate and graduate students alike could gain valuable insight into a research career.

Above: *The 2024 Organick Memorial Lecture at the Robert H. and Katherine B. Garff Building Auditorium. Photos courtesy of Ellen Lewis.*

Below: *Alexei Efros hosts a student town hall at Warnock Engineering Building. Photos courtesy of Ellen Lewis.*

MOONSHOT MAGIC-SCAN CANCER INITIATIVE

Valerio Pascucci
Professor, MAGIC-SCAN Team Member

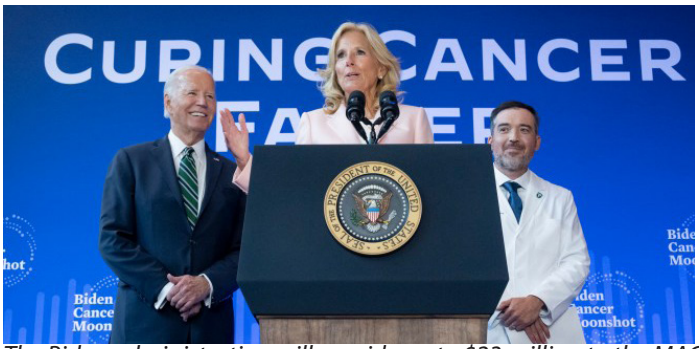
Even as cancer treatment options are multiplying and becoming more sophisticated, one relatively straightforward approach will always be in play: cutting the diseased tissue out of the body.

One persistent challenge with such cancer surgeries is preserving as much of the affected organ as possible while also ensuring all cancerous cells are removed. The so-called "margins" of a cancerous mass are hard to concretely define even when looking directly through a microscope, and are even more ambiguous in the kind of non-invasive scans patients undergo before surgery.

As such, surgeons must use their eyes and best judgment to know how much tissue to remove—all while the patient is under the knife. The consequences of error here are serious precisely because they are not immediately apparent: there is little way to tell that cancerous cells remain growing inside the patient until they begin forming new tumors.

Kahlert School of Computing professor Valerio Pascucci is now collaborating with researchers at Tulane University and the University of Georgia on a new Biden Cancer Moonshot project that aims to revolutionize this aspect of cancer treatment.

President Joe Biden and First Lady Jill Biden announed an up to $23 million award to create an imaging system that will give doctors the ability to scan a tumor during surgery and determine within minutes whether any cancer tissue has been left behind. While patients are still under anesthesia in the operating room, doctors will be able to assure patients, with certainty, that all the cancer has been removed from the area, making repeated invasive surgeries unnecessary.



The Biden administration will provide up to $23 million to the MAGIC-SCAN cancer project. Photos courtesy of whitehouse.gov.

The funding for the award comes from the Advanced Research Projects Agency for Health (ARPA-H), a federal funding agency established by the Biden Administration to rapidly advance high-potential, high-impact biomedical research that cannot be readily accomplished through traditional research or commercial activity.

Tulane researchers will lead a team focused on overcoming the technical computing and engineering challenges to make the advanced imaging device a reality within the next five years. Receiving the full $23 million will require the team to reach certain milestones in their efforts.

"The project, called MAGIC-SCAN (Machine-learning Assisted Gigantic Image Cancer margin SCANner), would be one of the world's fastest high-resolution tissue scanners, capable of detecting residual cancer cells on the surface of removed organs within minutes. The system would be trained on thousands of clinical scans so that it can accurately highlight cancer at a cellular level as it renders a highly detailed 3D map of the surface of the tumor. Once the map is complete, surgeons could then match cancerous margins with their counterparts inside the surgical site, removing additional tissue as necessary.

Tulane researchers have already been working on developing this technology using prostate and colorectal cancer patients – two of the most difficult kinds of tumors to remove – and they've managed to get the detection time down to about 45 minutes.

Pascucci and their colleagues at the U will work on the cyber infrastructure required to handle the massive sets of data from patients needed to train the machine-learning models. Called FASTMAP for "Fast, Accelerated Support for Training MAchine Learning models on Petascale data," this element of the project is emblematic of the work of the U's Scientific Computing and Imaging Institute, where Pascucci is a faculty member.

"FASTMAP is a human-centered approach that innovates responsible AI for cancer research by adopting the National Science Data Fabric infrastructure in two key areas," Pascucci said. "First, FASTMAP will introduce a high-performance computing cyberinfrastructure capable of repeatedly developing and training new AI models over petascale data in a matter of days for continuous feedback and validation by clinical pathologists.

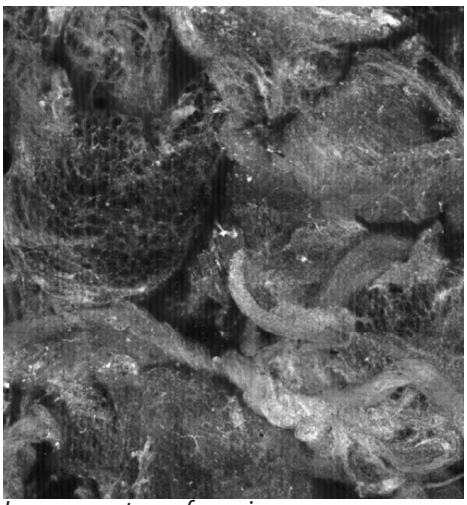


Image courtesy of magic-scan.org

"Second," he said. "FASTMAP will develop highly precise AI models that can be executed within minutes in the operating room, providing real-time guidance to surgeons during surgery."

Collaborating with Tulane and the U will be researchers from the University of Georgia, who will work on improving the quality of the imaging resolution.

Clinical validation of the device will be accomplished with partners at Cedars-Sinai Medical Center in Los Angeles, Southeast Louisiana Veterans Hospital and East Jefferson General Hospital. The Tulane-spinout company Instapath Inc. will help the team develop FDA-compliant versions of the new scanner. The project is part of a broader initiative by ARPA-H to develop Precision Surgical Interventions (PSI) that improve surgical accuracy and reduce errors.

The University of Utah is home to Huntsman Cancer Institute, a National Cancer Institute-designated Comprehensive Cancer Center. Huntsman Cancer Institute hosted then-Vice President Biden in 2016 as he kicked off the National Cancer Moonshot.

"MAGIC-SCAN represents the highest calling of engineers and lies at the core of the U's mission," says Charles Musgrave, Dean of the Price College of Engineering. "There's no better way to serve the people of Utah, the nation, and the world than to turn raw data into action that saves lives."

Modified from an article by Evan Lerner originally published on the Price College of Engineering website.

REMEMBERING FRANK STENGER

Frank Stenger
1968-2024

Frank Stenger, a Kahlert School of Computing emeritus faculty member, passed away on October 23, 2024. Frank joined the Department of Computer Science at Utah in 1989 and retired from the School of Computing in 2008.

Frank spent 20 years teaching and conducting research in the School of Computing, prior to joining the School he spent 20 years as a professor in the Department of Mathematics here at the University of Utah. He received an undergraduate degree in engineering at the University of Alberta (Engineering–Physics, with emphasis on Electrical Engineering), continuing at the University of Alberta he received Masters degrees in Electrical Engineering (Servomechanisms) and in Mathematics (Numerical Analysis), and a Ph.D. in Mathematics (Computational Asymptotics).

During his lifelong career, he produced a large body of original research in the development of algorithms, in areas "less traveled on" by other researchers, such as computational approximation, solution of nonlinear equations, Sinc methods; solving partial differential and integral equations. He also developed algorithms for non-destructive viewing of a part of a human being, and for determining whether the vote count at a voting center is fraudulent. He was an extremely productive scholar, publishing more than 200 papers and multiple books. Frank also lectured in over 20 different countries.

Frank was born in Hungary, and after WWII, he lived in East Germany, then in West Germany, then in Canada, finally landing in the United States after completion of his course studies.

Modified from an article by Evan Lerner originally published on the Price College of Engineering website.

FRANK STENGER MEMORIAL SCHOLARSHIP IN COMPUTING

A scholarship has been created in Frank's memory.

If you are interested in placing a donation in Frank's memory, please scan the QR code to the right, or visit ***price.utah.edu/frank-stenger.***

FRONTIERS OF SCIENCE LECTURE WITH PETER NORVIG

The Kahlert School of Computing co-sponsored the November 2024 Frontiers of Science lecture with guest Peter Norvig. The lecture series, housed under the College of Science, is the University's longest-running lecture series.

Norvig, a researcher at Google and the Distinguished Education Fellow at Stanford's Human-Centered AI Institute, described himself as an "AI hipster". "I was doing it before it was cool, and now is our time," he remarked.

AI maverick Peter Norvig speaks at the University of Utah campus.Photos courtesty of Todd Anderson

"Our time" refers to the 2024 Nobel Prize in physics, which John Hopfield and Geoffrey Hinton received for their work on neural networks, a central part of modern AI systems. As AI becomes more prominent in day-to-day life and receives further mainstream recognition, Norvig discussed how educators might use AI large language models (LLMs) in their teaching.

Norvig himself introduced machine learning into his teaching as early as 2011, when he and Sebastian Thrun modified a Stanford course, originally taught in a traditional setting, into an online format with 100,000 students enrolled worldwide. The free class featured YouTube videos and "reinforcement learning", where the utilization of machine learning helped improve student performance by 10%.

These massive open online classes led to gathering large data sets that helped him and Thrun improve the course for the future.

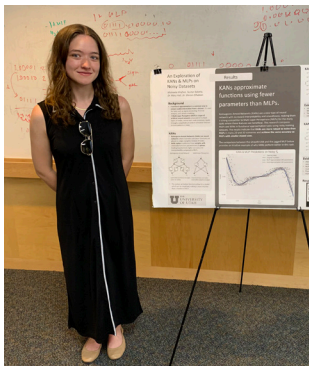
“I want the teachers to be more effective, to be able to do more, be able to connect more with the students, because that personal connection is what's important.”

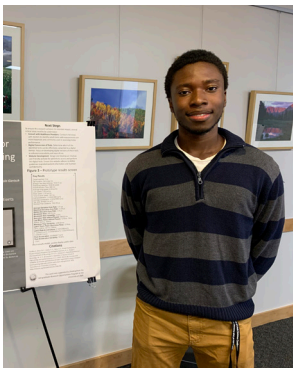
TRUST AND REPRODUCIBILITY RESEARCH EXPEREINCE FOR UNDERGRADS

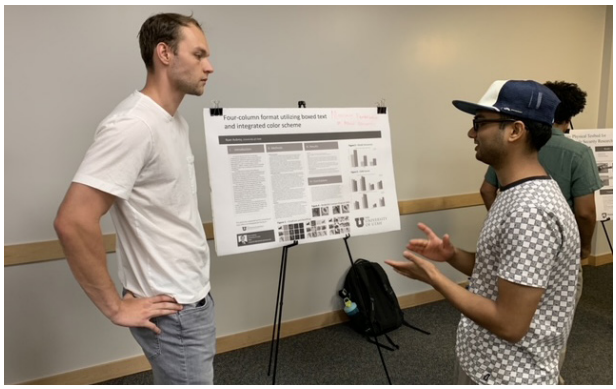
The Kahlert School of Computing hosted 10 undergraduate researchers for its second summer as part of its NSF Research Experience for Undergraduates Site on Trust and Reproducibility for Intelligent Computation. The chosen themes bring together several concerns for the future in producing computational results that can be trusted: secure, reproducible, based on sound algorithmic foundations, and developed in the context of ethical considerations. A typical undergraduate is not sufficiently exposed to these concerns—and yet they will be the ones building future intelligent systems in about a decade.

Our REU site helps broaden the conception of computing as a field, improves technical skills, strengthens understanding of ethical concerns in computing, and nurtures the ability to work in interdisciplinary settings in teams of people with different expertise. The research areas represented by student projects in this 10-week summer program include machine learning, high-performance computing, algorithms and applications, computer security, data science, and human-centered computing.

In addition to the educational opportunities, the students experienced the outdoor activities that encompass life in the western US. The first day included a short hike to Ensign Peak to look down over campus and downtown. A Saturday outing to Antelope Island showed off the Great Salt Lake and its wildlife—bison, pronghorn, and birds.







Photos courtesty of Ganesh Gopalakrishnan







FACULTY & STAFF NEWS

For service to the Kahlert School of Computing student body, Academic Advising Coordinator **Vicki Rigby** received the Price College of Engineering Outstanding Staff Award.

Professor **Jeff Phillips** will serve as the AI lead on the efficiency working group for the NSF-Simons Cosmic AI Institute, building a new breed of astronomical tools to assist and acceleradte with humanity's other understanding of the universe. Additional collaborators include Assistant Professors **Ziad Al-Halah** and **El Kindi Rezig**.

Professor **Ganesh Gopalakrishnan** and Assistant Professor **Pavel Panchekha** have received a CIRC grant valued at over $1 million from NSF for the collaborative research project, "Workbench for Reliable and Efficient Numerics", in partnership with UC Davis and the University of Washington. Panchekha and Gopalakrishnan serve as Principal and Co-Principal investigators.

Associate Professor **Alexander Lex** leads reVISit, an NSF-funded team pioneering open-source software for visualization research, launched this summer.

STUDENT NEWS

Timothy Wang has been selected as our inaugural Kahlert Fellowship Scholar.

Timothy attended undergrad at The University of Southern California (USC), majoring in computer science and minoring in screenwriting. He later went on to achieve a Master's degree in computer science at USC as well.

With a lifelong interest in both technology and storytelling, Timothy hopes to study the intersection of artificial intelligence, natural language processing, and creative storytelling at Utah.

In his free time, Timothy enjoys hiking, reading, working on his writing projects, and studying foreign languages. He's particularly excited by all the recreational opportunities to be found in Utah. Timothy's hometown is Seattle, Washington.

NEW FACULTY

The Kahlert School of Computing has expanded with two new lecturing faculty members and three new tenure-line faculty.

Ahmad Alsaleem
Assistant Professor, Lecturer

Noelle Brown
Assistant Professor, Lecturer

Andrew McNutt
Assistant Professor

Human-Centered Computing, Programming Interfaces, Visualization

Neal Patwari
Professor

Interactive Data, Mobile Networking

Guanhong Tao
Assistant Professor

AI-Enabled System Security and Safety

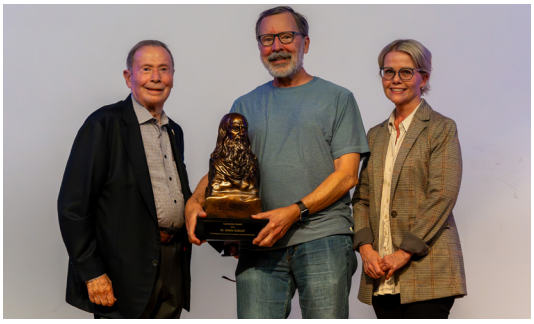
ED CATMULL RECEIVES 2024 LEONARDO AWARD

This September, The Leonardo Museum in downtown Salt Lake City presented Computer Science alumnus Ed Catmull with the 2024 Leonardo Award.

Known as the co-founder of Pixar Animation Studios and a five-time Academy Award winner, Catmull's career and contributions represent the intersection of art and science that The Leonardo looks to encourage and celebrate within our community.

Catmull reflected on his time at the University of Utah, describing a curious and supportive environment for higher education.

“It was probably one of the greatest things I got here. It was amazing, fortuitous,” Catmull said. “The whole place was extremely supportive (...) When I left, I knew that I loved the experience. I love the people. I love, their attitude, the way they work, where they support each other, and I was determined that I wanted to experience that kind of environment for the rest of my life.”



Photos courtesy of theleonardo.org

DISTINGUISHED LECTURE SERIES RETURNS

This fall, the Kahlert School of Computing's long-running Distinguished Lecture Series returned to the University of Utah campus for the first time since the 2020 COVID-19 lockdown.

The Fall 2024 presentations kicked off on October 17 with Dr. Madan Musuvathi, Partner Research Manager in the Research Software Engineering group at Microsoft Research.

The lecture series continued on November 12 with Mingyan Liu of the University of Michigan, where she serves as Associate Dean for Academic Affairs, the Alice L. Hunt Collegiate Professor of Engineering, and a Professor of Electrical Engineering and Computer Science.

The lecture series is currently organized by Professor Ganesh Gopalakrishnan, Assistant Professor Daniel Brown, and Professor Neal Patawari, who continuously provide these engaging opportunities for our student body to engage with computer science professionals from all corners of the field.

Left: *Ganesh Gopalakrishnan introduces Dr. Madan Musuvathi.* ***Right:*** *Professor Mingyan Liu delivers her lecture. Photos courtesy of Ellen Lewis.*

CALLING ALL ALUMS: WE WANT TO HEAR FROM YOU!

What professional achievements have you accomplished since graduation? Email ***ellen.marie.lewis@utah.edu*** with the email subject "Alumni News" and your first and last name.

Your achievements could be featured in an Alumni News page in an upcoming issue of COMPUTE, reaching a network of thousands of Kahlert School of Computing graduates.

STUDENT SPOTLIGHT

Q&A with Zack Freeman, BS in Computer Science and Physics

What program are you in, and what year will you finish?

I'm currently a fifth year undergraduate double majoring in Computer Science and Physics, with an emphasis in astronomy and astrophysics. I will finish my undergraduate degrees in May of 2025, but will then be a Masters of Computing student specializing in artificial intelligence in the fall 2025 semester!

Where are you from?

I am from northern Utah. I have grown up here my whole life and have loved exploring the Wasatch mountains!

How did you become interested in computer science?

I became interested in computer science during high school, when I took an intro to CS course. It was very basic and didn't involve much coding, but the teacher and the course content made me become more interested in CS. Once I started at the University of Utah, I decided to take the intro courses to see if it was an area I would be more interested in. I found myself loving the problem solving aspect of CS, in addition to being able to see results almost right away.

What interested you in pursuing this degree at the U?

I've been wanting to attend the University of Utah since I was young. As I neared high school graduation though, I learned that the U offered some of the best programs you can find, especially in the fields I was interested in.

How will you use your degree in the future?

As of now, I plan to go into the realm of AI and machine learning, ideally in an area related to physics as well. The overlap of computer science and physics is an exciting area to me!

What is your favorite class in the program?

If I had to choose one class, it would be CS 5350 - Machine Learning. Before starting this class, machine learning seemed like this elusive black box that few people understood. Being able to open this box up to see what is actually happening, and realizing that it is something you can learn, is very rewarding.

Not only was the machine learning course my favorite, but it was also one of the more difficult courses I have taken. The class is set up to teach you about the theory behind machine learning while implementing common machine learning algorithms, such as decision trees and perceptron. Having this framework set up, it gives students a great starting point into the world of machine learning and related fields, allowing you to branch out as you see fit; whether that is natural language processing, deep learning, etc.

Any students interested in this field should take this course, especially if Prof. Vivek Srikumar is teaching!

Is there a specific mentor, club, or program that made a difference in your experience here at the Kahlert School of Computing?

One club that has made a difference for me is the Undergraduate Student Advisory Committee (UgSAC). UgSAC serves as the liaison between students and faculty, assisting with Retention, Promotion, and Tenure (RPT) reports, in addition to assisting with any needs the Kahlert School of Computing has.

Joining as a member and then becoming president of UgSAC helped with my personal and career growth, and gave me great insight into the world of academia beyond the viewpoint of an undergraduate.

STUDENT SPOTLIGHT

Q&A with Estelle Trieu, PhD in Computing

What program are you in, and what year will you finish?

I'm a second-year PhD student in the Image Analysis program at the Scientific Computing and Imaging (SCI) Institute. PhD completion typically takes 5-6 years, so I'm aiming to finish in that timeframe.

Where are you from?

I'm from Portland, Oregon. Portland is all about lush greenery, roses, biking culture, and a vibrant food truck scene.

What interested you in pursuing this degree at the University of Utah?

My research interests combine mathematics, radiomics, and medical image processing, a blend that many in my undergrad years cautioned me was too broad. When I visited SCI at the University of Utah, I saw interdisciplinary research in action and found a community where blending fields was encouraged. The image analysis program here felt like the right place to truly explore my interests in a supportive and collaborative environment.

What is your favorite class in the program?

My favorite class so far has been CS 7690: Advanced Image Processing, taught by Professor Shireen Elhabian. The course was literature-intensive, with weekly analysis and presentations of cutting-edge medical imaging research papers. We then developed the architectures from these papers in our projects and compared our implementations. The final project was a team-based hybrid architecture, which was challenging yet rewarding and led to some great friendships. Professor Elhabian's teaching and mentorship made the class exceptionally engaging and valuable.

Is there a specific mentor, club, or program that made a difference in your experience here at the Kahlert School of Computing?

Absolutely. My research advisors, Sarang Joshi and Allison Payne, have been invaluable mentors, offering guidance and encouragement as I navigate the PhD process. They push me to excel while remaining patient and supportive. Outside of academics, my fighting instructor, Sean, and Olympic weightlifting coach, Jacob, have been pivotal in maintaining my work-life balance. Their encouragement and perspective have helped me stay calm and keep my passion for research alive.

> My interest in computer science grew from my fascination with mathematical computation from a young age.
>
> Initially, I studied mathematics in undergrad, but I soon realized that the types of problems I wanted to solve, especially in medical imaging, required a computational approach.
>
> That realization naturally led me to computer science as the most effective path forward.

How will you use your degree in the future?

My degree will equip me to tackle more complex medical imaging challenges as an experienced researcher. While my focus is on solving important problems, I've come to see the PhD as a journey that builds resilience, adaptability, and autonomy. The true value of my degree is in the wisdom and grit I'm gaining, allowing me to approach any future research challenges with confidence.

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Kahlert School of Computing
University of Utah
50 S. Central Campus Drive RM 3190
Salt Lake City, UT 84112-9200

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