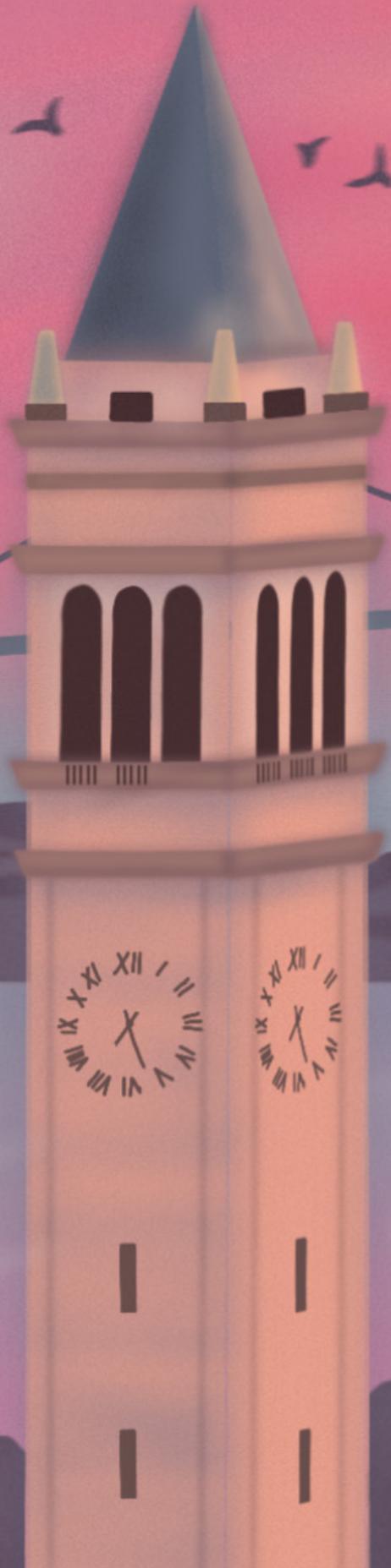


IEOR

INDUSTRIAL ENGINEERING & OPERATIONS RESEARCH
ALUMNI NEWSLETTER

SPRING 2021



Berkeley Industrial Engineering
& Operations Research
COLLEGE OF ENGINEERING



Dear Alumni and Friends of IEOR:

This past year has been challenging for all of us. We would like to offer our sincere condolences to those of you who have been sick or lost someone close to you during the pandemic. There are surely countless untold stories in our alumni community from this global tragedy. Our thoughts are with you and your families, and we hope that each and every one of you are recovering well. With expanding vaccination efforts, we look forward to returning to in-person instruction in the Fall semester.

In this annual alumni newsletter, we highlight our rapidly growing department. The IEOR programs have been receiving strong interest from the students. In the last five years, enrollments in our graduate and undergraduate programs have more than doubled. As collecting and processing large amounts of data become easier, the demand for data-driven, automated decision-making is rapidly rising across industries ranging from e-commerce to healthcare, from transportation to energy. Businesses and governments seek to harness data as a way to respond faster to changes in demand and supply, to better manage cost and risk, and to improve efficiency of their operations

through data-driven analytics. With their expertise in optimization, stochastics, and data analytics, IEOR faculty and students craft innovative solutions for business and industry systems, including healthcare, supply chains, energy, finance and risk management. To accommodate the growing number of students in IEOR, I am pleased to write that four new faculty members, Barna Saha, Rajan Udawani, Daniel Pirutinsky, and Thibaut Mastrolia, joined the department in the last two years.

In addition to new faculty helping us expand our curricula and impactful research, we are excited to announce that the Department is starting a new professional master's degree program in Analytics. The first cohort of 50 students will enroll in the Fall of 2022. I encourage you to visit our website for information about this exciting new program.

This spring 75 undergraduates, 75 masters of engineering, 9 masters of science, and 5 PhD students graduated from the IEOR department. Please join us in celebrating these new graduates who will go on to make a positive impact in industry, government, and academia all over the world. In this newsletter's Senior Spotlights, we highlight our new graduates who share their experiences at Berkeley and see where they will go next.

We also highlight our game changing alumni, including Haryanto Tanjo, who started the leading point-of-sale company in Indonesia, Willson Deng, who started Arcstone, a manufacturing execution systems solutions firm, and Tony Xu, who founded DoorDash, which had its Initial Public Offering this year.

Besides alumni who are making a difference in industry, we showcase the impactful research led by our world renowned faculty. In this issue, we talk with Professor Shmuel Oren about his work to improve auction theory with this year's Nobel Laureate in Economic Sciences, Robert Wilson. We also highlight Professor Ken Goldberg and his collaborators' work on telesurgery and the challenges that come with operating from the other side of the world.

It is truly an exciting time to be a member of the IEOR community as the Department embarks on new challenges to expand its impact. We hope that you enjoy this alumni newsletter. Please do not hesitate to reach out to me with questions, concerns, or ideas about how the IEOR department can grow and build community with our alumni.

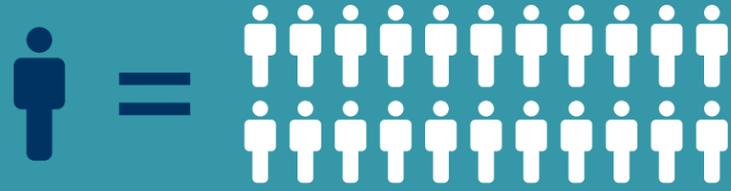
*Alper Atamturk
Professor and Department Chair
Department of Industrial Engineering & Operations Research
University of California, Berkeley*

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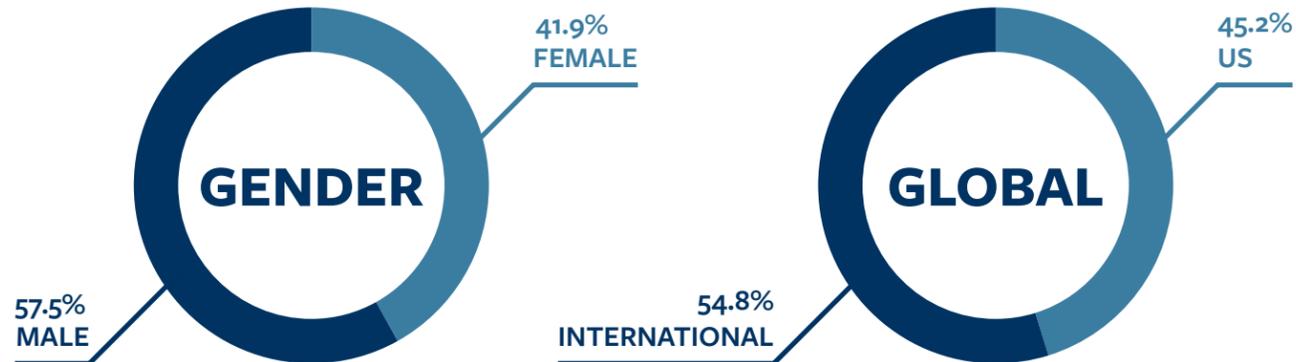
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Arthur Yu

IEOR BY THE NUMBERS

18.5 STUDENTS PER
TENURE-TRACK FACULTY



352 STUDENTS



4,679
ALUMNI

\$91k

AVERAGE STARTING SALARY
(UNDERGRADUATE)

\$114k

AVERAGE STARTING SALARY
(M.ENG)

POPULAR JOB TITLES

DATA SCIENTIST
FINANCIAL ANALYST
INDUSTRIAL ENGINEER
PRODUCT MANAGER
DATA ANALYST

OPERATIONS MANAGER
TECHNICAL CONSULTANT
BUSINESS INTELLIGENCE ANALYST
MACHINE LEARNING ENGINEER
SUPPLY CHAIN ENGINEER



NATIONAL ACADEMY OF
ENGINEERING FACULTY

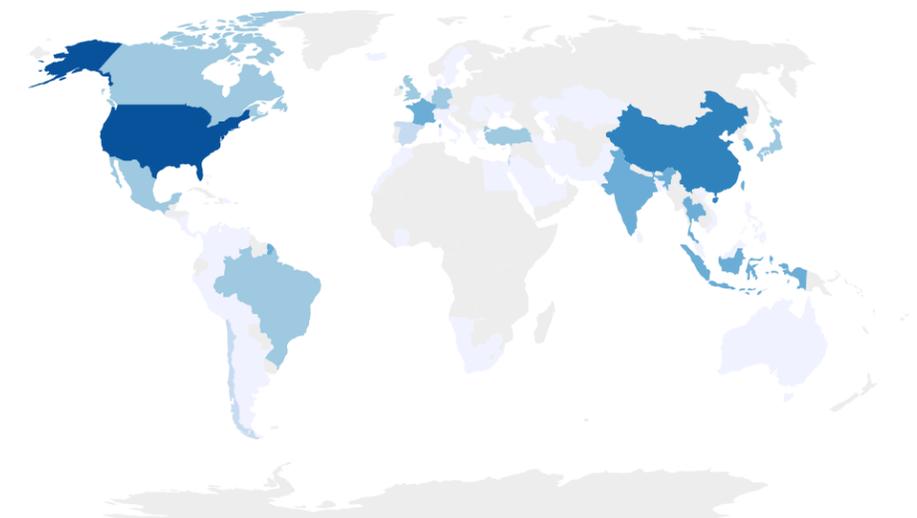
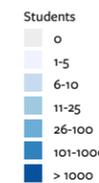
SHMUEL OREN
(PROFESSOR OF GRADUATE SCHOOL)

BOB OLIVER
(EMERITUS)

EARLY CAREER AWARD FOR
SCIENTISTS AND ENGINEERS
FACULTY MEMBERS

BARNA SAHA
JAVAD LAVAEI

WHERE ARE OUR ALUMNI NOW?



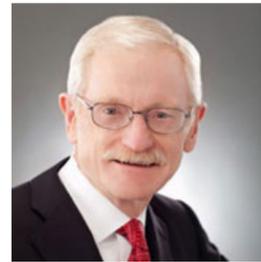
Advisory Board



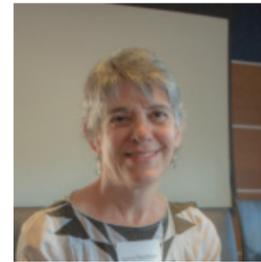
Raaid Alireza



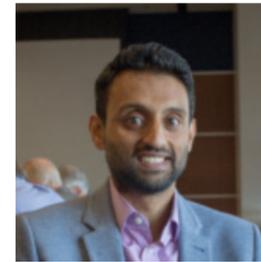
John Birge



Bob Bixby



Nancy Blachman



Sujit Chakravarthy



Tim Chen



John Chendo



Judy Chou



Bob Cliff



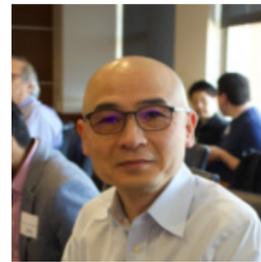
Terry Duryea



Michelle Fisher



Bill Floyd



Coleman Fung



Charles Huang



Judith Kulich



Andrew Laffoon



Robert Phillips



Andrew Rudd

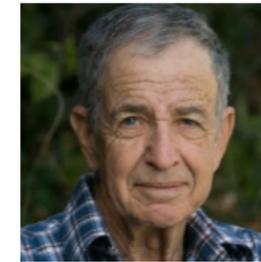


Aram Sogomonian



Todd Strauss

Faculty Members



Ilan Adler
Professor,
Head MEng Advisor



Anil Aswani
Associate Professor



Alper Atamturk
Professor,
Department Chair



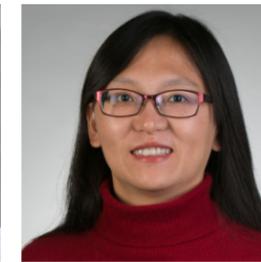
Lee Fleming
Professor



Ken Goldberg
Professor



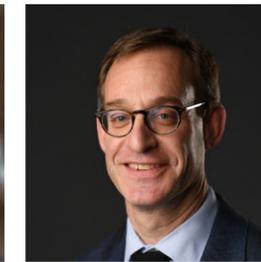
Paul Grigas
Assistant Professor



Xin Guo
Professor



Dorit Hochbaum
Professor,
Head Graduate Advisor



Philip M. Kaminsky
Professor



Javad Lavaei
Associate Professor



Robert Leachman
Professor, Head
Undergraduate Advisor



Shmuel Oren
Professor of the
Graduate School



Daniel Pirutinsky
Assistant Teaching
Professor



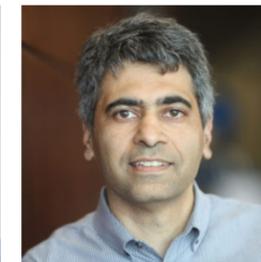
Rhonda Righter
Professor,
ORMS Advisor



Barna Saha
Associate Professor



Zuo-Jun Shen
Professor



Ikhtlaq Sidhu
SCET Faculty Director



Rajan Udhwani
Assistant Professor



Candace Yano
Professor, MS Advisor,
Equity Advisor



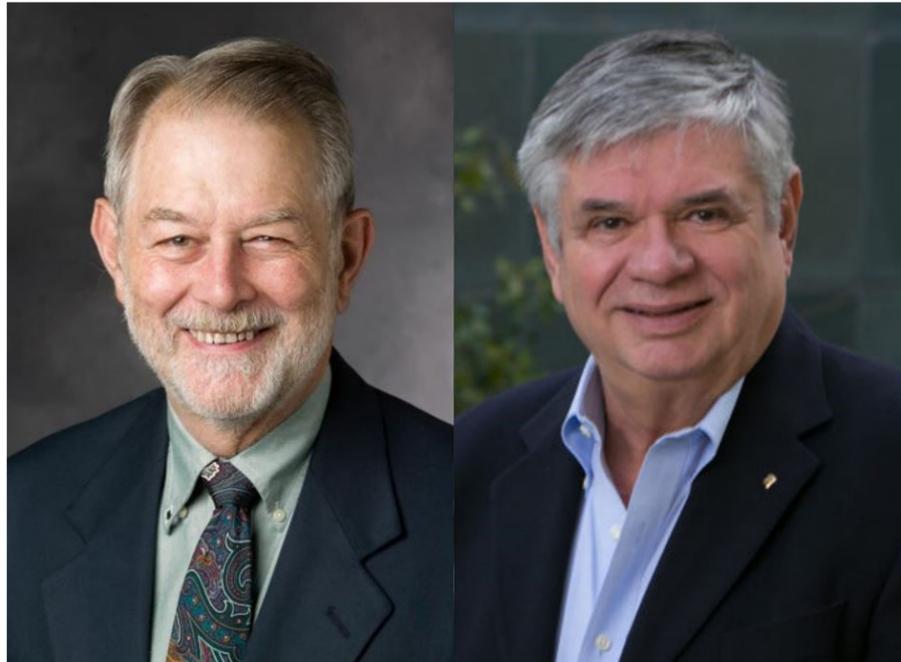
Zeyu Zheng
Assistant Professor

Shmuel Oren Reflects on his Collaboration with Nobel Laureate Robert Wilson

By Vishrut Rana

On October 12, 2020, Robert B. Wilson was co-awarded the 2020 Nobel Prize in Economic Sciences along with his long-time collaborator Paul Milgrom “for improvements to auction theory and inventions of new auction formats.”

Robert Wilson, Professor Emeritus at Stanford’s Graduate School of Business, worked on many research areas throughout his career. These included economic theory and market design and pricing, where Berkeley IEOR Professor Shmuel Oren was one of Wilson’s closest collaborators. In a recent conversation, Professor Oren looked back on his work with Professor Wilson, and highlighted its relevance to today’s energy markets and other OR fields.



Robert Wilson and Shmuel Oren

Oren first started working with Wilson in 1979, when he was a researcher at Xerox and Wilson was hired as a consultant to help launch the firm into the broadband communications market by creating a network of Xerox’s new fax machines. Oren explains that this network was exposed to the concept of “network externalities” – the value of fax machines depended on the number of fax machines already in use. They used Wilson’s work on theory for pricing to build the network and price its services. Together, they developed the concept of critical mass – a pricing strategy that would take the network to a point where people would be willing to pay for it.

Through this interaction, Oren was given his first introduction to non-linear pricing by Wilson. As their collaboration furthered in the future, their initial research papers were based on non-linear pricing applied to the field of telecommunications. They then explored ideas of product differentiation, where an array of products would be priced relative to each other to maximize sales and usage. These ideas,

Oren explains, are extensions of original auction theory.

Oren left Xerox in the ‘80s and was appointed a professor at Stanford. There, along with Hung-po Chao from the Electric Power Research Institute and Wilson, Oren realized that the electricity market is a good application of product differentiation. The researchers developed strategies for markets to allow customers to respond to peak and off-peak electricity supply. Instead of treating electricity as a homogeneous commodity, they would treat it as a qualitatively differentiated service – customers pay less if they are willing to absorb less reliability. Instead of randomized or rotating curtailments, such a service would ensure continuous supply for most users.

Through ideas like this, Oren and Wilson have worked to design deregulated energy markets using mechanism design theory that leverages Wilson’s Nobel Prize winning work. They have developed rules for contracts that

work as implicit auctions and emulate results from actual auctions, which are often challenging to conduct. Oren says, “there are a range of applications we have worked on together, for years, and that is why I am so excited that he has won the Nobel Prize.”

As Oren highlights his journey with Wilson, he credits Wilson for showing him the usage of “optimization as a paradigm for how markets should operate.” The collaboration with Wilson allowed solving of optimization problems by creating a set of rules that, when followed by diverse participants, ensure the same outcome as that from optimization algorithms is obtained. This is crucial because in most large real-world systems, there often isn’t enough information to solve problems centrally using algorithms. In situations like this, where all participants have a piece of the puzzle and the objective of maximization is distributed, approaches of mechanism theory become relevant.

Applying IEOR to Amazon’s Middle Mile Logistics



Phil Kaminsky

Phil Kaminsky, Earl J. Isaac Professor in the Science and Analysis of Decision Making at Berkeley IEOR, has been on industrial leave at Amazon since July 2019. Phil has been working as a principal research scientist with the middle-mile logistics team which oversees the transportation of goods from a factory or warehouse to a distribution hub, giving Amazon additional control of its logistics operation from start to finish. In a recent conversation with the department, Phil shared his experience of working at Amazon.

After many years in academia, how is the experience of working in industry? What are the most exciting parts of your time at Amazon and what do you miss most about Berkeley IEOR?

I’m having a great time at Amazon. It’s exciting to work with so many smart people, and to build models and tools that have a direct and immediate impact on so many people’s lives. I miss lots of things about Berkeley though. I miss the students, with their energy and enthusiasm. I miss my colleagues in IEOR, whom I’ve worked with for so many years. I miss wandering around the campus when I’m thinking hard about a problem or challenge. And I miss the chaos of life at Berkeley.

Please describe the work you are doing with Amazon’s middle-mile logistics team.

Amazon’s middle mile team is responsible for the transportation at Amazon that isn’t last-mile. This includes all of the trucks, trains, and airplanes that are moving goods around the Amazon network. On the middle mile research team, we build algorithms, tools, and analysis that enables the network to run more efficiently.

How did your experience at Amazon connect with the research you have been doing at Berkeley IEOR?

For many years, I have been developing tools and approaches to make supply chains and logistics networks more efficient. It has been a lot of fun applying many of the same ideas and concepts that I have been working on at Berkeley to the huge Amazon logistics network, and learning about all of the complications that arise in the real world in a huge logistics network.

What are some of the exciting ways that IEOR can help to transform goods delivery in the coming years?

During my time at Amazon, I’ve been struck by the power of algorithms, data, and analytics to continually transform goods delivery. There is no question that some of the changes in the coming years will be driven by robotics, autonomous and electric vehicles, drones, and an increased focus on the introduction of environmentally sustainable technology into the supply chain. But effectively using these technologies will be impossible without algorithms that continually analyze data and optimize systems — which is exactly what we do in IEOR.



Saha And Udwani Share Their Journeys To Cal



Professor Barna Saha

Can you tell us a bit about your childhood? Where did you grow up? What was it like there?

I grew up in a middle-class family in a suburban setting in India, where infrastructure and facilities tend to be city-centric. The educational opportunities were very limited with no platforms to compete in national and international level examinations. But there was fresh air to breathe and green fields to play which are even rarer in India! I had a very happy childhood. My mother was a chemistry teacher in a local high school, and my father was a mathematics professor. My mother taught my sister and me everything from literature to science. Her dedication towards our education is the reason behind our success. My dad told us stories of great mathematicians and scientists. Today, my sister is a doctor and I am a professor.

Tell us a bit about your education background and your journey to Berkeley.

After completing my undergraduate program in Kolkata, India, I wanted to learn more and attend a PhD program in the US. I first joined the Indian Institute

of Technology Kanpur to do my Masters, and was eventually admitted to the great computer science program at University of Maryland, College Park. I had a very fulfilling experience there with a very supportive PhD advisor. I then spent three years as a senior researcher at the AT&T Shannon Research Laboratory and then five years at the University of Massachusetts Amherst as an Associate Professor before getting an offer from Prof. Ken Goldberg to join UC Berkeley's faculty — a very humbling experience indeed. I am incredibly grateful towards those who helped me get this far. It's been a long journey but it's far from completion!

"I truly hope little girls who are growing up in different parts of the world irrespective of race and color get the best facilities to fulfill their educational dreams."

How did you get interested in math and computers? How did you stay committed and focused on these areas?

I was good at math, and when you are good at something, it's easy to develop interest. My interest in computers is a little different, though. I first saw a computer after graduating from high school. I wanted to study chemistry, but fate had other plans. My dad was critically injured in a road accident just before my high school graduation, and it was unclear if he could continue working. Studying engineering was the only way to ensure that I could get a job soon after undergrad and sustain my family economically. That led me to choose computer science. However, it didn't take me long to fall in love with it! Fortunately, my family's situation improved during my undergraduate studies, and I was able to continue studying.

Tell us about your research – what domain areas are you interested in? Where did you start and what are you working on now?

My research interest spans different facets of algorithm design. I specifically work on understanding how different complexity measures like time, space, and query complexity trade off with accuracy. Designing more efficient algorithms can help refute certain hypotheses related to solving NP-Hard Satisfiability Problems. This connection between a low-polynomial time problem and an NP-Hard problem is surprising, and at the core of fine-grained complexity. My recent works are in this area of fine-grained approximation algorithms, where near-optimal results can significantly improve running time.

You recently received the Presidential Early Career Award for Scientists and Engineers. Can you tell us a bit about the award and why you were nominated?

Established in 1996, the PECASE is the highest honor given to young researchers in the fields of science and engineering. I was nominated by the National Science Foundation (NSF) with the following citation:

"For pioneering a unified theory of fine-grained algorithm design leading to enhanced computation efficiency and practical solutions for a range of problems, and for outstanding dedication to mentoring and training a diverse and interdisciplinary scientific workforce."

How do you think your research interests might change over the next 5-10 years?

This is an interesting and hard question to answer! I want to work on solving some long-standing open questions on fine-grained complexity but who knows how many years it will take! I'd also like to increase my involvement in the computational biology field, especially after experiencing this pandemic. Similarly, fairness in computation, and energy-efficient computations are two areas that you may see me working in near future.



Professor Rajan Udwani

Tell us a little bit about your childhood – where did you grow up and how did you become interested in math and engineering?

I grew up in India. Interestingly I was neutral about mathematics as a subject until I was about 15. It was around this age that we had to decide a rough direction for what we wanted to do later on — picking math meant eventually becoming an engineer, choosing biology meant going into medicine. I picked mathematics because it personally seemed like the most challenging thing to do.

Please describe your journey through college. Where did you complete your undergraduate and graduate studies?

I did my undergrad at Indian Institute of Technology Bombay and subsequently did a PhD in Operations Research at MIT. My undergraduate was in EE and it was an interesting transition. At first I was keenly interested in doing a PhD in computer architecture (a conventional EE topic) and towards my last year I discovered algorithm design and optimization which really changed my direction and brought me into

operations research.

What was your research focus during the course of your PhD program? Can you tell us a little about your work?

My thesis consisted of new algorithmic results for optimization problems where the uncertainty is modeled through the lens of robust optimization. Robust optimization takes a pessimistic view of uncertainty and outputs solutions that work well in the worst case. The problems I considered had a diverse array of applications ranging from sensor placement to scheduling appointments. More recently I have been working on algorithmic problems that commonly appear in online platforms.

When and how did you decide to enter academia?

I worked for a year in industry before starting my PhD. That made me realize that I truly enjoy thinking hard about a problem over a period of time and really understanding the problem "physics" in a rigorous way. This kind of exploration takes time and patience, which is what led me to pursue a PhD with the goal of finding an academic job from the get go.

Beginning your time as a professor in a remote environment, how has your experience at Berkeley IEOR been? What are some of the best parts and biggest challenges about it?

Hardest has of course been the lack of normal daily conversations with colleagues and students. Normally, I would have looked forward to engaging and slowly getting to know everyone over the first year. But I expect to be able to make up for it once things get back to normal. Overall though, I count myself very lucky to have found this exciting opportunity last year just in time before the pandemic!

What research themes are you currently exploring? Where do you see your research interests going in the next 5-10

"My research thrust over the next few years will revolve around problems in optimization under uncertainty, especially in online platforms. These platforms are rife with interesting algorithmic challenges that demand solutions that are scalable and robust to various forms of uncertainty that underlie the very nature of online platforms."

years?

More broadly, I am interested in algorithm design and I aspire to develop a deep as well as broad expertise on both the theory and practice of algorithms in the next 10 years.

What is the most exciting thing about the field of IEOR right now?

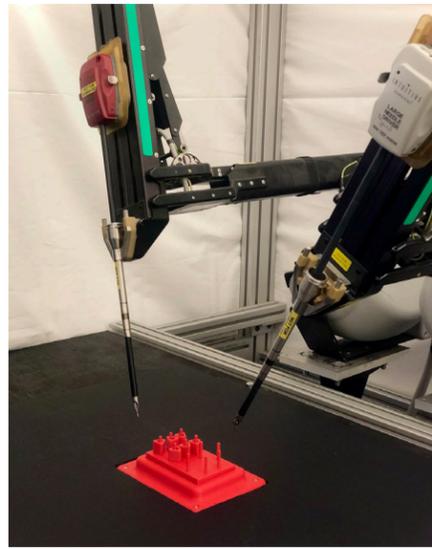
What I've come to understand is that every person who loves their research sees it as exciting and promising. So I, of course, think that problems involving online platforms and marketplaces are very exciting right now!

Would you like to share any advice for current PhD students trying to break into academic roles?

Pursue research that you love and don't be afraid of getting stuck and failing. Getting stuck is often a part of doing really interesting work. And loving your problem is what gets you across the periods of being stuck.

Accelerating the Innovation in Tele-Surgery with Deep Learning

By Vishrut Rana



Intermittent Visual Servoing in action

Tele-medicine services – where doctors can meet patients over video conference to treat non-critical conditions – have been on the rise over the past decade. Many medical technologies exist to facilitate routine procedures, like taking pulse and checking blood pressure, through this remote service. On the cutting-edge of using remote medical technology for patient care is tele-surgery – where expert surgeons guide remote robots to operate on patients. IEOR Professor Ken Goldberg and his team of researchers in the UC Berkeley Automation Lab (AUTOLAB) are using techniques in deep learning to create new surgery options for time-critical scenarios where expert surgeons are not available locally.

In recent times, the surgical-assist robot space has been very active. Efforts to improve accuracy and efficiency of cable-drive robots that automate surgical tasks has gained a lot of traction. With historic patents on the technology nearing expiration, many companies that develop a new generation of these surgical-assist robots for supervised autonomy are emerging in Asia. Existing startups in this space have also seen a lot of recent activity – Johnson and

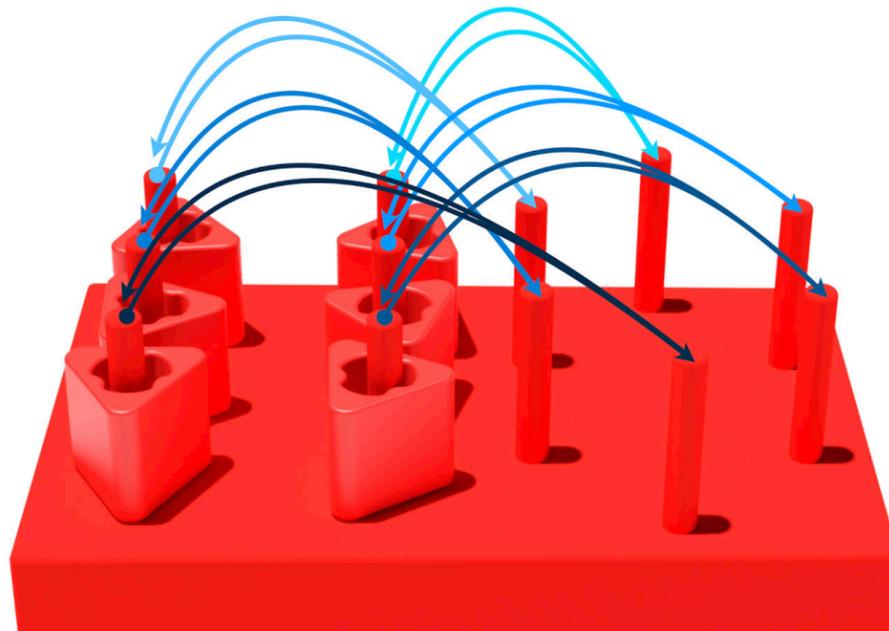
Johnson acquired Auris and Medtronic acquired Mazor.

Contributing to the space, Goldberg and his students are developing new robot hardware platforms and applying recent advances in deep learning to facilitate supervised control, where a surgeon remotely supervises a sequence of short-duration autonomous surgical subtasks – for instance, repeated stitches to a large wound – performed by the robot. Their proposed framework, called intermittent visual servoing (IVS), improves accuracy by mapping images of the workspace and instruments from a top-down RGB camera and making corrective motions trained with deep learning using 180 human demonstrations.

The challenges are aplenty – primarily that of unstable feedback systems due to time-delay and variations in network transmissions. Think of a video conference where the audio-video lag makes it incredibly hard to coordinate something as simple as singing the birthday song. The researchers, nonetheless, believe that imitation learning – an area of

deep learning where robots learn from human examples – can improve perception. Speaking about their recent achievements, Minho Hwang and Sam Paradis – the lead students on the team – said “we were able to automate peg transfer, a common training procedure for minimally invasive surgery where a robotic arm lifts and transfers small plastic nuts between hooks, with 99.4% accuracy (357/360 trials) – even when the surgical instruments are switched. We’re now working on making it faster.”

With collaboration from Intuitive Surgical and SRI International in Palo Alto, Goldberg and his team are currently working with simulated tissues and hope to work with animals at some point. Although dedicated surgical robots, like the Intuitive da Vinci, are used in over 3000 operating rooms worldwide with surgeons controlling them from a few feet away, applying fully autonomous surgical-assist robots on humans is still several years away. Nonetheless, the technology presents a tremendous opportunity to save lives during medical emergencies.



FLS peg transfer task: Transferring 6 blocks from the 6 left pegs to the 6 right pegs and then back from the right pegs to the left pegs.

FACULTY AWARDS FOR EXCELLENCE IN TEACHING

Ikhlaq Sidhu receives Extraordinary Teaching in Extraordinary Times Award



Ikhlaq Sidhu

SCET Faculty Director & Chief Scientist, Prof. Ikhlaq Sidhu has been awarded the University of California, Berkeley’s Extraordinary Teaching in Extraordinary Times Award for demonstrating his commitment to students and excellence in teaching, even under extraordinarily difficult circumstances.

Ikhlaq was nominated for his work on the SCET Data-X course, Applied Data Science with Venture Applications. With its significant team-based component, it wasn’t originally meant to be a remote learning experience, so when the COVID-19 pandemic hit, Ikhlaq decided to re-design the course.

In 2020, he led a team of undergraduate and graduate students to convert the course into a flipped-classroom model, so that time in the class could be used for interactive discussion and project presentations, and the lecture and homework content could be completed asynchronously. Over the summer, his team developed lecture videos, code samples, and project processes. The result was Data-X Online, an open, online repository that supported the

new course format and allowed anyone in the world to take the Data-X course. Students in the Fall 2020 course embraced the new format, creating innovative projects that explored topics such as road safety, sports analytics, social connection, and police bias.

“We are fortunate and grateful for Ikhlaq’s commitment to innovation and excellence in teaching for the Sutardja Center for Entrepreneurship and Technology,” says Tsu-Jae King Liu, Dean, College of Engineering.

Congratulations to Ikhlaq! Learn more about Ikhlaq’s journey at SCET in this recent piece celebrating 15 years of his leadership at UC Berkeley: bit.ly/ikhlaq-sidhu.

Shmuel Oren Awarded IEEE PES Outstanding Power Engineering Educator Award



Shmuel Oren

The IEEE Power & Energy Society (PES) has awarded Professor Shmuel Oren the 2021 IEEE PES Outstanding Power Engineering Educator Award for his contributions to mentorship and education on the design and operation of electricity markets. The Outstanding Power Engineering Educator Award was established to recognize outstanding contributions and leadership in power engineering education.

Selected as the recipient after a competitive nomination process, Professor Oren will receive the award at the 2021 IEEE PES General Meeting, to be held virtually.

Berkeley IEOR extends a hearty congratulations to Professor Oren on this achievement!

From IEOR to Fintech Entrepreneur: Alum Haryanto Tanjo Shares His Journey

By Keith McAleer



Haryanto Tanjo graduated from Berkeley IEOR in 2009. He went on to earn an MBA from UCLA, and then decided to take a risk to create a new startup, MOKA, which is now the leading point-of-sale company in Indonesia.

Under his leadership, MOKA grew to become the leading point-of-sale company in Indonesia with over 40,000 merchants using its services. MOKA raised over \$25M in funding from renowned investors such as Sequoia Capital and Softbank before getting acquired by Gojek, Indonesia's largest tech company, for \$130 million. Recognized as a young and inspiring entrepreneur, Haryanto was named one of Forbes 30 Under 30 Asia list in 2019.

The IEOR department contacted Haryanto to learn more about his journey from IEOR to successful entrepreneur.

Berkeley IEOR (Keith McAleer):

Congratulations on launching your venture MOKA, with great success! Berkeley is being recognized as a top school for entrepreneurs. What advice would you give our student entrepreneurs? Or, if you were to go back in time to your Berkeley days, would there be anything you would do

differently to set yourself up to create an innovative company?

Haryanto Tanjo: If I were to go back to my Berkeley days, I would take more elective classes outside of IEOR to broaden my understanding of other fields. I would also reach out to more alumni across multiple professions and ask them about what they do. I feel like college is a time for exploring, and I was so focused on my major that I didn't do enough of that.

IEOR: What do you think are the biggest opportunities or challenges in FinTech in the coming 5-10 years?

Haryanto: The opportunities and challenges are different depending on which part of the world you're in, but I believe emerging markets present the most exciting opportunities. In Indonesia where I'm from, 40% of the population are unbanked and most small businesses don't have access to financing. This creates a massive opportunity for FinTech players to serve the underserved.

IEOR: What do you think were some of your biggest learnings from your undergraduate degree in IEOR?

Haryanto: I think IEOR has a good balance between engineering and business. Concepts such as managing by the bottleneck, the bullwhip effect, and decision analytics have a very broad application and are still relevant in how I manage the company today. I feel that IEOR helped shape my thinking process and allows me to approach a problem or decision in a structured and logical manner.

IEOR: Do you have a favorite IEOR class?

Haryanto: My favorite class was IEOR 180. We were able to get Cisco as a client and my team won the best Senior

Project award. I really enjoyed that class because it was my first real-world consulting project which convinced me to pursue a career in consulting before starting my own business.

IEOR: What mindsets do you think are most important for business and entrepreneurship?

Haryanto: Don't wait until you figure it all out before trying, because you won't. Entrepreneurship requires a mix of data and gut – you'll have some basic data around the problem statement to convince you it's a problem worth solving, but building the product to solve the problem requires you to go into uncharted territory where there's most likely no data available – that's the gut part. You'll learn that by doing.

IEOR: What is next for you?

Haryanto: My focus in the next few years is to continue growing Moka to become an end-to-end solution for businesses in Southeast Asia. The company that acquired us, Gojek, has IPO aspirations in the near future – I definitely want to be a part of that and complete the full cycle from founding a company, getting acquired, to going public! Beyond that, I have no idea what I will be doing, but I will probably take 6-12 months to travel and explore the world.

IEOR: Finally, graduation is right around the corner. Do you have any advice for our new IEOR grads?

Haryanto: You are graduating into a world that has changed dramatically over the last 12 months. These are unprecedented times, and things might appear daunting. But challenges and opportunities always go hand-in-hand, so keep your eyes open and don't be afraid to explore and try out new things.

Meet the Forbes Asia 30 Under 30 Recipient IEOR Alum Willson Deng Transforming Manufacturing

By Vishrut Rana



Willson Deng, Berkeley IEOR '09

“[The] greatest opportunities arise in areas no one is looking at,” says IEOR '09 Alum Willson Deng, as he describes what prompted his move from the world of finance to the world of manufacturing. In a recent conversation with the Department, Willson Deng, who was awarded the Forbes Asia 30 Under 30 title in 2016, spoke about how his work in manufacturing came to be.

Willson always liked numbers and came to Berkeley expecting to study Business Administration and become a trader. This expectation changed soon after he spent a summer interning as an investment analyst. “Although the experience was great, this would become my life, and I couldn't live with that,” thought Willson as he hoped to find more purpose through his career.

Willson was then introduced to an IEOR seminar by a friend and realized that the program included everything he hoped to do. He decided to switch tracks to IEOR. Willson's favorite class was IEOR 174, Simulation for Enterprise-Scale Systems, and he credits Prof Lee Schruben, who then taught IEOR 174, saying “I would not be who I am today without him.”

As advised by Prof Schruben, Willson's first job after graduation was at an

early stage bio-manufacturing startup. The exposure through different responsibilities at a startup allowed Willson to learn with no limitations. In his second year at work, Willson identified that there was lack of visibility on the manufacturing floor across all industries. He wanted to rewrite the software used in these operations, and to gain credibility to do so in the conservative environment of manufacturing, he felt he needed a PhD. He discussed this idea with Prof Schruben who suggested attending INSEAD, a technical graduate school in France well connected to the business community.

During his first year as a PhD student, Willson joined his mandatory 2 months exchange program at INSEAD's Singapore campus in January 2013. Meeting fellow first year students based in Singapore, he got particularly close to one while interacting about post-PhD plans. Narrating his idea of working on manufacturing execution system (MES) solutions while being on a tenure-track at a US university, Willson began chalking out details about his entrepreneurial idea. As he packed his bags at the end of the 2 month program, his lunch table friend knocked on his door and expressed willingness to write an angel investment check if Willson was ready to launch his venture right away and drop out of his PhD program.

Willson knew this was a big decision — he would be dropping out of a fully paid PhD program within his first year. He eventually decided to take up the challenge just as he completed his finals for the year. Worst case scenario, he says, “everything fails, and I go and pursue a PhD program elsewhere.”

April 1, 2013 marked the unofficial founding of Willson's manufacturing execution systems solutions firm — Arcstone. At Arcstone, Willson has used his courses in optimization, control

theory, and simulation to offer tool sets that run and manage production operations. Arcstone is also developing supply chain management tools, where data from the production floor is aggregated right up to the supply level to help multiple suppliers integrate with just in time manufacturing, thereby benefiting the end consumer and reducing environmental damage.

Willson went back to INSEAD to finish a few courses and clear requirements for a Masters degree, and now, seven years after the initial founding of Arcstone, he has led the company to great heights. Speaking about the recognition received from Forbes — the title of Forbes Asia 30 Under 30 — he calls it a legitimacy to the value of industrial engineering that the whole world is realizing.

And this impact is what drew Willson to the manufacturing space — old and neglected, it offered an ideal opportunity for revamp. Willson valued the change he could create in the world through transforming manufacturing. Sharing this as advice to current students, he asks them to not chase glory in titles but consider the impact their work creates.

Willson chose to merge the tools and foundations of IEOR with software development for manufacturing, and hopes that graduating students now can focus on industries like agriculture, power generation, and waste management where reform will have the highest impact. Even if the bragging rights are smaller, in Willson's words, “you yourself would know that you have made a directional shift in the industry and that is going to stay with you for the rest of your life.”

The Max-Cut Decision Tree: Improving on the Accuracy and Running Time of Decision Trees

Proceedings of the 12th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management

Jonathan Bodine, Dorit Hochbaum

Decision trees are a widely used method for classification, both alone and as the building blocks of multiple different ensemble learning methods. The Max-Cut decision tree involves novel modifications to a standard, baseline model of classification decision tree, precisely CART Gini. One modification involves an alternative splitting metric, Maximum Cut, which is based on maximizing the distance between all pairs of observations that belong to

separate classes and separate sides of the threshold value. The other modification is to select the decision feature from a linear combination of the input features constructed using Principal Component Analysis (PCA) locally at each node. Our experiments show that this node-based, localized PCA with the novel splitting modification can dramatically improve classification, while also significantly decreasing computational time compared to the baseline decision

tree. Moreover, our results are most significant when evaluated on data sets with higher dimensions, or more classes. For the example data set CIFAR-100, the modifications enabled a 49% improvement in accuracy, relative to CART Gini, while reducing CPU time by 94% for comparable implementations. These introduced modifications will dramatically advance the capabilities of decision trees for difficult classification tasks.

Smoothing Property of Load Variation Promotes Finding Global Solutions of Time-Varying Optimal Power Flow

IEEE Transactions on Control of Network Systems

Julie Mulvaney-Kemp, Salar Fattahi, and Javad Lavaei

This paper analyzes solution trajectories for optimal power flow (OPF) with time-varying load. Despite its nonconvexity, it is common to solve time-varying OPF sequentially over time using simple local-search algorithms. We aim to understand the local and global optimality behaviors of these local solution trajectories. An empirical

study on California data shows that local solution trajectories initialized at different points may converge to the time-varying global solution of the data-driven OPF, even if the problem has multiple local solutions throughout time. That is, these trajectories can avoid poor solutions. To explain this phenomenon, we introduce a backward

mapping that relates a neighborhood of the time-varying OPF's global solution at a given time to a set of desirable initial points. We show that this proposed backward mapping could act as a stochastic gradient ascent algorithm on an implicitly convexified formulation of OPF, which justifies the escaping of poor solutions over time.

Statistical Consistency of Set-Membership Estimator for Linear Systems

IEEE Control Systems Letters

Pedro Hespanhol, Anil Aswani

Suppose we can choose from a set of linear autonomous systems with bounded process noise, the dynamics of each system are unknown, and we would like to design a stabilizing policy. The underlying question is how to

estimate the dynamics of each system given that measurements of each system will be nonsequential. Though seemingly straightforward, existing proof techniques for proving statistical consistency of system identification

procedures fail when measurements are nonsequential. Here, we prove that the set-membership estimator is statistically consistent even when measurements are nonsequential. We numerically illustrate its strong consistency.

Performance Degradation in Parallel-Server Systems with Shared Resources

Proceedings of the 13th EAI International Conference on Performance Evaluation Methodologies and Tools

Esa Hyytiä, Rhonda Righter

Parallel server systems are ubiquitous. Multicore CPUs are in practically every personal device from mobile handsets to high-end desktop PCs. At larger scale, data centers consist of a huge number of physical servers often shared by multiple users (for economic reasons). Moreover, the simultaneous users are typically unaware of each other due to reasons that can be technical (cf. security & privacy),

practical (coordination layer would add complexity) and business related (usage can be business sensitive information). This results in server-side variability in terms of unpredictable response times. We study means for tackling these challenges. In particular, we consider a model where multiple users (dispatchers) route their jobs to a pool of servers using different (dispatching) policies. The goal is to determine how

different policies interact: whether users' decisions support each other, or if some decisions are simply counterproductive. The lack of coordination is shown to increase, e.g., the mean response times, with two common and robust dispatching policies: the static Size-Interval-Task Assignment (SITA) and the dynamic Round-Robin (RR). We refer to this phenomenon as the price of ignorance.

When Demands Evolve Larger and Noisier: Learning and Earning in a Growing Environment

Proceedings of the 37th International Conference on Machine Learning

Feng Zhu, Zeyu Zheng

We consider a single-product dynamic pricing problem under a specific non-stationary setting, where the underlying demand process grows overtime in expectation and also possibly in the level of random fluctuation. The decision maker sequentially sets price in each time period and learns the unknown demand model, with the goal of maximizing expected cumulative revenue over a time horizon T . We prove

matching upper and lower bounds on regret and provide near-optimal pricing policies, showing how the growth rate of random fluctuation over time affects the best achievable regret order and the near-optimal policy design. In the analysis, we show that whether the seller knows the length of time horizon T in advance or not surprisingly render different optimal regret orders. We then extend the demand model such that the

optimal price may vary with time and present a novel and near-optimal policy for the extended model. Finally, we consider an analogous non-stationary setting in the canonical multi-armed bandit problem, and points out that knowing or not knowing the length of time horizon T render the same optimal regret order, in contrast to the non-stationary dynamic pricing problem.

Submodular Function Minimization and Polarity

Mathematical Programming

Alper Atamturk and Vishnu Narayanan

Using polarity, we give an outer polyhedral approximation for the epigraph of set functions. For a submodular function, we prove that the corresponding polar relaxation is exact;

hence, it is equivalent to the Lovasz extension. The polar approach provides an alternative proof for the convex hull description of the epigraph of a submodular function. Computational

experiments show that the inequalities from outer approximations can be effective as cutting planes for solving submodular as well as non-submodular set function minimization problems.

How to Engage Students' Brains

Five Principles of Teaching from Daniel Pirutinsky, IEOR's new assistant teaching professor

The Department of Industrial Engineering & Operations Research was pleased to welcome Daniel Pirutinsky as its new assistant teaching professor in Fall 2020. Daniel's primary focus is to educate IEOR's rapidly growing student population, and develop effective teaching techniques to help students succeed. He earned his PhD in Operations Research from Rutgers University in 2020.

Daniel grew up in the New York Metro Area in a Yeshivish community that was very insular and isolated from other cultures. While he spent more than twelve hours per day in studies, most of his education was religious in nature. He did have some math and history education, but it was heavily censored. While he can see the beauty of mathematics now, when he was young, he really disliked math, which he remembers mostly as memorization and frustrating moments.

Daniel had a suspicion that even though he didn't like math in high school, that he might not have been given the best math education, so he decided to revisit the subject after realizing that operations research may be a career he would enjoy since he seemed to gravitate towards

making processes more efficient in his first jobs and saw that mathematics was the key skill for an operations research analyst. A pivotal moment that changed his perspective on math was when he discovered an online lecture series with Herbert Gross from the Massachusetts Institute of Technology which helped him see its beauty.

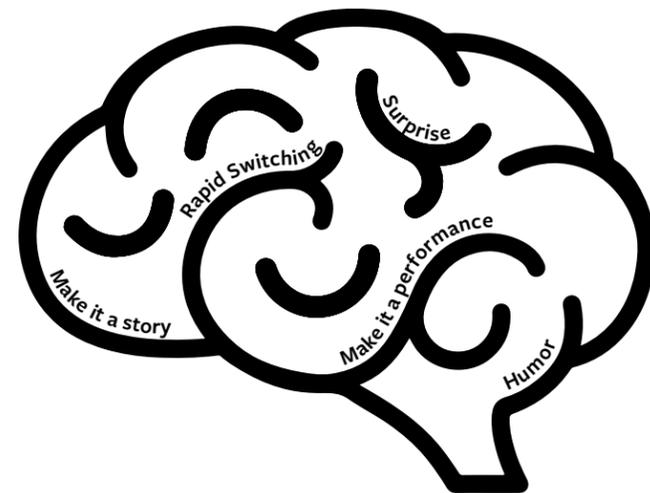
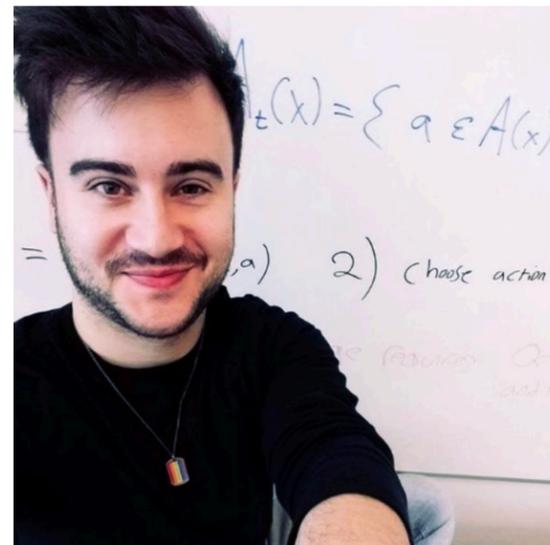
"The exciting, interesting part about mathematics is how it all logically fits together, the reasons why things are set up the way they are set up, how things follow, and the mathematical sophistication. That is when I realized this stuff is really, really cool."

So he spent two years teaching himself mathematics. He thought it was very hard at first. At times he felt bored, frustrated, and sometimes even dumb and inadequate. Every mistake he made proved why he shouldn't be doing this. He kept pushing like this, and it was at least a year before he felt more comfortable and enjoyed the work. He still feels inadequate sometimes, which makes him empathize with students who he knows must sometimes feel that way as well, especially when they are first starting out.

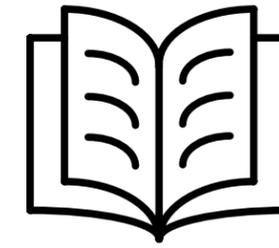
"That type of feeling is so natural because math is hard. There are so many ways to be wrong and one very, very specific way to be right. So it's frustrating, scary and disheartening. But when you get it, and as you slowly push through it, it gets more exciting."

So, having taught himself the fundamentals of mathematics, going on to earn a PhD in Operations Research, and now a teaching professor at Berkeley, how does Daniel now think about educating the next generation of students?

"In order to teach people, you have to see them as people. You have to actually engage their brain and not just see them as empty vessels that are waiting to be filled up. I don't think that is how people learn and that is definitely not how I learn. Sitting in lecture was probably the most frustrating thing I have ever done. It's just someone talking at you. Have you ever learned when people talk at you? Your brain goes here, your brain goes there. It is really really difficult. Knowing that, I still do give lectures, but my philosophy is that we engage people's brains."

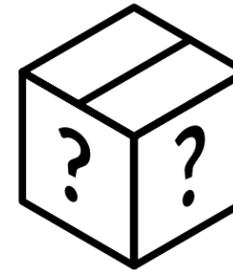


Daniel's Five Principles of Teaching



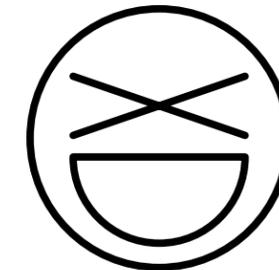
Make it a story

"One of the ways is that we make it a story. People are not machines; they are not computers. Even if it is a really technical, rigorous subject, the best way to engage them is to engage the emotional part of their brain, and then they can start listening and hearing. One way is to tell a story. It doesn't have to be a literal story, but something that gets them curious, excited, or a cliffhanger; when will the next thing drop? Regardless of whether they can absorb everything at the time it at least gets them interested in exploring it later."



Surprise

"Another way to do that is to keep surprising people. If the lecture drones on, then people lose focus; if I say something different, I will engage them again. It's not always easy to make everything completely fascinating all the time, especially for an entire course worth of lectures. Hopefully with practice, it becomes easier, with more of the moments where people can zone in."



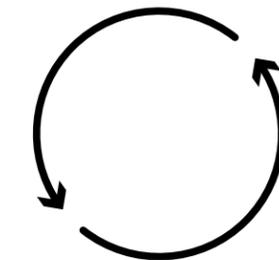
Humor

"Another way to engage people's brains is with literal humor and dropping jokes. It doesn't matter if they are funny. Tries can sometimes still be humorous, and it has the same effect of engaging the part of their brain that we want."



Make it a performance

"Even using tone of voice can be effective. Teaching is like performing or improv. In a way it's almost theater. One of the things that makes teaching exciting is seeing that engaging light bulb on people's faces that is unexpected or breaks the rules."



Rapid Switching

"Another strategy I call 'rapid switching' between different levels of technicalities. Occasionally, I do have to show some math because it is a math class, but I often switch between the mathematical ideas and showing how to think about a problem intuitively."

Nobel Laureate Jennifer Doudna at Berkeley IEOB



Jennifer Doudna

University of California, Berkeley biochemist Jennifer Doudna has been awarded the 2020 Nobel Prize in Chemistry, sharing it with colleague Emmanuelle Charpentier for the co-development of CRISPR-Cas9, a genome editing breakthrough.

CRISPR-Cas9 allows scientists to rewrite DNA — the code of life — in any organism, including human cells, with Jennifer Doudna unprecedented

efficiency and precision. The groundbreaking power and versatility of CRISPR-Cas9 has opened up new and wide-ranging possibilities across biology, agriculture and medicine.

In Spring 2019, Doudna spoke to students through SCET's A. Richard Newton Lecture Series about her work on the innovations in gene editing technology that will change our lives.

Watch Prof. Doudna's talk here: <http://bit.ly/jennifer-doudna-ieor>

Alum Tony Xu launches DoorDash IPO

Alum Tony Xu (B.S. 2007) founded DoorDash, a leading food delivery company in 2013. The company launched its initial public offering (IPO) in 2020. As of April 2021, the company has a market capitalization of close to

\$50 billion. Tony Xu visited IEOB's A. Richard Newton Lecture Series to share his insights in 2018 (video can be viewed here: bit.ly/tony-xu). Congratulations to Tony for his success with DoorDash!



Tony Xu



Kristin Johnsen

IEOB Alum Speaks at the Class of '21 Engineering Graduation

Berkeley IEOB alumna Kristin Johnsen was selected to be the commencement speaker at Berkeley Engineering's master's degree ceremony in May 2021.

A member of Berkeley Engineering's Advisory Board, Kristin is a global business leader with more than 30 years of experience in running multibillion-dollar companies, setting business-line

and product-line strategies, and driving digital transformation programs of change. She is renowned for strategy development and driving global execution models that deliver results. Through her commencement speech, Kristin encouraged students to collectively solve challenging problems that make a difference to our wider society, and to do so while working together.

The IEOB Department Welcomes Thibaut Mastrolia as a new Assistant Professor

by Keith McAleer



Thibaut Mastrolia will join the IEOB department as a new assistant professor in July 2021

The Department of Industrial Engineering & Operations Research is excited to announce that Thibaut Mastrolia will be joining the department as a new assistant professor starting in July 2021. Thibaut is joining from École Polytechnique, where he was an assistant professor in applied mathematics.

Thibaut's research interests lie at the intersection of stochastic control, game theory, finance and optimization. He is interested in developing new stochastic models and tools to solve optimization problems related to financial regulation, market microstructure and population dynamics.

When asked about what is most exciting in the field of IEOB right now, Thibaut responded, "Stochastic optimization with a large number of actors in financial or economic systems is one of the subjects of IEOB that I am most passionate about. It allows us to design mechanisms that guide the behavior of

several agents." Thibaut will teach INDENG 222 – Financial Engineering Systems I and INDENG 223 – Financial Engineering Systems II for the 2021-2022 academic year for masters and doctoral students pursuing professional or research careers, and wishing to learn more about topics and approaches for financial technology, credit risk and analysis, and pricing.

"Berkeley IEOB is a distinguished place to innovate. I am looking forward to working with bright and motivated students in a friendly atmosphere that promotes equity, diversity, and inclusion. All the ingredients are in place at Berkeley for exciting research and teaching in a nice environment," says Thibaut about what he is looking forward to most about joining Berkeley.

The Department and IEOB community wishes Thibaut congratulations on his appointment and looks forward to welcoming him to Berkeley!

Fung Institute celebrates 10 years with Lee Fleming

The Fung Institute was launched in January 2010 with Coleman Fung's vision of infusing the traditional student experience with real-world projects, interdisciplinary learning, and opportunities to learn about communications, teaming, and project management.

The Fung Institute for Engineering Leadership at UC Berkeley is excited to celebrate ten years under Lee Fleming's leadership. Lee, a Bay Area native, has spent most of his life inhabiting the space between business and engineering. He earned his bachelor's degree in Electrical

Engineering at UC Davis, followed by a master's in Engineering Management from Stanford University in the Honors Cooperative Program. He then received his PhD in Organizational Behavior in the Department of Industrial Engineering at Stanford. His dissertation focused on how diversity improves innovation, which he later implemented and applied into his classroom. He spent 13 years as a professor at the Harvard Business School before joining the Fung Institute.

To read more about Lee's contributions, visit bit.ly/fungfleming



Lee Fleming

MEET THE CLASS OF 2021: SENIOR SPOTLIGHTS



Arya Anand

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

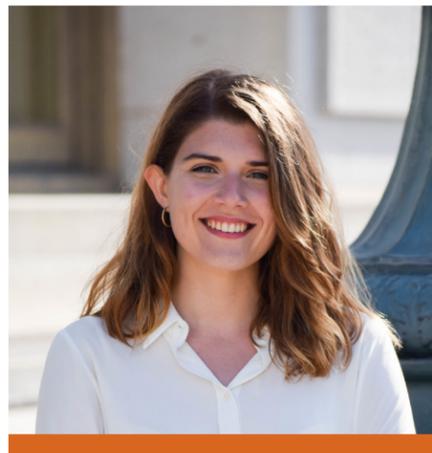
Berkeley IEOB has given me the unique skill of bridging the gap between business and engineering. Often in Industry, there is a huge gap in communication between departments which leads to inefficiencies of the company overall. Berkeley IEOB has trained me in both technical and interpersonal skills which allow me to create a sense of unity within a company and optimize operations. From my internship experiences at SpaceX, Startups, and the Navy, I have directly applied these skills and seen critical impacts on organization within just one summer.

What was your favorite IEOB class and why?

Human factors was by far my favorite class. This course not only taught us the technicalities of design, but did a deep dive into how to design a user centered products and how changes as small as a centimeter could have major impacts on ergonomics.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I will be attending the 5th year Masters in IEOB at UC Berkeley. My subsequent plans are yet to be confirmed, but I am confident that UC Berkeley has taught me to be successful in any field.



Fatmanur Aydin

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

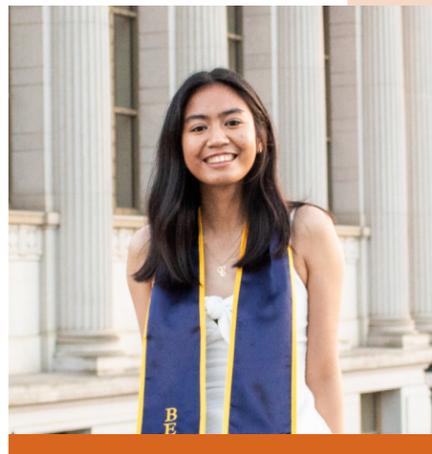
Berkeley IEOB really focuses on projects and group work. I had a lot of fun working with my class mates to solve real life problems. Working at V&A after a class at Etcheverry holds a special place in my heart.

What was your favorite IEOB class and why?

My favorite IEOB class was IEOB 173. Learning about the mathematical aspects of queuing and the optimization process of waiting times was fascinating. As what I learned had direct application to real life situations, I became invested in the class. But most importantly I loved the class due to Professor Zheng. He is one of the best professors I have ever had Cal and taught me so much. He is also currently my senior project advisor!

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I will be working at McKinsey Istanbul as a Business Analyst. I think my strong analytical skills due to my IEOB degree differentiated me from other candidates. I think my technical background and focus on efficiency and improvement will enable me to create strong strategies for the client. Using my skills I expect to create a real impact while working at McKinsey and hope to work in the education industry in the future.



Celestina Calarde

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

The late night study sessions at Kresge with my IEOB friends were unironically some of my favorite parts of not only IEOB, but my experience in Berkeley in general. You form a certain bond with people when helping each other understand IEOB concepts and study for you exams!

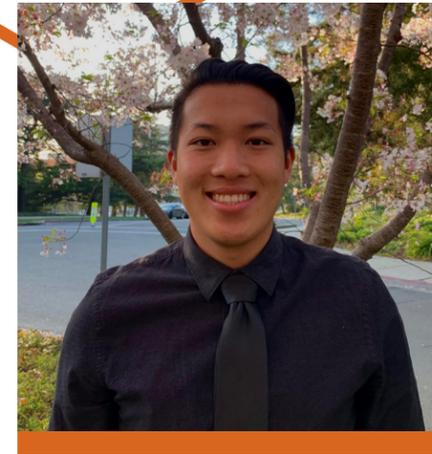
What was your favorite IEOB class and why?

IEOB 150: Production Systems Analysis! It's probably the most useful class I took going into industry since I work closely with manufacturing. Professor Yano was an amazing professor and I love that she gave us real life examples for the theories and techniques she presented in class. Tackling case studies was also a great way to navigate through reality's nuances and helped me improve my critical thinking skills.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

After graduating in December 2020, I began a two-year Global Purchasing & Supply Chain rotation program at General Motors. I use a lot of the concepts I learned from IEOB 150 and 153 since I work closely with materials allocation. I'm sure these classes will remain useful as I do my rotations in logistics and purchasing.

MEET THE CLASS OF 2021: SENIOR SPOTLIGHTS



Jonathan Chow

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

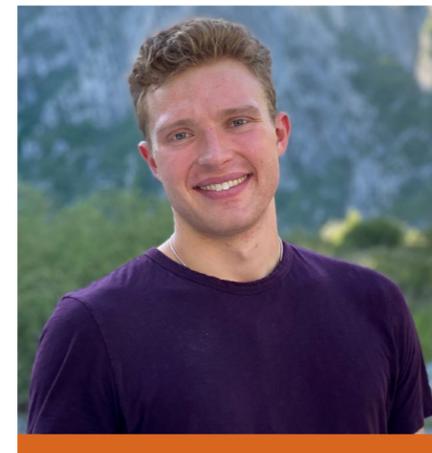
I will never forget taking my first semester of upper division IEOB courses. Although challenging, the passion that I developed for the coursework served as a vindication that I was exactly where I was supposed to be. On top of that, I am also really fond of the experiences that I had with my 115 and 180 class projects because they gave me a chance to apply classroom knowledge to real world problems.

What was your favorite IEOB class and why?

My favorite IEOB class was 172 because it taught me how to view the world from the lens of probability and uncertainty. These concepts form the pillar of many skills and analytical techniques used in the IEOB world, and learning about them under Professor Righter was an immense pleasure.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

Next year I will be returning to Cal for the 5th year IEOB M.S. program. After that, I plan to work in industry in the realm of Data Science/Analytics and Operations Research.



Justin Gerwien

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

I had a wonderful experience as an IEOB student at Berkeley. I learned a wide variety of skills and knowledge from so many incredible professors, and I made many great friends along the way. I had plenty of fun in my classes, but my best memories were the ones I made with my friends outside of class, exploring the Bay Area around Berkeley.

What was your favorite IEOB class and why?

My favorite IEOB class was IEOB 142. The class is an introduction to machine learning, and I loved learning about and applying advanced data analysis techniques. Professor Grigas also made the class a pleasure with his light-hearted humor and his clear and cogent explanations of many difficult concepts. I think this class should be a requirement for all IEOB majors because it is so valuable.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I will be working full-time as an associate engineer in the Affordability group at Aerojet Rocketdyne, a manufacturer of propulsion systems for both space and defense applications, in Redmond, WA. In this role, I will apply my knowledge of manufacturing improvement techniques and statistics to determine how to minimize costs while still achieving all the mission requirements for a propulsion system.



Kiana Go

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

I truly made some of my closest friends in the IEOB department. There's something empowering about feeling defeat then feat with your peers in all our shared, small IEOB classes.

What was your favorite IEOB class and why?

IEOB 172 (Probability and Risk Analysis for Engineers) was a challenging and rewarding class! Professor Righter was very patient and resourceful in explaining the topics to us.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I'm currently seeking data/business analyst roles and plan to return to get my masters after a few years working in industry! IEOB gives me the technical background to make data-driven decisions with the business impact and value in mind.

MEET THE CLASS OF 2021: SENIOR SPOTLIGHTS



Tushar Jain

Major: B.A. Operations Research and Management Sciences

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

All experiences at Berkeley IEOB have been nothing short of amazing. With IEOB, I not only managed to find a diverse peer group to optimize real world problems, but also found faculty members who acted as mentors at every step of the journey.

What was your favorite IEOB class and why?

Simulations in Enterprise Systems (IEOB 174) and Production Systems Analysis (IEOB 150) have been my favorite IEOB classes at Berkeley. IEOB 174 educated me about the importance of decision making in service businesses and IEOB 150 made me realize that the world functions on a healthy supply chain. Additionally, both Prof. Zheng and Prof. Yano went out of their way to mentor on personal projects and career plans.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I'll be joining IQVIA as an Associate Consultant. The skill of modularity would help me a lot. I would gain advantage from breaking down a bigger problem into smaller problems and solving each one of them individually to arrive at a bigger solution.



Siddharth Kumaran

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

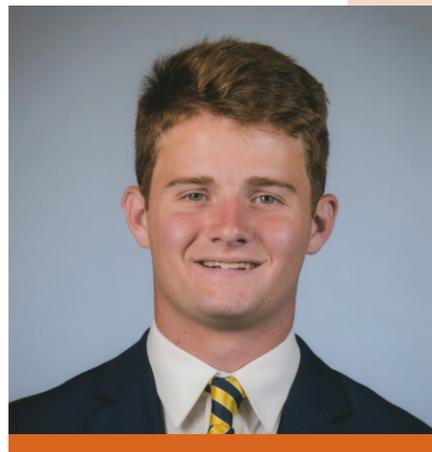
Studying IEOB at Berkeley has been an amazing experience. The close-knit faculty and student body was a great way for me to make meaningful connections with my professors and peers. To be honest, some of my best memories have been casually meeting new IEOB students during office hours and getting to know them as we were working on projects and problem sets.

What was your favorite IEOB class and why?

My favorite class so far has been IEOB 153: Supply Chain Management and Logistics Network Design. I think in this day and age, many of us, including myself, take for granted the intricate process that goes behind ordering something online or finding the things we need in a store. However, this class and Prof. Leachman's detailed lecturing helped me greatly understand just how much planning and creative engineering goes behind managing supply chains and designing logistics networks. After having taken this class, I truly see the importance of why such a domain exists and how it makes our world function day in and day out.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I will be pursuing a 5th-year M.S. for IEOB at Berkeley in Fall 2021. This summer, I am re-interning at Amazon. After grad school, I hope to get a full-time industry job as a Data Scientist or ML Engineer.



Chris Landgrebe

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

Forming such close friendships with other IEOB classmates, due to the small nature of the classes and program as a whole.

What was your favorite IEOB class and why?

IEOB 142 because you get to take large sets of data and create predictive models that make use of all of that information to make accurate predictions.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I'm going into the IEOB 5-Year MS program!

MEET THE CLASS OF 2021: SENIOR SPOTLIGHTS



Carol Lee

Major: B.A. Operations Research and Management Sciences

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

IEOB classes provide a lot of opportunity for group work, and I've had so much fun getting to know others through those projects. The late night study sessions I've had with friends are definitely some of my favorite memories.

What was your favorite IEOB class and why?

My favorite class was IEOB 142, taught by Professor Grigas. This class was my introduction to machine learning and it was incredibly fascinating. I decided to pursue a career in data science as a result of this class, so it will always hold a special place in my heart.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

After graduation, I will be joining the treasury team at Salesforce as a data science and strategy analyst. Throughout these past four years, I've gained knowledge in the intersection of mathematics, programming, and business that I am very grateful for and am certain will be useful in my new role and beyond. IEOB professors have done an amazing job of teaching not just theories, but also practical applications, and it's been extremely valuable learning how to apply these quantitative methods and problem-solving skills to real-world scenarios.



Maddie Mikschl

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

My best memories have been late study nights with classmates! Dear friends have been made in the depths of the engineering library.

What was your favorite IEOB class and why?

IEOB 151, Service Operations Design and Analysis, was my favorite class because of its focus on the experiences of the individuals within the industries we study. Learning how to optimize efforts of service workers or reduce waiting times of medical patients brought a personal touch to already fascinating algorithms.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I will be continuing my studies for another year after graduation through the IEOB MS program here at Berkeley! I am so excited to further my education in this field and in this department. I cannot thank IEOB faculty enough for supporting me in my academic career and hope to use my education to create more equitable and sustainable outcomes within large-scale industries.



Mustafa Mirza

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

A great aspect of Berkeley IEOB is the small and close knit community. I absolutely loved seeing a lot of the same students in all my classes, and so made many close friends in IEOB. This community helped me through my classes via study groups and the like and made studying IEOB an enriching experience. Furthermore, I thought some of the project driven classes such as INDENG 171 or INDENG 170 were some of the most memorable, as we worked with teams on big ideas. It was almost like working in a startup!

What was your favorite IEOB class and why?

INDENG 171. After being assigned in completely random teams, we were tasked with creating our own companies which solved solutions to complex problems. This was not only challenging but highly stimulating for someone wanting to know how a business is run. Everything revolved around your team which meant learning team-building was key. I will never forget the skills I learnt here.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I will be joining a footwear manufacturing firm- Mirza International Limited, in India, run by my family. I see the technical mindset that IEOB has given me coupled with a lot of the teamwork I did helping me in business development, from sales all the way down to running the factory.

MEET THE CLASS OF 2021: SENIOR SPOTLIGHTS



Ambika Mukherjee

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

My favorite IEOB memory is when we visited the Tesla factory with the Institute of Industrial Engineers (IIE). They used to plan the most amazing socials (hiking, pumpkin carving, hanging out on the glade) and I made some of my best friends through the IEOB department. Another plus was that the IEOB office always had candy or cookies for us. The IEOB community is certainly one of the best on campus!

What was your favorite IEOB class and why?

My favorite class was stochastic processes (IEOB 173) with Prof. Zeyu Zheng. I loved how he taught such difficult probability concepts in a way that was simple to understand and apply. I found the course to be the most interesting and rewarding class I took at Berkeley.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I'll be joining a management consulting firm in New York. I foresee myself using the strong mathematical and analytical foundation that IEOB provided. IEOB also trained me to feel very comfortable around large data sets and seeing a story within numbers – that is key to making good recommendations at a consultant.



Albert Qian

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

My IEOB experience was built on being apart of two engineering honors societies: TBP & APM. Those are where I first made friends with other IEOB majors and learned about which classes to take and what career paths there were. I loved finding new IEOB friends from these clubs that paid off in my junior and senior year classes. I enjoyed Grad School Panels and infosessions that brought something new and engaging outside the classroom.

What was your favorite IEOB class and why?

IEOB 173: I love probability and that was the first class to introduce the endlessly intriguing topic of Markov Chains.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

Working for JP Morgan, and I hope to continue applying data science and optimization techniques to financial technologies and products.



Priyan Sathianathan

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

The Berkeley IEOB department has been a persistent source of warmth and support at all times. With faculty who balance brilliant pedagogy with enthusiasm for student mentorship, to staff who excel at keeping the IEOB community tightknit, embracing environment, the Berkeley IEOB department has afforded me a private school experience at the best public university.

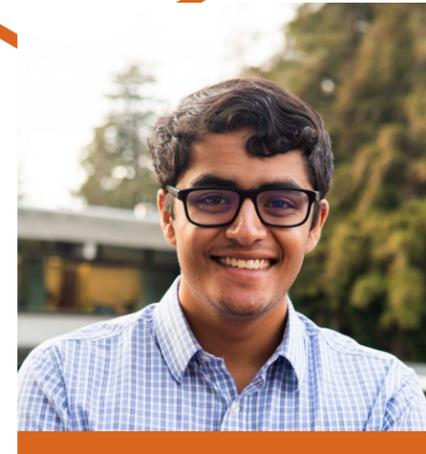
What was your favorite IEOB class and why?

My favorite class was IEOB 174, Simulation for Enterprise-Scale Systems. The class truly felt like the culmination of several classes in probability and stochastic theory, and gave me an applied experience that really has changed how I interpret and problem-solve real-world situations.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

I plan to join SpaceX's Process Development team as an Associate Engineer, and continue my education as a Master's student of Industrial Engineering at Columbia University. My IEOB education has afforded me the ability to provide technical approaches and solutions to big-picture problem areas like organizational management and overarching business operations. I know already how invaluable it was to learn this skill so early, and how central it will be for the rest of my career.

MEET THE CLASS OF 2021: SENIOR SPOTLIGHTS



Roshan Srinivasan

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

My best memories were almost setting my apartment complex on fire, walking around Berkeley campus by myself at 3am in the morning for fun, and playing Smash until 6 or 7am with friends.

What was your favorite IEOB class and why?

IEOB 173 or 165. Both were cool classes with great professors (Zheng and Aswani respectively).

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

Product @ Roblox + maybe moonlighting some side gigs/businesses/startups in supply chain. IEOB like all engineering fields teaches you to be analytical but keep in mind that at most maybe 20% of what you learn in school is stuff you can actually apply in the real-world.



Sarina Xin

Major: B.S. Industrial Engineering and Operations Research

Tell us about your Berkeley IEOB experience. What were some of the best memories you had here?

"Studying" with my IEOB friends until random hours of the night on campus.

What was your favorite IEOB class and why?

IEOB 166 because it was different from anything else I'd ever learned and I really enjoyed the content.

What are your post-graduation plans? How do you see skills from IEOB being used in your future?

After graduation, I will be joining Accenture full-time as a consulting analyst. Since most IEOB classes require a group project, I can see how learning to apply the theory covered in classes to a real world problem prepares me to tackle most anything I may encounter during my career.

PHD SPOTLIGHT

Alfonso Lobos



Graduating with a Ph.D. in Spring 2021, Alfonso Lobos is now working as a data scientist in the Microsoft AI Development Program (MAIDAP) helping different teams at Microsoft speed up their AI ambitions. At Berkeley, Alfonso worked with Professor Paul Grigas on optimization, machine learning, and online advertising topics.

ALUMNI SPOTLIGHTS



Ebru Kasikaralar

PhD Student at The University of Chicago Booth School of Business

What was the most important thing you learned while studying at Cal?

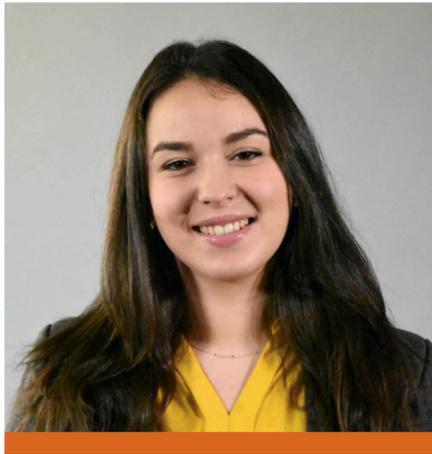
Cal is a place of harmony where many people from various backgrounds come together to pursue their paths. Therefore, the most important thing I learned while studying at Cal is the value of brain-storming, empathy and tolerance.

What was your favorite IEOR class and why?

My favorite IEOR class was IEOR 180 (Senior Project) since in that class we had a chance to use everything we learned throughout the years to come up with a project that has a real world application and influence.

What did you do after graduating from Cal?

I went to University of Chicago to pursue PhD in Management Science& Operations Management.



Ines Mezerreg

Machine Learning Scientist/ Computer Vision at Grabango

What was the most important thing you learned while studying at Cal?

This would be everything I learned from others, coming from all over the world with their own background and experiences.

What was your favorite IEOR class and why?

IEOR 242 because Paul Grigas is amazing.

Do you have any advice for current IEOR students?

Organization is key to success. Optimize your schedule and always allow some time for you to relax and breathe, no matter how busy you might be.



Lisa Hom

Chief Product & Merchandising Officer at KiwiCo, Inc.

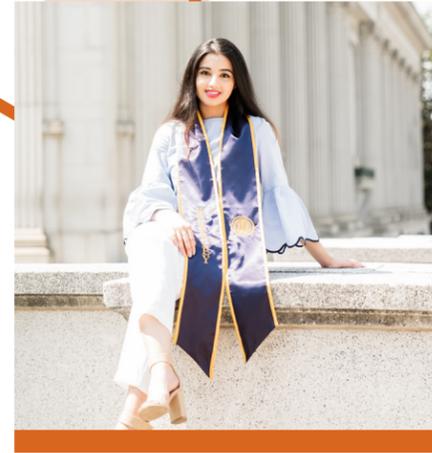
What was your favorite IEOR class and why?

I loved the database class that I took as part of the IEOR program. I remember building my first database during an internship for an Industrial Engineering Consulting firm. It gave me the foundation for understanding a lot of the systems that were used at larger companies. At one of the startups I worked for, I ended up managing the Technology team. And my understanding of coding and databases came in very handy as we implemented a new ERP system. Last year at KiwiCo, I brought in Air Table (a web-based database system) to transition the team off Google Sheets and scale our systems. Currently, I am also involved with evaluating new ERP and WMS systems for KiwiCo as a whole. That database class that I took at Cal still stays with me today and is still very relevant!

Do you have any advice for current IEOR students?

Take the time while you are at school to learn as much as you can about different jobs and industries. Find time to network with alumni, set up informational interviews with folks to understand what people do day-to-day and what the career paths might be. Get hands-on job experiences through internships and summer jobs. And don't worry about making a "wrong" job choice - it all works out in the end and you will find your way to a job and career that you love!

ALUMNI SPOTLIGHTS



Rameen Saeed

Industrial Engineer Intern at Siemens

What was the most important thing you learned while studying at Cal?

The people you surround yourself with make a big impact on who you become and the ambitions & goals you set for yourself.

What was your favorite IEOR class and why?

IEOR 172 Probability and Risk Analysis is the building block of the major.

Do you have any advice for current IEOR students?

You chose the right major! There is so much you can do with a degree in IEOR and a lot of flexibility when deciding which industry you would like to work in.



Mert Gurkan

Business Analyst at McKinsey & Company

What do you miss most about being a student at Cal?

Having conversations and working on projects with fellow brilliant students. I also have to mention spending time at BAMPFA, and being able to attend events organized by SF Film Society.

What was your favorite IEOR class and why?

Portfolio and Risk Analytics (IND ENG 224). I thought overall course and teaching method was a great combination of theory and real-world application. I have actually had opportunities to use most of my knowledge I gained from this class after I graduated.

Do you have any advice for current IEOR students?

Very briefly, appreciate your year/s at Cal. I know that all the classes and assignments can be stressful from time to time, but in the end what's left is always the good memories, even after only 3 years.

PhD SPOTLIGHT

Xu Rao



Graduating with a PhD in Fall 2020, Xu Rao is now working with Google as a data scientist, focusing on datacenter capacity planning. At Berkeley, Xu worked on network flow algorithms and approximation algorithms design with Professor Hochbaum.

AWARDS



Best Student Paper Award Finalists at IEEE Conference
Salar Fattahi, Cedric Josz, Javad Lavaei, Reza Mohammadi, Somayeh Sojoudi



Best Student Paper Award at KDIR 2020
Jonathan Bodine, Dorit Hochbaum



2021 Duryea Fellows
Mengzi (Amy) Guo, Mo Liu



Best Student Paper Award at 2020 American Control Conference
Elizabeth Glista, Javad Lavaei, SangWoo Park, Somayeh Sojoudi



Best Paper Award at Winter Simulation Conference 2020
Haoting Zhang, Zeyu Zheng



2020 Jengyee Prize, Leadership for a Better World
Nicholas Foo, Sang-Min Kim



2020 Energy, Natural Resources and the Environment Student Best Paper Award & Best-of-the-Best Conference Paper at the 2020 Power & Energy Society General Meeting
Salar Fattahi, Javad Lavaei, Julie Mulvaney-Kemp



2020 INFORMS Undergraduate Operations Research Prize Finalist
Anna Deza



Winner of the 2020 INFORMS Junior Faculty Interest Group Paper Competition
Paul Grigas



INFORMS Optimization Society Student Paper Prize
Yingjie Bi



IIT Kanpur Young Alumnus Award
Barna Saha



Best Paper Finalist at the 2021 American Control Conference
Murat Arcak, Yuhao Ding, Javad Lavaei



The Fung Institute's Most Innovative Project Award
Pablo Amor, Martin Banet-Rivet, Ruobin Liu, Alex Wolcott





CLASS OF 2021 GRADUATES



B.S. IEOR

Vedant Agarwal	Leah Maria Kochendoerfer	Gabrielle V Prindle
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Sameer Pranav Annamraju	Ege Kucukcolak	Rameen Saeed
Jessica L Au	Siddharth Kumaran	Akhil Sai Sagar
Fatma N Aydin	Nikhil Anand Kuppuswamy	Wendy Samayoa
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Sherren Kashmir	Nikhil Patel	

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Jay Jaehyun Choi	Tushar Jain	William Wei Teng Wu
Nathan Jeremie Fillingim-Selk	Carol Lee	Yilin Ye
Manasi Prasanna Hardikar	Casey H Li	
Jayson Gabriel Harriott	Yanwei Liu	

Ph.D.

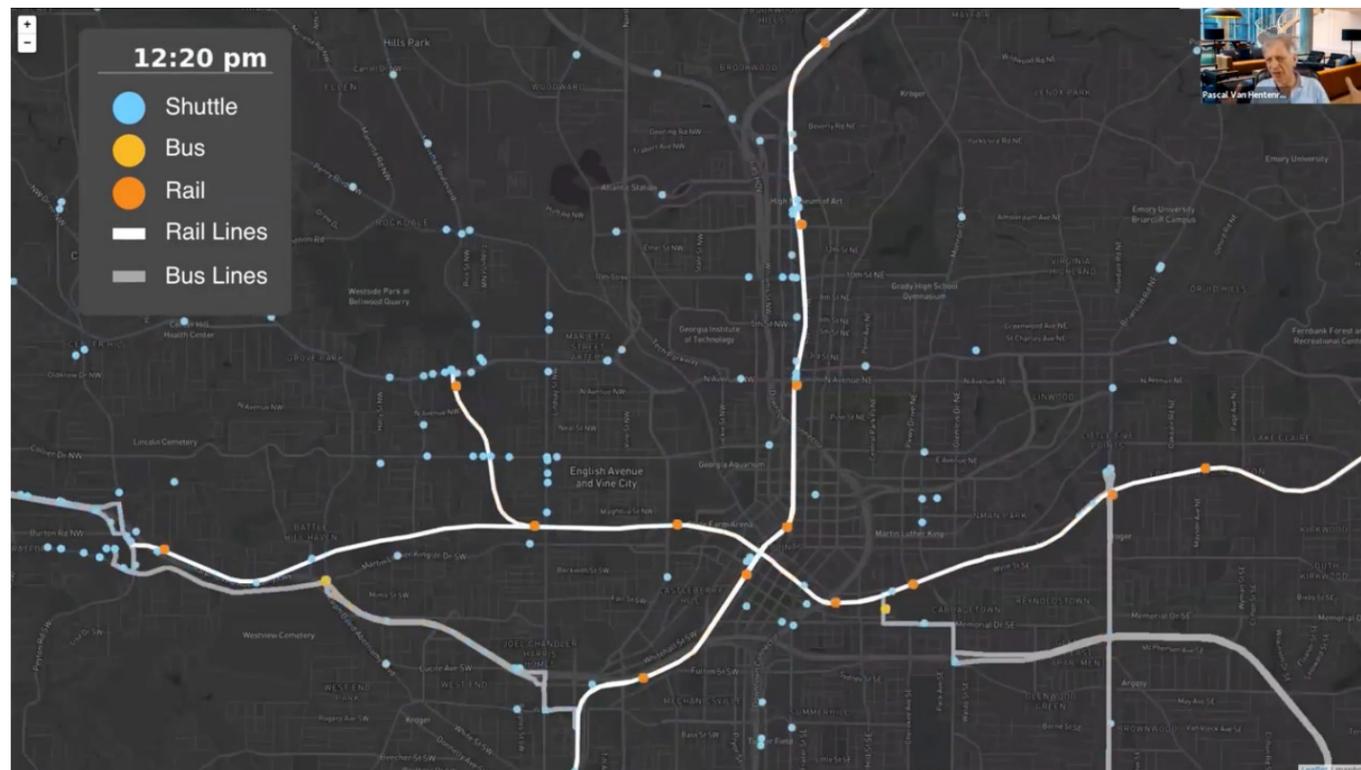
Erik Bertelli	Alfonso Lobos Ruiz	Xu Rao
Haoyang Cao	Cristobal Pais	

M.S.

Daniel Campbell	Michelle Liu	Stephen Sloan
Yiwen Chen	Ahmad Masad	Jieqiong Wang
Zekai Fan	Pablo Pineiro Cruz	Yi Eddi Xu
Hongyu Jin	Xinyu Ren	Haoting Zhang

M.Eng

Shihanah Alhusayni	Malo Le Magueresse	Paris Sheu
Mathilde Bachy	Nanxi Li	Anqi Shi
Tianyuan Cao	Wenxi Li	Jiayue Tao
Yuhao "Alex" Chen	Xinyi Li	Ishan Tikku
Tingting Chen	Shengfeng Li	Vishnu Swaroop Vijaykumar
Yuying Chen	Zeyu Li	Chen Wang
Ming Yu Chi	Zhengdong Li	Yilin Wang
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Ziwen Jiang	Moraldeepsingh Sachdeo	Fengyu Zhu
Lemin Kong	Armand Sauzay	Hongdi Zhu
Pak Lai	Yuyang Shao	Zhao Zou
Sixtine Lauron	Chengwu Shen	Yiyaqi Zuo



Pascal Van Hentenryck, A. Russell Chandler III Chair and Professor in the H. Milton Stewart School of Industrial and Systems Engineering at the Georgia Institute of Technology, presenting "End End-to-End Learning and Optimization for Engineering Applications" at the Spring 2021 IEOR Seminar Series.

John Birge

University of Chicago

Spatial Price Integration in Commodity Markets with Capacitated Transportation Networks

bit.ly/ieor-sem-jb

Noah Gans

University of Pennsylvania - Wharton School

Overbooking with Endogenous Demand

bit.ly/ieor-sem-ng

Jianqing Fan

Princeton University

Analysis of Deep Q-Learning

bit.ly/ieor-sem-jf

Luyi Yang

UC Berkeley

To Brush or Not to Brush: Product Rankings, Consumer Search and Fake Orders

bit.ly/ieor-sem-ly

Jamol Pender

Cornell University

Beyond Safety Drivers: Staffing a Teleoperations System for Autonomous Vehicles

bit.ly/ieor-sem-jp

Amy Cohn

University of Michigan

Solving Real-World Multi-Criteria "Optimization" Problems in Healthcare Scheduling

bit.ly/ieor-sem-ac

Jing Dong

Columbia University

Prediction-driven surge planning with application in the emergency department

bit.ly/ieor-sem-jd

Pascal Van Hentenryck

Georgia Institute of Technology

End-to-End Learning and Optimization for Engineering Applications

bit.ly/ieor-sem-pvh

THANK YOU!



IEOR Department Benefits from a New \$1 Million Endowment to Support Graduate Students

The IEOR Graduate Support Fund reached \$500,000 in June, 2021 and was matched by the estate of Marjorie Jackson to establish a \$1 million endowment that will pay each year to help graduate students have the support they need to make new discoveries, learn the latest tools and approaches, and teach the next generation of undergraduate students studying industrial engineering & operations research. Thanks to alumni for making 479 contributions to support graduate students.



Applications open for the first cohort of the IEOR Master of Analytics Program this fall 2021.

Learn more at <https://ieor.berkeley.edu/academics/master-of-analytics/>

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