bridging engineering and medicine through academic and research affiliations in a world class city
MESSAGE FROM THE DEPARTMENT HEAD

Dear Friends of UIC Bioengineering,

First of all, I hope you are healthy and safe during this difficult time, and I extend sincerest condolences to any of you who have suffered losses during this pandemic, personally or through friends and family.

This is our fifth annual report, providing a snapshot of activities and accomplishments of our students and faculty over the past academic year. In spite of the pandemic, many metrics related to education and research are up this year, including archival peer-reviewed journal publications and peer-reviewed external grants for both educational innovations and research projects.

As always, thank you for your support of our continued pursuit of excellence. Gifts targeted to the department continue to help us achieve our strategic goals and could include opportunities to endow a named professorship, scholarship, laboratory, or special facility or program. With your generous support to the department, we have been able to increase the number of scholarships we can offer to deserving incoming undergraduates. For more information on giving, visit engineering.uic.edu/support. In addition to financial support, I know that the network of UIC BioE alumni and friends will continue to help our students find internship and employment opportunities.

As I write this, we are welcoming our students to campus (most virtually) for the start of the fall 2020 semester. I’ll end my message in our annual report with a part of the note I recently sent to our students. Its sentiments are extended to all of you.

Dear UIC Bioengineering Students, returning and new,

"Welcome to a new school year under challenging times. Our faculty and staff have been working extra hard this summer to prepare high quality, mostly online instruction as the pandemic continues into this Fall semester. We look forward to meeting (for now virtually) and getting to know or become re-acquainted with each and every one of you. We understand that, especially for those of you who are new, there are added barriers to start this year in becoming fully engaged with everything bioengineering has to offer. Our active student organizations are a big part of many of our students’ experience, providing opportunities to utilize and expand the skills you are learning in the classroom as you compete on teams in national design competitions, develop technological innovations to improve the lives of others in collaboration with charitable organizations, and have the opportunity to socialize with your fellow students outside the classroom, from freshmen through seniors and graduate students, often making friends for life and professional connections that will help you in your career. Please check your email for upcoming opportunities to become acquainted, for now virtually, with these organizations, identifying which may interest you the most. Some cut across multiple engineering and other disciplines. Several are housed primarily in bioengineering. Below, I provide information and and a link to one such upcoming event. We’ll also keep our website (bioe.uic.edu) up to date with all the latest news and event information that intersects with bioengineering. And, please pay attention to occasional email updates from our director of student affairs, Ms. Susan Lee. I wish you all a great semester and look forward to a time in the hopefully not too distant future when I can welcome you in person. Hang in there and take care of and be patient with one another and yourself. We can all get through this together."

Best wishes,
Tom

PhD student Guangying Ma is seen here reflected in the functional optical coherence tomography (OCT) and OCT angiography (OCTA) system custom-designed in the Biomedical Optics and Functional Imaging Laboratory.

The OCTA can provide three-dimensional mapping of retinal vasculature at capillary level resolution in the eye. In coordination with retinal stimulation and digital data processing, the functional OCT also can provide a platform to conduct intrinsic optical signal imaging for objective opto-retinography of retinal physiology, promising advanced study and diagnosis of eye diseases that are known to produce retinal neurovascular coupling defects.

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bioe.uic.edu
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BioE undergrads win accolades for new wearable device to treat bruxism

Sixty-six million Americans chronically grind or clench their teeth—and most of them don’t know that they do it. A team of undergraduate bioengineering students are developing a wearable device to help people break the habit.

Allison Bayro, Analise Hernandez, and Brandon Sakas worked on creating a wearable oral device called BruxALERT that uses sensors to alert users when they are clenching or grinding, a habit called bruxism that can lead to chronic headaches, jaw soreness, receding gums, and lesions of the teeth.

“This is an important feature as only 3 percent of [people] who suffer from bruxism are aware of this behavior and can consciously stop the habit,” Bayro said. She added that current products on the market such as night guards only address symptoms such as enamel wear but do not target the root of the problem. To clinically test the device, the students began working under the supervision of Professor Hananeeh Esmailbeigi in the Wearable Technology & Sensory Enhancement Laboratory. Nicholas Marjanovic, a PhD candidate in the department of bioengineering, is also advising the group. Esmailbeigi said the wearable device sends a signal to an app during instances of clenching or grinding, and the app then collects the data and allows users and their doctors to track the progression of this condition over time.

The team received a $5,000 grant from the VentureWell Stage E-Team Program, training that could help the students take their invention from the lab to market. They were also one of the finalists from the 225 applicants at the 2020 Johns Hopkins Healthcare Design Competition this spring. “Our device is in the early stages of development, and the competition was of high caliber. It was an enormous honor to be part of it,” Esmailbeigi said.

To prepare for the final round of the Johns Hopkins Healthcare Design Competition, which was held virtually this year, the team had to create a seven-minute pitch covering topics such as the intellectual property, research and development strategy, and business model as well as preparation for an eight-minute question-and-answer session. Hernandez said this was a nerve-wracking and exciting experience because it was their first time giving a virtual, professional presentation.

“Some of the other projects at the competition were well developed and were being prepared to be on the market,” Hernandez said. “It was interesting to see this because hopefully, our project will get to that phase in the future. It was a great learning experience overall, and I feel more confident in presenting our project and answering any questions moving forward.”

Despite the inability to work in the laboratory due to social-distance rules, the team practiced together every night for weeks and continued to work on the prototype and software at home. Bayro said the project and the competition provided invaluable experience for the team. “This experience was the culmination of my education as I believe that all the learned technical, professional, and soft skills prepared me to partake in the Johns Hopkins Competition,” Bayro said. “I thoroughly recommend that students participate in opportunities like these to apply such knowledge and skills as well as to expand their professional network.”

As part of the VentureWell grant, the team will receive virtual training on how to bring an invention to the marketplace later this year and will be able to further develop their prototypes. They will then have the opportunity to apply for Stage II, which is a $20,000 grant. All three students plan to continue working in Esmailbeigi’s lab on BruxALERT the next academic year. “This was really exciting, as it was also the same week that we were informed about the upcoming competition and answering any questions moving forward. “

Kotch named “Notable Woman in STEM” by Crain’s Chicago Business

Finding your calling can take time. That was the case for Mila Kotche, now a clinical professor in the Richard and Loan H. Department of Bioengineering, who was named as one of Chicago’s “notable women in STEM” by Crain’s Chicago Business. Kotche earned her undergraduate degree in engineering but never intended to be a classroom instructor. She worked in industry and only started teaching part-time for the sheer pleasure of it.

In fact, she discovered that she loved teaching so much that she decided to go back to school for a PhD in bioengineering—a degree that would allow her to mentor and teach young engineers full-time. Kotche’s passion and enthusiasm for teaching and her students helped her to attract the notice of Crain’s.

The “notable women in STEM” list spotlights accomplished female leaders and role models in science, tech, engineering, and mathematics.

I was really surprised and thrilled and, frankly, pretty humbled,” Kotche said. “I feel like I have the best job in the world. I am grateful every day to do challenging work that I love, and to be recognized is incredibly flattering.” Kotche received her undergraduate degree in general engineering from the University of Illinois at Urbana-Champaign and a master’s degree in mechanical engineering from UIC. She then entered the workforce. In her spare time, for “fun,” she started teaching at Crain’s small four-year schools at night, but she could only teach math and physics because she lacked a terminal degree in engineering.

“I found that I absolutely loved being in the classroom but kept thinking, I should be teaching engineering courses, so I should go back to school myself,” Kotche said. “After nearly 10 years, I ended up coming back to UIC to earn a PhD with the goal of getting into the classroom to help prepare engineering students for industry and beyond.” She hit the ground running as an adjunct in bioengineering in 2011, moving from visiting professor to full-time clinical faculty member. Kotche spent the last decade going above and beyond for her students, spearheading several programs to help improve their experiences. She helps to lead the Freshmen Engineering Success Program, runs a Clinical Immersion Program that gives bioengineering students firsthand experience in a medical environment, and works with the College of Medicine on Innovation Medicine, which aims to produce physicians who can solve clinical problems with creativity and technology.

One of the projects Kotche is most excited about is Bioengineering Experience for Science Teachers, which she founded with UIC College of Education Professor Jennifer Olson. The two received a National Institutes of Health grant to bring high school teachers from Chicago Public Schools to spend the summer working in bioengineering labs with students and faculty. The CPS teachers then take what they have learned and create curricula for their own classrooms. “It has been really gratifying because we focus on making sure we have a diverse group of teachers that teach students from all kinds of socioeconomic backgrounds and all the different kind of schools in the city: neighborhood, magnet, selective enrollment,” Kotche said. “We know our program directly impacts how teachers teach in their classrooms. We want to give them exposure to what bioengineering is so that they can pass this knowledge on to their students through lessons and activities. Ultimately we hope to encourage students to pursue bioengineering at UIC.” Most recently, in response to the coronavirus crisis, Kotche collaborated with two colleagues from UIC’s MakerSpace production facility to design and produce face shields to protect local frontline healthcare workers. Throughout her teaching career, Kotche has strived to be a strong female mentor for all of her students.

“Looking back at my own education, I can remember how few women were in my classes, and even fewer were taught by women,” she said. “I want to help provide role models to my students, not just for our female engineering students, but also for our non-engineering students, so they can see a female in a role-model situation.”

Kotche added that it has been really encouraging to see all the progress that has been made in the past few decades, partially in bioengineering, where women make up generally half of the undergraduate population. She said there is always more work to do, though, as women are less represented in engineering as a whole. “On top of that, there is a lack of representation of underrepresented minorities,” Kotche said. “We want to continue to be part of this conversation and help improve the experiences. She helps to lead the Freshmen Engineering Success Program, runs a Clinical Immersion Program that gives bioengineering students firsthand experience in a medical environment, and works with the College of Medicine on Innovation Medicine, which aims to produce physicians who can solve clinical problems with creativity and technology.

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Despite the massive leaps and bounds scientists have made in understanding the natural world around us, some places and forces remain a mystery due to the intense pressure of their environment. However, UIC researchers have unlocked a way to study these harsh environments right here in the lab.

Despite the massive leaps and bounds scientists have made in understanding the natural world around us, some places and forces remain a mystery due to the intense pressure of their environment. However, UIC researchers have unlocked a way to study these harsh environments right here in the lab.

“Interdisciplinary GLC studies combine materials science, physics, and chemistry to deliver unprecedented characterization capabilities on aqueous dispersions of nanoparticles, proteins, and bacteria,” he said. “At UIC, we have cultivated the art of GLC microscopy, from graphene production to GLC fabrication and high-resolution electron microscopy and spectroscopy through the years.”

“Diversity helps increase talent, innovation, and creativity in bioengineering, which will ultimately help us address some of the biggest challenges in medicine and healthcare.”

Despite the massive leaps and bounds scientists have made in understanding the natural world around us, some places and forces remain a mystery due to the intense pressure of their environment. However, UIC researchers have unlocked a way to study these harsh environments right here in the lab.
BioE alumna trades Fulbright opportunity for WUSTL postdoc

Seven UIC students and alumni are among more than 2,100 U.S. citizens offered the opportunity to study, conduct research, and teach abroad for the 2020-2021 academic year through the Fulbright U.S. Student Program, including a recent alumna from the Richard and Loan Hill Department of Bioengineering. The Fulbright Program is the flagship international educational exchange program sponsored by the U.S. government and is designed to increase mutual understanding between the people of the United States and people living in other countries. Due to the COVID-19 pandemic, Fulbright programs are either being delayed or cancelled, with the status of some countries yet to be determined. "Fulbright would have given me the opportunity to experience oncology research and patient care from a completely different healthcare system," Rahmani said in the piece. Rahmani received the Fulbright offer due to uncertainty and additional authors on the paper from UIC include Soroosh Sharifi-Asl, Pavel Rehak, Petr Kral, Constantine M. Megaridis, and Reza Shahbazian-Yassar. Rahmani and the team at Northwestern Memorial Hospital were able to successfully perform the surgery and help Harry through his recovery to restore his vision. “It’s one of those successes that keeps you going because you are making a difference in a kid’s life,” Rahmani said in the piece. Rahmani received the opportunity to experience oncology research and patient care from a completely different healthcare system. "Nevertheless, I am deeply grateful for the opportunities at Washington University as the education and mentoring have been wonderful and in-line with my long-term goals." The award was offered to Suvidee (Suri) Pachigolla for the 2020-2021 year. Pachigolla is a medical student at the UIC College of Medicine at Peoria. She applied for a 10-month Fulbright research position in Villigen, Switzerland, where she planned to study novel pediatric cancer therapies at the Center for Proton Therapy at Paul Scherrer Institute. Unfortunately, she declined the Fulbright offer due to uncertainty and program truncation as a result of the COVID-19 pandemic. With hopes of pursuing a career where she could apply her engineering skills to improve cancer therapy, she continued her research path and accepted a mentored research training position at Washington University in St. Louis in the Master of Science in clinical investigation program. Pachigolla, who earned a bachelor's degree in bioengineering from UIC in 2017, is working with her mentor, Perry Grigsby, to build a deep learning model to correlate magnetic resonance imaging with treatment failure. Pachigolla is a native of Schaumburg, Illinois. She plans to complete medical school in 2022 and pursue specialty training in radiation oncology. Afterward, she hopes to become an academic physician and continue caring for cancer patients while simultaneously carrying out image analysis-based treatment outcomes research.

BioE alumna profiled on WGN for vision-saving story

A Richard and Loan Hill Department of Bioengineering alumna was recently featured in a WGN news report for helping restore the vision of an 18-year-old patient with special needs. Safa Rahmani, an assistant professor of ophthalmology with Northwestern University Feinberg School of Medicine, is a retina specialist and member of the Lurie Children's Surgical Foundation. The article describes how Rahmani was able to help Margaret Panas and her son Harry Panas, who had a severely detached retina. Harry has been diagnosed with autism and is non-verbal, and the family ran into trouble finding a doctor in Wisconsin to perform the desperately needed surgery. Rahmani and the team at Northwestern Memorial Hospital were able to successfully perform the surgery and help Harry through his recovery to restore his vision. “It’s one of those successes that keeps you going because you are making a difference in a kid’s life.” Rahmani said in the piece. Rahmani received both her bachelor’s and master’s degrees in bioengineering at UIC in 2004 and 2007, respectively. She worked closely with Associate Professor John Hetling and his Neural Engineering Vision Laboratory during her time in the department.

Hetling said Rahmani was the first graduate of the Northwestern Ophthalmology residency program to ever get into the Harvard Vikingsrot Fellowship program. Rahmani also helped co-found RetMap, a Chicago-based company that is working to bring vision-saving technology to the market to help patients with progressive eye disease by providing more effective screening, more accurate diagnosis, and more informative monitoring during disease management. Hetling, who is the CEO of RetMap, said, “Safa played a major role in discovering and developing those technologies.”
Doctorate in Bioengineering

Yazan Mohamed Hamzeh Abdel Majied
Computational Modeling to Predict and Affect Recovery After Stroke
Advisor: James Patton

Minhaj Nur Alam
Quantitative Analysis and Automated Classification of Retinal Images
Advisor: Xinrong Ye

David James Banner
v’ED of Biologically Induced Reactions: Kidney Stone Mineralization and E. coli-Fiber Interactions
Advisor: Ttoki Shokuhfar

Shreyas Ghosh
Quantum-Dot Based Aptasensors for the Detection of Biomolecules with Related Raman/SEIRS Spectral Analysis
Advisor: Michael Stroscio

Martina Guidetti
Understanding Magnetic Wave Propagation in Anisotropic Samples through Magnetic Resonance Elastography
Advisor: Thomas Roylan

Grant A. Hartung
Multi-Scale Simulations of Cerebral Blood Flow and Oxygen Exchange for the Entire Mouse Brain
Advisor: Andreas Linzer

Yiming Lu
Quantitative Investigation of Stimulus-evoked Intracellular Optical Signal Change in Retinal Photoreceptors
Advisor: Xinrong Ye

Sheyyn Majumdar
Development of Magnetic Resonance Elastography for Assessing Small Regions of Interest in Marine Models
Advisor: Christian Knoll

Surya Narayanan
In situ TSEM to Study Ion-Crystallization Mechanism in Ferritin
Advisor: Ttoki Shokuhfar

Farah J. Shareef
Light-Amplifying Artificial Nerve: Implantable and Contact Lens Designs
Advisor: Michael Cho

Meltem Uyanik
Tissue Structure Analysis Using Anomalous Diffusion Signal Decay Models in Magnetic Resonance Imaging
Advisor: Richard Magin

Zachary Alan Wright
Distribution Analysis of Motor Actions for the Design of Customized Robot-Assisted Therapy
Advisor: James Patton

Doctorate in Bioinformatics

Jingting Xu
Computational Analysis of DNA Methylation and Gene Regulation
Advisor: Yang Dai

Ankit S. Jambusaria
Computational Investigation of Drug Modelling: Heterogeneity During Homoeostasis and Inflammation
Advisor: Jalees Rehman, Asrar Malik (COM)

To the UIC College of Engineering Class of 2020:

On behalf of all UIC Engineering faculty and staff, it is my distinct honor to offer each of you our sincere congratulations on earning a degree in one of the rigorous disciplines within engineering. You are well-prepared for a lifetime of learning and highly capable of being a part of the solution to the world’s most critical problems—a task for which engineers are uniquely equipped. I encourage you to give back and to make the world around you a better place. I wish each of you courage you to give back and to make the world’s most critical problems—a task for

Pete Nelson
Dean of Engineering and Professor

Master of Science in Bioengineering (Thesis)

Bekah Elise Allen
Acoustic Frequency Analysis Investigating Frequency Differences in Acute Chest Syndrome
Advisor: Thomas Roylan

Ludovica Barilla
Vascular Focusing and Sorting of Particles and Asymmetric Cells in Straight Microfluidic Channels
Advisor: Ian Popakupcy

Davide Bondavalli
Tongue-Targeted: An Augmentative and Assistive Device Aimed at Enhancing the Digital Life
Advisor: Hananeh Esmailbeigi

Filippo Cinetti
Wear Behavior of Polyethylene Against Titanium Nitride Coated Alloy Surfaces for Joint Replacement
Advisor: Markos Werner (Rush)

Daniel Mark Devine
Tuning Microscale Substrate Mechanics by Stereolithography to Control Mesenchymal Stromal Cell Differentiation
Advisor: Christian Knoll

Niccolo Galdini
Spinal Fracture Treatment: Finite-Element Analysis of Different Fixation Techniques
Advisor: Tsou Man-Chung (COM)

Chiara Gambacorta
Multimodal Actuation in Magnetic Resonance Elastography Experiments
Advisor: Thomas Roylan

Lorenzo Girotto
Generation of Surface Nanotubes on Titanium Kirschner Wire for the Enhanced Release of Antibacterial Drug
Advisor: Thomas Roylan

Antonio Iezzi
Microenvironmental Transhydrophilic Artificial Fibula: Alter Cardiac Fibroblast Structure and Function
Advisor: Russell Brasenga (COM)

Davide Lecca
Dynamic Real-Time 3-Dimensional Model of the Tongue’s Motion
Advisor: Hananeh Esmailbeigi

Christine Lee
Non-Invasive Early Detection of Failure Modes in Total Hip Replacements via Acoustic Emission Techniques
Advisor: Mathew Mathew

Lucas Leoni
Magnetic Resonance Elastography of Anisotropic Materials Under Pre-Stained Boundary Conditions
Advisor: Thomas Roylan

Syeda Fatima Zehra Rizvi
3D Cell Module Approach in Colon Cancer Therapeutics Using Nanoparticle-Mediated Photodynamic Treatment
Advisor: Teppei Rapi (UICOM)

Silvia Maddalena Rossi
Mobile Interface Development for a Tongue-Controlled Device Aimed at Training and Real-Life Interaction
Advisor: Hananeh Esmailbeigi

Jose Rubio Romero
Distribution Analysis of Functional Daily Tasks with the Kinect Device
Advisor: James Patton

Brinda Nishith Sevak
Automatic Sleep and Wake State Detection in Rats Using EEG
Advisor: James Patton / Jeffrey Leach (BioE / Neuroscience)

Giulia Sorensen
Distribution Analysis of the Tongue’s Free-Exploration Pattern Using an Oral Wearable Device
Advisor: Hananeh Esmailbeigi

Matthew A. Tombac
The Oral User Interface Controller (O-UIC): An Assistive Communication Device
Advisor: Hananeh Esmailbeigi

Jacob Lee Van Doom
Individual Thought Chart Shows Task Differences in EEG of Meditators and Healthy Individuals
Advisor: Alex Leon

Master of Science in Bioengineering (Non-Thesis)

David James Banner
Lauren Renee Craig
Achal Gupta
Daniel Lee
Gresa Mustafa
Vignesh Nataraj
Pooja Mukesh Patel
Osksana S. Persindina
Vijay T. Putherkul
Claudia Vesel
Frehiwot Woldeyes
Mo Yang

Master of Science in Bioinformatics (Non-Thesis)

Benjamin J. Imloy
Revaithy Venukuttan
Jesse D. Williams

Kritika Agarwal
Photodynamic Treatment 3D Cell Modular Approach in Colon Cancer Therapeutics Using Nanoparticle-Mediated Photodynamic Treatment
Advisor: Teppei Rapi (UICOM)

Yuanyuan Chen
Boundary Conditions
Advisor: Thomas Roylan

Niccolo Galdini
Multiparametric Analysis of Tongue’s Free-Exploration Pattern
Advisor: Tsou Man-Chung (COM)

Master of Science in Bioinformatics

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Revathy Venukuttan
Benjamin J. Imlay
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Multiparametric Analysis of Tongue’s Free-Exploration Pattern
Advisor: Tsou Man-Chung (COM)
Bachelor of Science in Bioengineering

Akshara Acharya
Ahmad Adwan
Farhan Ali
Yusuf A. Baggia
Chloe E. Baratta
Allison Michelle Bayro
Dionna Eugenia Bidny
Abdel Karam Bilemon
Agata M. Bogdanowicz
William Camacho
Michael Philip Castillo
Shreya Chaudhry
Milton Chung
Grieta Danosa
Maram Dohal
Humerto Dominguez
Collin A. Drelich
Mateusz Drozd
Monica K. Erramilli

Lauryn Semaj Flynn
Jacob Albert Gasiencica
Veronica Gonzalez
Diana Gutierrez
Iram Fatima Hameeduuddin
John Henry Jarka
Kristen Taylor Kacich
Heba Kanah
Samantha S. Labrador
Edin D. Latic
Ameera W. Lodhi
Omar Mohamed Mahmoud
Daniela Merlos
Anna Metlushko
Suha Fatima Mohiuddin
Naima George Muckom
Yash G. Nadkarni
Osayd Nazzal
Muneeb A. Omar

Meghana Pasupula
Farhin M. Patel
Raj J. Patel
Szymon Piotr Pawlowski
Sandra Rivas
Mohammad Tarek Safieh
Ritu Chirag Shah
Eliyas Siddiqi
Ulises Sosa
Claudia Stampi
Dominique D. Stewart
Dylan Paul Tremmel

UIC Engineering was unable to hold its in-person graduation ceremony as planned in May due to the coronavirus, so the BioE faculty and staff created a video message to the graduates.

This video tribute was shared with the entire department community. Congratulations and best wishes to our students who graduated!

The university held a virtual graduation ceremony on Saturday, May 16. More information on the virtual ceremony can be found at today.uic.edu.

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 Degrees Awarded 2009 – 2020

<table>
<thead>
<tr>
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</table>

Total Population Comparison 2009 vs. 2020

<table>
<thead>
<tr>
<th>PD etc.</th>
<th>7</th>
<th>-7</th>
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</thead>
<tbody>
<tr>
<td>Postdocs, research faculty &amp; specialists</td>
<td>24</td>
<td>106</td>
</tr>
</tbody>
</table>

| PhD | 106 | 99 |
| MS | 49 | 61 |
| BS | 186 | 335 |
### Research Funding

**National Institutes of Health (NIH)**

<table>
<thead>
<tr>
<th>PI &amp; CO-I'S IN THE DEPARTMENT</th>
<th>TITLE OF PROJECT</th>
<th>PERIOD</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eben Alsberg (Co-I)</td>
<td>Dual peptide presentation from engineered carriers to catalyze bone healing.</td>
<td>4/01/17 – 3/31/22</td>
<td>$830,010</td>
</tr>
<tr>
<td>Eben Alsberg (PI)</td>
<td>High-throughput microenvironment regulation for chondrogenesis.</td>
<td>7/01/15 – 6/30/20</td>
<td>$2,047,274</td>
</tr>
<tr>
<td>Eben Alsberg (PI)</td>
<td>Opposing RNAi molecule gradient constructs to repair osteochondral defects.</td>
<td>6/01/16 – 5/31/21</td>
<td>$1,958,373</td>
</tr>
<tr>
<td>Eben Alsberg (PI)</td>
<td>Engineering a self-assembled, multi-tissue tracheal replacement.</td>
<td>8/01/17 – 4/30/21</td>
<td>$1,922,333</td>
</tr>
<tr>
<td>Eben Alsberg (PI)</td>
<td>Driving tissue formation by inductive stem cell sheet technology.</td>
<td>8/01/12 – 7/30/19</td>
<td>$1,701,948</td>
</tr>
<tr>
<td>Eben Alsberg (co-I)</td>
<td>Salivary gland regeneration.</td>
<td>3/01/18 – 12/31/19</td>
<td>$20,800</td>
</tr>
<tr>
<td>Eben Alsberg (co-I)</td>
<td>Modeling diabetes using an integrated plate system.</td>
<td>9/20/18 – 7/31/20</td>
<td>$270,000</td>
</tr>
<tr>
<td>Eben Alsberg (co-I)</td>
<td>Mechanical regulation of endochondral bone formation.</td>
<td>4/01/19 – 2/28/24</td>
<td>$424,380</td>
</tr>
<tr>
<td>Yang Dai (co-I)</td>
<td>Precision Medicine in Sarcoidosis.</td>
<td>4/1/18 – 3/31/22</td>
<td>$2,807,312</td>
</tr>
<tr>
<td>Yang Dai (co-I)</td>
<td>The Microbiota and Allergot Papain: Novel investigation into the Consequences of Obesity.</td>
<td>7/1/17 – 6/30/22</td>
<td>$666,245</td>
</tr>
<tr>
<td>Yang Dai (PI)</td>
<td>MED12 and Progesterone Receptor Interaction in Uterine Leiomyoma.</td>
<td>09/19 – 3/31/20</td>
<td>$370,712</td>
</tr>
<tr>
<td>David Eddington (PI)</td>
<td>3D Printed High Throughput Microfluidic Platform to Generate Microenvironmental Oxygen and Hydrogen Sulfide Landscapes.</td>
<td>06/18 – 05/20</td>
<td>$410,000</td>
</tr>
<tr>
<td>David Eddington (PI)</td>
<td>Confined Genetic Transformation and Exchange of Antibiotic Resistance Genes in Fentoliters Microdroplets.</td>
<td>06/17 – 05/20</td>
<td>$413,000</td>
</tr>
<tr>
<td>Dieter Klatt (PI), Richard Magin (co-I)</td>
<td>Adding MRE to DTI for free.</td>
<td>09/18 – 06/20</td>
<td>$483,391</td>
</tr>
<tr>
<td>Dieter Klatt (co-I)</td>
<td>Pathogenic Role of Signature High Mobility Group Box-1 isoforms as Potential Therapeutic Targets to Prevent and/or to Resolve Liver Fibrosis.</td>
<td>07/17 – 06/21</td>
<td>$2,015,754</td>
</tr>
<tr>
<td>Mimi Kolche (PI)</td>
<td>Bioengineering Summer Research Experience for High School Teachers.</td>
<td>1/01/16 – 12/31/20</td>
<td>$537,865</td>
</tr>
<tr>
<td>Salman Khetani (PI), Gregory Underhill (MPI, UIUC)</td>
<td>High-throughput exploration of chemomechanical crosslinks in the maturation of iPSC-derived human hepatocytes</td>
<td>09/23/19 – 07/31/21</td>
<td>$409,024</td>
</tr>
<tr>
<td>Salman Khetani (PI)</td>
<td>Functionally maturing iPSC-derived human hepatocytes in 3D microgels.</td>
<td>4/17/17 – 3/31/20</td>
<td>$426,595</td>
</tr>
<tr>
<td>Salman Khetani (PI)</td>
<td>Human iPSC-derived atrial cardiomyocytes to model atrial fibrillation in a dish.</td>
<td>1/17/20 – 12/31/23</td>
<td>$976,148</td>
</tr>
<tr>
<td>Salman Khetani (PI)</td>
<td>Elucidating chemo-mechanical determinants of human hepatocyte and stellate cell responses in non-alcoholic fatty liver disease.</td>
<td>2/8/18 – 1/31/22</td>
<td>$1,380,334</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>PERIOD</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Alex Leow (PI), Heidi Klumpp (PI)</td>
<td>Passive, Mobile Assessment Of Sleep, Circadian Timing, And Keyboard Dynamics To Prospectively Predict Depression Severity, Cognition, Emotion Processing, And Emotion Regulation.</td>
<td>9/11/19 – 6/30/21</td>
<td>$400,000</td>
</tr>
<tr>
<td>Alex Leow (PI)</td>
<td>Highly-Sensitive Imaging Markers For Early Detection Of Alzheimer’s Disease Using Multi-View Connectomics.</td>
<td>9/11/19 – 6/30/21</td>
<td>$400,000</td>
</tr>
<tr>
<td>Jie Liang (PI)</td>
<td>Database and Tools for Functional Inference and Mechanistic Insight into Somatic Cancer Mutations.</td>
<td>4/01/17 – 3/31/20</td>
<td>$1,064,054</td>
</tr>
<tr>
<td>Jie Liang (PI)</td>
<td>Models and Algorithms for Beta-Barrel Membrane Proteins and Stochastic Networks.</td>
<td>7/01/17 – 6/30/22</td>
<td>$2,421,445</td>
</tr>
<tr>
<td>Jie Liang (co-PI)</td>
<td>Collaborative Research: Mathematical frameworks for biomolecules: from proteins to RNAs to Chromosomes.</td>
<td>7/01/17 – 6/30/22</td>
<td>$1,549,997</td>
</tr>
<tr>
<td>Jie Liang (co-PI)</td>
<td>Collaborative Research: Mathematical frameworks for biomolecules: from proteins to RNAs to Chromosomes.</td>
<td>7/01/17 – 6/30/22</td>
<td>$1,549,997</td>
</tr>
<tr>
<td>Jie Liang (co-PI)</td>
<td>Deciphering high resolution IgH transcriptome topologies and impacts on Ig repertoire.</td>
<td>4/04/18 – 3/31/20</td>
<td>$420,546</td>
</tr>
<tr>
<td>Richard Magin (co-I)</td>
<td>Imaging Intra-vascular Tissue Heterogeneity.</td>
<td>9/1/17 – 8/31/21</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Richard Magin (PI), Joe Zhou (PI)</td>
<td>Probing Intra-vascular Tissue Heterogeneity Using MRI.</td>
<td>9/1/16 – 8/31/22</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Ian Papautsky (PI)</td>
<td>Validation and Demonstration Of Point Of Care Sensor For Multi Metal Exposure Assessment.</td>
<td>9/18 – 7/21</td>
<td>$1,784,589</td>
</tr>
<tr>
<td>Zhangli Peng (PI)</td>
<td>Collaborative Research Multi Scale</td>
<td>8/16/19-7/31/21</td>
<td>$100,501</td>
</tr>
<tr>
<td>Thomas Royston (PI), Dieter Klatt (co-I)</td>
<td>Acquisition of Hyperpolarized Gas System for Lung MR Imaging.</td>
<td>4/17/17 – 3/31/20</td>
<td>$479,745</td>
</tr>
<tr>
<td>Thomas Royston (PI), Dieter Klatt (co-I), Ramille Shah (co-I), Richard Magin (co-I)</td>
<td>Noninvasive Tests for Assessing Muscle Structure and Function.</td>
<td>9/1/16 – 8/31/21</td>
<td>$719,666</td>
</tr>
<tr>
<td>Thomas Royston (PI)</td>
<td>Early Warning for the Onset of Acute Chest Syndrome in Sickle Cell Patients.</td>
<td>11/16/17 – 11/15/19</td>
<td>$60,000</td>
</tr>
<tr>
<td>Jee-Won Shin (PI)</td>
<td>Encapsulation Of Mesenchymal Stromal Cells In Engineered Microgel For Resolution Of Lung Fibrosis.</td>
<td>4/01/19 – 3/31/24</td>
<td>$2,000,000</td>
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<tr>
<td>Parul Gupta (PI)</td>
<td>Role of Interleukin-1 Receptor Clustering in Neuropathic Pain Signaling.</td>
<td>8/20/17-7/31/22</td>
<td>$159,900</td>
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<tr>
<td>Ramille Shah (PI)</td>
<td>Heterogeneous 3D-printed scaffolds for control of biliary tree formation in vitro.</td>
<td>9/13/18 – 9/13/20</td>
<td>$400,000</td>
</tr>
<tr>
<td>Ming Wu (PI)</td>
<td>Improve dynamic lateral balance of humans with SCI.</td>
<td>6/10/16 – 3/31/21</td>
<td>$1,874,382</td>
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<tr>
<td>Ming Wu (PI)</td>
<td>Constraint induced movement therapy for walking in individuals post stroke.</td>
<td>8/06/15 – 7/30/20</td>
<td>$1,546,074</td>
</tr>
<tr>
<td>Xincheng Yao (PI), Jennifer Lim (PI), Davrim Toskak (Co-I)</td>
<td>Differential artery-vein analysis in OCT angiography for individuals post stroke.</td>
<td>2/1/20 – 1/31/24</td>
<td>$1,450,176</td>
</tr>
<tr>
<td>Xincheng Yao (PI)</td>
<td>Functional tomography of neurovascular coupling interactions in healthy and diseased retinas.</td>
<td>4/1/19 – 3/31/23</td>
<td>$1,391,708</td>
</tr>
<tr>
<td>Xincheng Yao (PI)</td>
<td>Development and Validation of a Holographic Waveguide-Based Oculometer for Objective and Comprehensive Oculomotor Disorder Assessment.</td>
<td>9/1/16 – 6/31/19</td>
<td>$144,398</td>
</tr>
</tbody>
</table>
PI & CO-I’S IN THE DEPARTMENT | TITLE OF PROJECT | PERIOD | AMOUNT
--- | --- | --- | ---
Xincheng Yao (PI) | Functional Imaging of Retinal Photoreceptors. | 11/01/14 – 3/31/20 | $1,615,565
Xincheng Yao (PI) | A portable ultra-widefield fundus camera for nonmydriatic examination of retinopathy of prematurity | 9/30/18 – 8/29/19 | $66,000
Xincheng Yao (PI) | Nonmydriatic ultra-widefield fundus photography employing trans-para-planar illumination. | 9/1/19 – 9/1/23 | $1,872,993

Other Agencies and Industry

PI & CO-I’S IN THE DEPARTMENT | TITLE OF PROJECT | PERIOD | AMOUNT
--- | --- | --- | ---
Anthony Fielder and Min Kotche (PI’s) | Biomedical Engineering Learning Module for the SEEK (Summer Engineering Experience for Kids) Program (United Engineering Foundation) | 1/2019/ – 12/2019 | $34,520
John Hetting (PI) Thasarat Vajaranant (co-PI), Jason McAnany (co-PI) | Diagnosing Glaucoma in the Peripheral Retina. (Bright Focus Foundation) | 7/01/19 – 6/30/21 | $149,998
Salman Khetani (PI), David Eddington (co-PI) | A Scalable 3D Human Liver Platform for Drug Discovery. (University of California at Irvine) | 3/1/19 – 3/1/20 | $63,158
Salman Khetani (PI) | Phase II IUCRC University of Illinois at Chicago Center for Advanced Design and Manufacturing of Integrated Microfluids CADMIM | 3/1/19-2/29/24 | $16,000
Salman Khetani (PI) | CADMIM industrial projects | 3/1/20-2/29/21 | $50,000
Ian Papautsky, Alicia Hubert | Translational Oncology Program Proposal (UIC Cancer Center Pilot Grant) | 1 year | $125,000
James Patton (PI) | Collaborative Machines Enhancing Therapies (COMET: NIDILRR | 3/30/18 – 9/29/23 | $924,952
James Patton (PI) | Collaborative Machines Enhancing Therapies (COMET: NIDILRR) | 3/30/18 – 9/29/23 | $924,952
Michael Stroscio (Co-PI) | Phononic Effects in Diamond Electronics. ARD/ARL | 5/2019 – 5/2022 | $400,000
Michael Stroscio, (PI) | Novelus (now LAM) Grant on Characterization of Nanoscale Voids on Metallic Surfaces. LAM Novelus | Started 2012 under MRC with no specific end date | $200,000
Michael Stroscio, (PI) | Subcontract on Semiconductor-enabled Exploration of Bioelectronic Properties of Organells (through UChicago) | 5/2019 – 5/2020 | $100,000
C.G. Takoudis | Selective atomic layer deposition of Zirconia and Hafnia. (Lam Research) | 1/1/2019 – 1/1/2020 | $39,000

National Science Foundation (NSF)

PI & CO-I’S IN THE DEPARTMENT | TITLE OF PROJECT | PERIOD | AMOUNT
--- | --- | --- | ---
Salman Khetani (PI) | CAREER: Towards a miniaturized stem cell-derived human liver array for high throughput screening. | 4/1/18 – 3/31/20 | $75,908
Salman Khetani (PI) | Collaborative Research: High-throughput microcell platform for drug toxicity screening. | 9/1/17 – 8/31/20 | $300,000
Salman Khetani (PI) | Collaborative Research: Protein nanofiber growth factor delivery platforms for modulating phenotype of iPSC-derived human hepatocytes and liver non-parenchymal cells | 10/01/19-9/30/22 | $300,000
Andreas Linninger (PI) | Intrathecal Drug Delivery. | 2017 – 2020 | $311,000
Ian Papautsky (PI) | Center for Advanced Design and Manufacturing of Integrated Microfluids CADMIM | 2020 - 2025 | $16,000
Ian Papautsky (PI) | Center for Advanced Design and Manufacturing of Integrated Microfluids (Phase 2). | 3/19 – 2/24 | $500,000
Ian Papautsky (PI) | Center for Advanced Design and Manufacturing of Integrated Microfluids (Phase 1). | 12/16 – 2/20 | $138,000
Ian Papautsky (PI) | Y5-005: Electrochemical Sensors for Plant Nutrition Industry (via NSF Center) | 3/18 – 2/20 | $82,000
Zhangli Peng (PI) | Collaborative Research Multi Scale | 8/16/19-7/31/21 | $100,501
Thomas Royston (PI), Dieter Klatt (Co-PI) | Transformation Elastography. | 6/1/19 – 5/31/22 | $422,094

TOTAL RESEARCH FUNDING 2019 – 2020

Other Agencies and Industry

NIH

$47,770,826

$2,325,491

$4,090,580

Total active research grants during AY 2019–2020

$54,186,897
Refereed Journal Articles


46. Mesor TH, Shokuhfar T*, Evans JE*. Considerations for imaging thick, low contrast, and beam sensitive samples with liquid cell transmission electron microscopy. Micron 117, 8-15 S 2019


