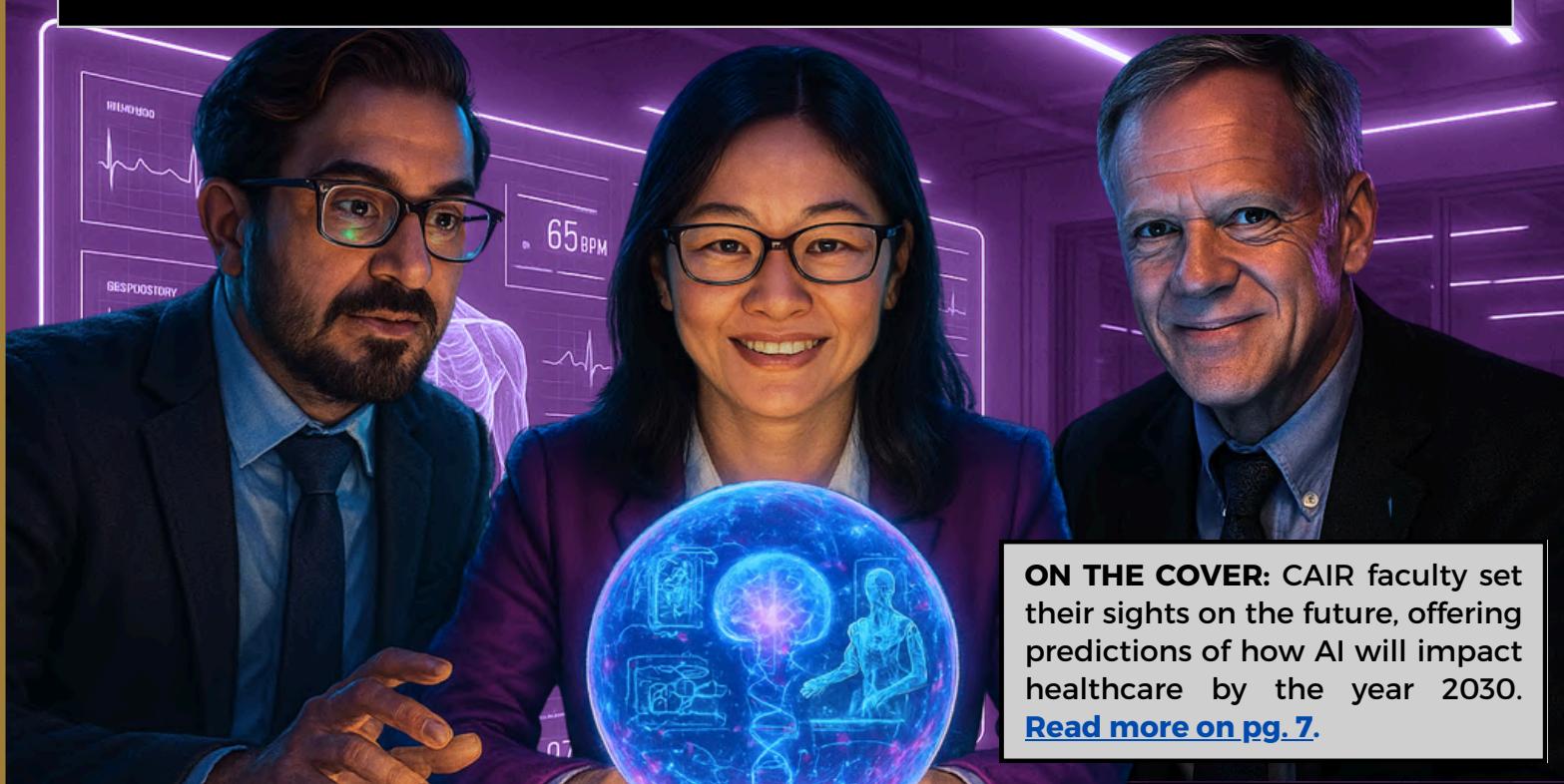


CAIR QUARTERLY



ON THE COVER: CAIR faculty set their sights on the future, offering predictions of how AI will impact healthcare by the year 2030. [Read more on pg. 7.](#)

Inventing the Future of AI in Healthcare

Director's Note from Dr. Metin Gurcan

"The best way to predict the future is to invent it." This visionary quote by computer scientist Alan Kay could not be more fitting as we reflect on CAIR's progress and look toward the future. In just over a year, our center has become a catalyst for innovation in healthcare AI - and we are just getting started.

This summer, I am thrilled to share a major development that will significantly expand our capacity for impact: the launch of the **Artificial Intelligence Modeling & Solutions**

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CAIR in the News

In early March, WXII 12 News visited the offices of Wake Forest CAIR to spotlight the center's latest innovations as part of the local news station's "AI Week" coverage.

The report highlights two software solutions in particular – one designed to enhance a doctor's ability to examine the eardrum and make diagnoses with greater confidence, and another that helps determine the risk of breast cancer recurrence.

"We make sure that everything we do is explainable," CAIR Director **Metin Gurcan, PhD**, told the news station. "So when we provide all these tools and techniques, our physicians can really explain these things to their patients and then say, well, here is how we make the decision."

👉 Click the screenshot below to watch the [full report on YouTube](#), or you can [read the story here](#).



Looking for more video content? Check out the latest from **@WakeForestAI** on YouTube:

[New Faculty Spotlight: Mohammad Moghimi, PhD](#)

[AI-IA Seminar: "Enhancing GPT Models for Genomics"](#)

[Full Archive: "AI in Action" Seminar Series](#)

ALSO INSIDE

News & Notes

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Professional Development

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FAIR Launches Podcast

Wake Forest CAIR's student chapter, the Future of Artificial Intelligence Research (FAIR), has lifted the curtain on its new podcast, "Demystifying AI: a FAIR Podcast."

In the debut episode, co-hosts **Robbie Bennett** and **Fahim Mobin** lay a foundation for understanding AI and its impact on healthcare.

[Listen Now on the
@WakeForestAI
YouTube Channel](#)



FOLLOW @wakeforestai

To stay updated on CAIR research, events, and more!



Director's Note

(continued)

(AIMS) unit. This new unit will serve as CAIR's engine for translating ideas into action – designing, implementing, and deploying AI-powered solutions across clinical care, education, and strategic planning. With AIMS, we are turning promise into practice and helping our institution meet its boldest goals through responsible, human-centered AI.

The summer 2025 issue of CAIR Quarterly celebrates a season of forward momentum. From Dr. Mohammad Moghimi's breakthrough hearing aid technology to Dr. Da Ma's Alzheimer's research funded by the Alzheimer's Association, our faculty continue to lead in developing practical, patient-centered applications of AI. Meanwhile, Dr. Ravi Chacko's pilot-awarded project explores how AI can improve emergency care decision-making – a testament to CAIR's commitment to supporting transformative, real-world research.



Metin Gurcan, PhD

We also expanded our collaborative ecosystem. Our joint pilot initiative with **UNC Charlotte's AI4Health Center** created new connections between institutions and awarded \$50,000 to support interdisciplinary projects. Our partnership with the Future of Artificial Intelligence Research (FAIR) student chapter continues to thrive, with recent events, such as the "Lunch & Learn" series, opening new pathways for engagement with the next generation of medical innovators.

At CAIR, we believe the future of medicine is not something to wait for – it's something we build together. With the launch of the AIMS unit, continued investments in people and projects, and a strong culture of collaboration, we are inventing a future where AI is seamlessly embedded into every layer of healthcare – improving lives, expanding access, and accelerating discovery.

Warmest regards,

Dr. Metin Gurcan
Director, Center for Artificial Intelligence Research
Senior Associate Dean, Artificial Intelligence
Wake Forest University School of Medicine

Dr. Ajay Dharod Inducted as Fellow of American Medical Informatics Association

Ajay Dharod, MD, the Vice Chair of Informatics and Analytics for the Department of Internal Medicine at the Wake Forest University School of Medicine and a CAIR faculty member, has been inducted as a Fellow of the American Medical Informatics Association (AMIA).



Dr. Dharod has advanced the field of biomedical informatics through his research, clinical practice, and educational initiatives.

workflows. His expertise spans data safety, interoperability, and navigating the challenges of conducting EHR-derived research, allowing him to drive innovation in healthcare delivery.

Beyond his research achievements, Dr. Dharod is a dedicated clinician and mentor. He maintains an active practice across inpatient, consultative peri-operative, and outpatient settings, ensuring that his informatics innovations are grounded in real-world clinical needs. He also established the Clinical Scholars in Informatics mentorship program within WFUSM's Internal Medicine Residency Program. "I believe the downstream return on investment for educating future generations of clinicians, scholars, and informaticists will have the most profound impact on healthcare and our society," he says.

Wake Forest CAIR congratulates Dr. Dharod on this well deserved recognition. The center is grateful to work with such an accomplished research leader and looks forward to advancing AI applications in healthcare together. 

According to AMIA, the honor recognizes individuals "who apply informatics skills and knowledge toward the goals of enhanced personal and population health, improved organizational performance and learning, and individual empowerment in healthcare." Dr. Dharod was formally inducted as a Fellow at the 2025 AMIA Clinical Informatics Conference, held May 20-22 in Anaheim, CA.

Throughout his career, Dr. Dharod has worked to advance the development of EHR tools, facilitate the integration of digital health applications, and improve clinical

Dr. Jennie Lou Appointed Senior Associate Dean for Medical Education Innovation & Academic Affairs

Jennie Lou, MD, a CAIR faculty member, has been appointed the Senior Associate Dean for Medical Education Innovation & Academic Affairs at the Wake Forest University School of Medicine (WFUSM). In this role, she will report to **Amber Brooks, MD**, Vice Dean for Strategic Initiatives.

Dr. Lou brings more than 30 years of experience in medical education and academic leadership, with deep expertise in curriculum design, biomedical informatics, teaching innovation, and artificial intelligence. Since joining the MD Program in 2022, she has made significant contributions, including shaping the Wake Ready curriculum, expanding Entrustable Professional Activity (EPA)-based assessments across both campuses, and championing AI integration in medical education.

In her new role, Dr. Lou will lead several strategic initiatives to enhance health education across the school, including:

- Integrating AI in health and medical education
- Designing and launching a Virtual Medical School
- Supporting the development of an Accelerated MD Pathway
- Providing curricular guidance for the Charlotte MD campus

A nationally and internationally respected academic leader, Dr. Lou has developed new education programs and campuses, led multiple successful accreditation efforts, and created forward-thinking, student-centered learning environments. Her recent research applies advanced neuron modeling to train machine learning algorithms that may help predict seizure onset.

CAIR congratulates Dr. Lou on this appointment. The center looks forward to seeing her lead WFUSM's effort to advance AI in medical education and prepare future clinicians to thrive in a healthcare field increasingly shaped by emerging technologies. 



Jennie Lou, MD



Xi (Sunshine) Niu, PhD



Mohammad Moghimi, PhD



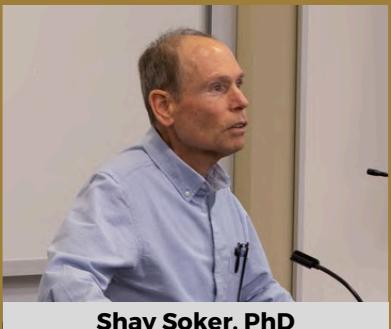
Gabriel Terejanu, PhD



Pu Wang, PhD



Srijan Das, PhD



Shay Soker, PhD



Cheryl Brown, PhD



Da Ma, PhD

Wake Forest CAIR Holds Joint Pilot Collaboration with UNC Charlotte's AI4Health Center

Multi-disciplinary event fosters connections and brain exchange among researchers advancing AI in medicine

By Jesse Burkhart and Emma McKnight

Eighty miles of Interstate 85 separate Wake Forest CAIR and UNC Charlotte's AI4Health Center, but after a special collaborative event this spring, the two centers now stand on common ground as co-funders of new research.

On March 5, UNC Charlotte researchers made the trip to Wake Forest Biotech Place for "Collaboration in Action: a Joint Pilot Program," a scientific forum highlighting novel AI-driven research and concluding with the announcement of a \$50,000 pilot

award jointly offered by both centers.

After welcoming remarks from CAIR Director **Metin Gurcan, PhD**, and AI4Health Center Co-Director **Ahmed Helmy, PhD**, faculty members from both centers delivered brief presentations on AI methodologies they're developing and how to implement them fairly. The presenting researchers included **Cheryl Brown, PhD**; **Samuel Carmichael II, MD**; **Srijan Das, PhD**; **Da Ma, PhD**; **Mohammad Moghimi, PhD**; **Xi (Sunshine) Niu, PhD**; **Shay Soker, PhD**; **Gabriel Terejanu, PhD**; and **Pu Wang, PhD**.

Dr. Brown, Chair and Associate Professor of Political Science and Public Administration at UNC Charlotte, is the multidisciplinary principal investigator for a research project utilizing AI to study heart-transplant outcomes, with the ultimate goal of reducing health disparities.

She has also developed an ethical framework called “Cultural Humility Plus” (CHP), which was the subject of her presentation at Biotech Place.

“CHP matches AI use and purpose with cultural understanding for convergence of multidisciplinary teams of experts recognizing the boundaries of their knowledge,” Dr. Brown says. “CHP gives meaning to transparency and enhances trust of technology acceptance for patients and the developing teams. As healthcare moves forward with human digital twin technology requiring additional data collection, privacy concerns, and cybersecurity risks, informed consent and technology acceptance will heighten the need for CHP, integrating cultural humility and ethics.”

The event closed with Drs. Gurcan and Helmy announcing the availability of a \$50,000 pilot award. Attendees then participated in a networking session to explore collaborations toward applying for the grant.

In 2024, CAIR established joint pilot programs with Northeastern University’s Institute for Experiential AI and the Wake Forest School of Medicine’s Critical Illness, Injury, and Recovery Research Center. CAIR will hold its next joint pilot event in November with WFUSM’s Maya Angelou Research Center for Healthy Communities. 



AI4Health Center Co-Directors Dr. Pu Wang (left) and Dr. Ahmed Helmy field questions from attendees.



Dr. Cheryl Brown (right) meets with a Wake Forest graduate student following her talk.



After the presentations, attendees made one-on-one connections to discuss collaboration opportunities.

PROGNOSIS 2030

NINE WAKE FOREST CAIR PROFESSORS PREDICT HOW AI WILL IMPACT HEALTHCARE IN THE NEXT FIVE YEARS



AKBILGIC

DHAROD

DOWNS

GURCAN

KARABAYIR

KIRKENDALL

LOU

MA

REZAPOUR

THE “LOGIC THEORIST,” DEVELOPED IN 1956 BY ALLEN NEWELL AND HERBERT A. SIMON, IS WIDELY REGARDED AS THE

first AI software program. Designed to prove mathematical theorems, it demonstrated that machines could mimic aspects of human cognition – shifting AI from philosophical idea to working reality.

Nearly 70 years later, large-language models like ChatGPT are transforming modern life. As generative and other AI-powered tools grow more powerful and pervasive, a question looms large: Where will the field of AI be five years from now?

Last fall the Wall Street Journal posed that query to CAIR Director Metin Gurcan, PhD, whose prediction for the state of AI in 2030 [appeared in an online feature](#). Now it’s time for the rest of the CAIR faculty to peer into their crystal orbs, shake their Magic 8-Balls, and prompt their Gray Matter GPTs for predictions of their own.

We asked nine CAIR professors to forecast how AI will impact healthcare in the next five years. Their responses spanned a range of topics, from personalized medicine to operational integration to education to policymaking, and more. ➤



Newell + Simon



I believe that, with the assistance of AI, home-based mobile devices and wearables will reach or exceed

actionable clinical diagnostic accuracy thresholds for many diseases and conditions. This will enable clinically informed telemedicine to reduce the cost of healthcare, increase accessibility, and lead to a more proactive approach in the U.S. healthcare system as opposed to its current reactive, treatment-focused structure.

◆ OGUZ AKBILGIC, PhD

Associate Professor, Cardiovascular Medicine



By 2030, I hope healthcare has reliably implemented standards/systems to effectively evaluate pre-implementation and post-implementation effectiveness with consistent continuous feedback loops integrated into domain-specific AI. As the implementation of domain-specific AI-based screening, diagnostic, and prognostic systems expands, I hope clinicians will focus their energy on compassionate, communicative care – the human element of medicine.

◆ AJAY DHAROD, MD

Associate Professor, General Internal Medicine



I predict that we will continue to train very complex, deep learning, generative models driven by simple objective functions, resulting in surprising emergent properties. We will entrust these models with relatively low-risk tasks, and we will evaluate them as we do humans, with measures like ROC, Brier scores, and tests of knowledge. I also predict that we will develop straightforward platforms for incorporating predictive AI models into the EHR as a strategy for integrating them into clinical practice.

◆ **STEPHEN DOWNS, MD**

Professor, Pediatrics



In the near future, I believe decision-makers will reach a consensus on the effectiveness of AI models in improving patient outcomes and healthcare. This agreement will drive the development of key policies at the national level for creating universal pathways for more efficient data collection, leading to the creation of robust, generalizable models that can be deployed in both clinical and remote settings.

◆ **IBRAHIM KARABAYIR, PhD**

Assistant Professor, Cardiovascular Medicine

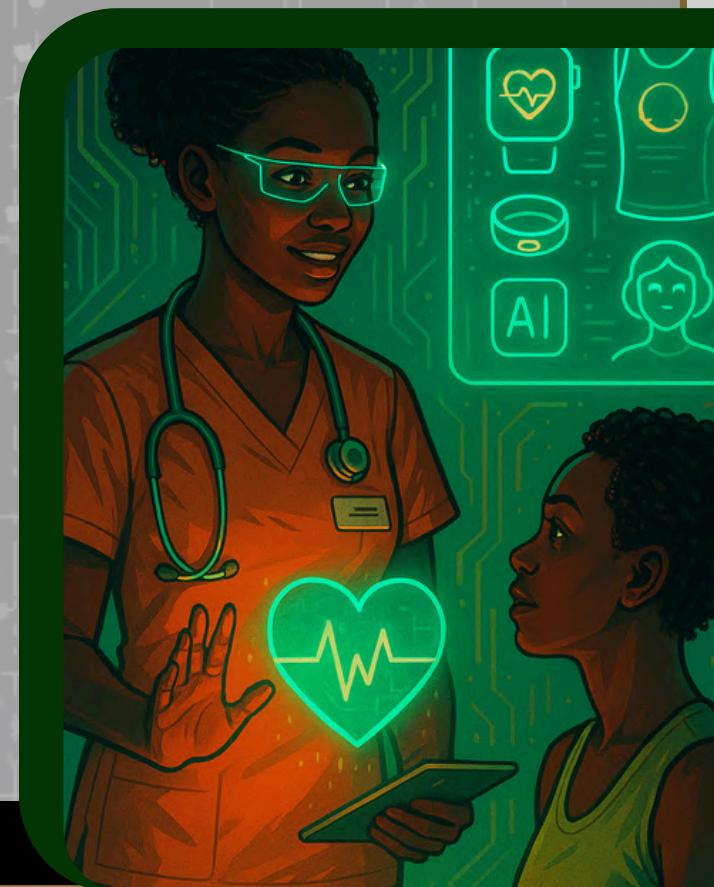


By 2030, AI will be deeply integrated into healthcare, fundamentally reshaping patient-provider interactions and streamlining

operations. Health monitoring devices and AI-driven wearables will enable continuous health tracking, while virtual assistants will offer 24/7 support, handling routine inquiries and scheduling. AI will also alleviate administrative burdens by automating tasks like coding and navigating complex systems. Stronger ethical, equitable, and legal frameworks will guide this AI evolution, ensuring responsible deployment.

◆ **METIN GURCAN, PhD**

Professor, General Internal Medicine





It will be very interesting to watch and improve upon how users and patients interact, accept, and adopt AI-based tools. There will be learning curves for users to understand the performance, benefits, and risks of AI, how best to use the tools, and differing levels of acceptance/adoption. We will create educational and awareness artifacts to help both groups understand the implications and increase transparency of the tools. As [AI tools] become more commonplace, literacy increases, and actual tangible value becomes apparent, stakeholders will become more comfortable and we'll be more tolerant of risk to a degree.

◆ **ERIC KIRKENDALL, MD**

Professor, Pediatrics



In my opinion, by 2030, AI will be seamlessly integrated into medical education to provide much more personalized, immersive, and data-driven educational experiences to prepare the learners for their chosen career path(s), with AI serving as both a tool and a subject of study.

◆ **JENNIE LOU, MD**

Professor, General Internal Medicine



AI model explainability will likely advance significantly to increase the trustworthiness in healthcare applications. Counterfactual

analysis would be an integrated component in the future of healthcare AI design, especially in multimodal integration, to help disentangle causal relationships in medicine and healthcare operation. Effective measurement of AI model uncertainty and human-in-the-loop design will enable active integration of health care practitioners, regulatory partners, and even patient and caretakers to shape the active training, adaptation, and deployment of the future AI model for healthcare.

◆ **DA MA, PhD**

Assistant Professor, Gerontology



By 2030, AI will be at the forefront of revolutionizing disease management and treatment by harnessing the power of omics and imaging data. This integration will enable highly personalized healthcare through the effective analysis of datasets, including genomics, proteomics, and metabolomics, alongside imaging data. AI's ability to integrate and interpret these diverse data streams will lead to earlier and more precise diagnoses, particularly in diseases that require a nuanced understanding of multiple biological markers.

◆ **MOSTAFÄ REZAPOUR, PhD**

Assistant Professor, Institute for Regenerative Medicine



Dr. Mohammad Moghimi's Team Develops First-of-Its-Kind Hearing Aid

A new type of hearing aid may bring a new treatment option to patients with conductive hearing loss, and it's thanks to CAIR faculty member **Mohammad Moghimi, PhD**, and his research team.

Their breakthrough innovation is a flexible hearing aid that sidesteps the risks and invasiveness of conventional surgical treatments. Using tiny micro-epidermal actuators, the device transmits sound vibrations through the skin behind the ear, delivering them straight to the cochlea and completely bypassing the ear canal. The result is a new solution for patients with conductive hearing loss who want to avoid going under the knife.

The promising findings of Dr. Moghimi's team were [published in Communications Engineering](#), part of the Nature Portfolio.



**Mohammad
Moghimi, PhD**

"Treatment for conductive hearing loss can include corrective surgeries and implantable hearing aids, which can be very invasive, especially for pediatric patients," Dr. Moghimi says. "Flexible hearing aids offer a non-invasive alternative."

To test their device, researchers simulated conductive hearing loss in 10 participants (ages 19-39) using earplugs and earmuffs, then applied actuator arrays to strengthen vibrations, improve sound quality, and control direction of vibration. "We found that using an array of these actuators, rather than a single one, significantly enhances the strength and quality of the vibrations, leading to better hearing outcomes," Dr. Moghimi says.

He also noted that improving hearing in children can reduce delays in language and speech development and boost educational development. "This technology has the potential to improve the quality of life for children with hearing impairments and transform the way we approach pediatric hearing aids," he says.

The researchers' next step is to conduct a larger study to evaluate the device's safety and effectiveness in children and adults. 

Alzheimer's Association Awards \$200K Grant to Dr. Da Ma

Da Ma, PhD, Assistant Professor of Gerontology and Geriatric Medicine and a CAIR faculty member, was awarded a \$200,000 grant from the Alzheimer's Association to advance a research project with profound implications for the way Alzheimer's disease is treated as it progresses.

The study, *Cardiometabolic-Integrated Neuroimaging Genomics for Alzheimer's Disease*, explores how cardiometabolic and genomic factors contribute to distinct subtypes of Alzheimer's pathology at different stages of the disease. Dr. Ma is joined in this critical work by four co-investigators from the Wake Forest University School of Medicine - **Metin Gurcan, PhD**; **Suzanne Craft, PhD**; **Gary Beecham, PhD**; and **Trey Bateman, MD** - as well as **Sterling Johnson, PhD**, from the University of Wisconsin-Madison.



Da Ma, PhD

The Alzheimer's Association's International Research Grant Program funds investigations to advance our understanding of Alzheimer's disease, identify new treatment strategies, improve care for people with dementia, and further knowledge of brain health and disease prevention.

Dr. Ma has contributed extensively to the field of Alzheimer's research through his innovative work at the intersection of imaging, genetics, and data science.

He was part of a research team that developed a machine learning-based dementia score combining brain MRI scans and genetic data to predict an individual's risk of developing Alzheimer's disease. The study found genetic data was more effective in predicting dementia progression in cognitively normal individuals, whereas MRI data provided better insights for those with mild cognitive impairment. By integrating both data types, Dr. Ma and his colleagues enhanced predictive accuracy, demonstrating the complementary role of genetics and neuroimaging in assessing Alzheimer's risk.

CAIR congratulates Dr. Ma and his team on this impactful award and is eager to see how their research will pave the way for more personalized, effective interventions for people with Alzheimer's disease. 

Dr. Ravi Chacko Named Winner of CAIR's 2025 Pilot Award

Ravi Chacko, MD, PhD, an emergency medicine physician and Co-Director of Research and Publication at Advocate Health, was named the winner of CAIR's 2025 Pilot Award, an annual grant providing \$40,000 in funding to support AI-driven medical research.



**Ravi Chacko,
MD, PhD**



**Ryan
McKillip, MD**



**Alex
Biskis, MS**

Dr. Chacko and his research team – including **Ryan McKillip, MD** and **Alex Biskis, MS** – received the grant to advance their innovative project, *Predicting Blood Culture Outcomes in the Emergency Department: Classical Machine Learning vs. Deep Neural Networks*. The goal of the award is to allow investigators to pursue novel ideas that will improve the likelihood of obtaining extramural funding.

Dr. Chacko's team is using machine learning to predict bloodstream infections in the emergency department. The researchers have three specific aims: (1) explore classification performance with larger datasets; (2) assess model generalizability across geographic locations; and (3) compare novel deep neural networks like TabNet with ensemble models like XGBoost, which have long been the standard for structured healthcare data.

"We will compare the classification accuracy of the best-performing model against human behavior," Dr. Chacko says. "If the model demonstrates superiority to human decision-making, we will implement a clinical-decision tool and investigate it in future work." 

CAIR Investigators Take Step Toward Predicting Lung Disease in Premature Infants

New research by two CAIR faculty members and their collaborators highlights how AI can help predict a dangerous lung condition in premature infants, [as published in Microbiome](#), a Springer Nature journal.

The Problem

Bronchopulmonary dysplasia (BPD) is a serious lung disease that affects premature newborns, and predicting which infants will develop it remains a challenge. Early intervention is critical, but current tools fall short in identifying those at highest risk.

The Research



Oguz Akbilgic, PhD



Ibrahim Karabayir, PhD

The team applied machine learning – specifically, random forest models – to study gut microbiomes in a neonatal model of BPD. The researchers' goal was to uncover microbial patterns that might forecast future development of the disease.

They found that while bacterial microbes showed little predictive power, certain types of fungi stood out as strong early indicators of BPD risk. "These findings position the neonatal fungal microbiome as a transferable, modifiable driver of BPD risk and highlight the potential of AI-based microbiome profiling as a tool for early prediction and future therapeutic targeting," Dr. Karabayir says.

The Impact

By identifying specific, modifiable fungal signatures linked to BPD, this research reveals the neonatal fungal microbiome as more than a bystander – it's a potential driver of disease risk and a target for interventions during a critical window of development. This positions AI-powered microbiome analysis as a promising tool for early diagnosis and the development of new, more precise therapies. 

Invitation to Contribute to AI Research Project Inventory

As part of Wake Forest CAIR's ongoing efforts to highlight and support the innovative and high-impact work being undertaken in our community, we are compiling an inventory of AI research projects at Advocate Health (including Aurora Healthcare, Advocate Healthcare, and Atrium Health) and the Wake Forest University School of Medicine.

What Is an "AI Research Project"?

An AI research project encompasses any research initiative that involves developing or applying AI technologies.

This includes, but is not limited to, projects focusing on machine learning, deep learning, AI algorithms, computer vision, natural language processing, robotics, and AI applications in various disciplines. The aim is to understand, augment, or create systems that exhibit some form of human-like intelligence or autonomous decision-making.

To ensure your project is included in this inventory and to foster collaboration and awareness within our community, we kindly ask you to complete [this questionnaire](#), which seeks to gather essential information about your project.

Please complete the questionnaire as soon as possible. Your contributions are invaluable, and we believe that this inventory will serve as a vital resource for fostering collaboration, securing funding, and showcasing our collective achievements in AI research. 

Four New Researchers Join CAIR's Clinical Image Analysis Lab

Wake Forest CAIR has added four new researchers to its Clinical Image Analysis Lab (CIALAB), which is dedicated to advancing computer-assisted analysis and interpretation of medical images. The lab is overseen by CAIR Director **Metin Gurcan, PhD**.



Abbas Alili, PhD

Dr. Alili, who earned his PhD in Electrical and Computer Engineering from N.C. State University, has joined CAIR as a Research Fellow. He will conduct research at the intersection of AI and biomedical engineering, developing AI-powered solutions that integrate data from multiple domains – including genomics and electronic health records – to generate actionable insights and enhance patient care.

Fatih Demir, MD

Dr. Fatih Demir brings several years of experience in clinical medicine, emergency care, and public health. He has also served as assistant general manager in biotechnology research and development and contributed to microbiology scholarship. His work is driven by a strong interest in machine learning for diagnostic support.

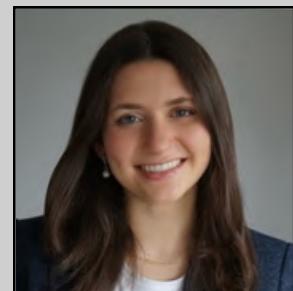


Erin Proctor

After studying cellular and molecular biomedical science at the University of Michigan, Erin is now pursuing her MD degree at the Wake Forest School of Medicine. She is also a member of the Future of Artificial Intelligence Research (FAIR), CAIR's student chapter. At CIALAB, she will work to identify factors that affect maternal health outcomes, including postpartum depression.

Gabriella Puchall

Gabriella earned her BS degree in behavioral neuroscience at Lehigh University and recently completed her first year at the Wake Forest School of Medicine. At CIALAB, she will be work to develop an AI learning model that analyzes otoscope images to support clinical decision-making.



17 College Students Join CAIR for Summer Research Internship Program

Student orientation for CAIR's 2025 summer internship program was held May 28th at Wake Forest Biotech Place, marking the start of a 10-week research experience focused on real-world AI and biomedical informatics projects with healthcare applications.

Seventeen college students from across the country comprise this summer's cohort. Eleven of those students are part of the Culturally Augmented Learning in Biomedical Informatics Research (CALIBIR) program, which is funded by an R25 grant from The National Institutes of Health. All students receive hourly pay, and non-local students are provided on-campus housing.



More fast facts about the 2025 cohort and program agenda:

- This year's interns represent 14 institutions across 11 states
- Class makeup: 4 sophomores, 6 juniors, 3 seniors, and 4 graduate students
- Students will contribute to a variety of research projects in biomedical informatics, healthcare innovation, and AI ([full project list](#))
- Additional activities include technical bootcamps, journal clubs, networking events, and one-on-one mentorship
- All interns will present their work at a closing research symposium at the end of the summer

The cohort includes: Josh Bowser, Rhea Chatterjee, Jillian Griffith, Jackson Hamilton, Olivia Harper, Camille Jacome, Atishay Kasliwal, Raaha Kumaresan, Ian Liu, Ashlyn Melichar, Kendall Powe, Bryan Ramillano, Zian Shang, Minna Siddiqui, Molly Stitzel, Yeraldine Tamayo, and Mary-Katherine Thompson.

CAIR is honored to host these talented students for the summer and looks forward to seeing how they'll contribute to innovative healthcare solutions. 

CAIR Hiring Two AI Analysts for Newly Created AIMS Unit

Wake Forest CAIR is launching an **Artificial Intelligence Modeling & Solutions (AIMS)** unit and is accepting applications for two AI Analysts to join the team.

What is AIMS?

AIMS puts CAIR's vision into action by developing and deploying AI-powered solutions that advance institutional priorities across clinical care, education, and strategic planning.

Responsibilities of the AI Analyst:

- Design and implement predictive models using AI/ML on structured and unstructured data
- Perform data preprocessing, feature engineering, and rigorous model validation
- Collaborate with clinicians, educators, and administrators to shape projects and interpret findings
- Evaluate and address fairness, bias, and explainability in AI systems
- Turn insights into action via dashboards, briefings, and stakeholder presentations
- Contribute to strategic efforts like student success analytics, crowding forecasts, and early detection models

Required Qualifications:

- A Master's or PhD in Data Science, Computer Science, Biomedical Informatics, Statistics, Engineering, or related fields
- Experience in machine learning, natural language processing (NLP), or AI development
- Proficiency in Python, R, and data libraries (e.g., pandas, scikit-learn, TensorFlow/PyTorch)
- Familiarity with clinical, academic, or operational datasets (preferred)
- Strong communication skills to bridge the gap between technical outputs and real-world impact

To apply, email your CV, cover letter, and three references to CAIRjobs@wakehealth.edu with "AI Analyst Application – AIMS Unit" as the subject line. 

Recent Events

★ Celebrate Research! 2025 ★

In March, the Wake Forest University School of Medicine (WFUSM) and Advocate Health hosted “Celebrate Research!”, a month-long celebration that highlighted the ongoing scientific innovation across the Advocate Health enterprise. Featuring a keynote address, digital health showcase, panel discussions, and awards presentations, Celebrate Research! 2025 gave faculty, students, and community partners the opportunity to share discoveries that are shaping the future of healthcare.



Dr. William Kaelin Jr.

The celebration began on March 4 at the Millennium Center in Winston-Salem with a keynote by Dr. William Kaelin, a recipient of the 2019 Nobel Prize in Physiology or Medicine. He discussed the science of cellular oxygen sensing and how it has led to breakthroughs in treating anemia and cancer.

CAIR Director **Metin Gurcan, PhD**, and faculty members **Arezoo Movaghar, PhD**, and **Oguz Akbilgic, PhD**, represented the center at Celebrate Research! 2025 with their own presentations:



Dr. Arezoo Movaghar

- Dr. Akbilgic displayed a poster about his latest research, which uses smartwatch ECG data to estimate a heart failure biomarker (BNP) without a blood test, enabling easier remote monitoring.
- On March 17, as part of the “Ignite Talks” session, Dr. Movaghar discussed her work developing AI-powered solutions for the early and equitable diagnosis of genetic disorders.
- On March 19, Dr. Gurcan joined the “Future of Research in Medicine” panel exploring how AI, regenerative medicine, and biomechanics are driving the future of patient care innovation.



Dr. Metin Gurcan (second from right) joined colleagues to discuss the future of research.

The Celebrate Research! events emphasized collaboration, scientific progress, and the potential for research to improve patient outcomes, building strong momentum for future discoveries and partnerships. CAIR is grateful to have participated in them and looks forward to turning more ideas into impact. 

Recent Events

★ “Lunch & Learn” with DAWN Alzheimer’s Research Study Team ★

On April 15th, CAIR partnered with its student chapter, the Future of Artificial Intelligence Research (FAIR), to host a “Lunch & Learn” event for the DAWN Alzheimer’s Research Study team at Wake Forest University. The event highlighted emerging applications of AI in healthcare and showcased how innovation and collaboration are driving progress in medical research.

The DAWN Alzheimer’s Research Study is an international, multi-site initiative dedicated to expanding global genetic research on Alzheimer’s disease. DAWN investigators from multiple universities are working to uncover genetic risk factors that contribute to Alzheimer’s, with the ultimate goal of informing new prevention strategies and therapeutic approaches.



Dr. Arezoo Movaghah (second from left) and Robert Bennett (third from left) provided an overview of AI applications in healthcare to the DAWN Study team.

Robert Bennett, a PhD candidate at the Wake Forest University School of Medicine and President of FAIR, opened the event with a clear and accessible introduction to AI. His talk provided a foundational understanding of key terms and concepts, which proved valuable for attendees who were new to the subject. This enabled attendees to participate in discussions about how AI is transforming the healthcare landscape and can advance the DAWN team’s mission.

Arezoo Movaghah, PhD, Assistant Professor of Pediatrics and a CAIR faculty member, followed with a presentation about her team’s research on Fragile X Syndrome. Dr. Movaghah’s work leverages AI to detect hidden patterns in biological data, accelerating discovery and deepening our understanding of this disorder.

The DAWN Study includes researchers from the from the University of Miami, Case Western Reserve University, Columbia University, Wake Forest University, and the University of Ibadan (Nigeria). For more information about the DAWN Alzheimer’s Research Study at Wake Forest, visit thedawnstudy.com/wake-forest-university/. 

PROFESSIONAL DEVELOPMENT & COLLABORATION

2024-25 Artificial Intelligence in Action Seminar Series

Wednesday, March 19

Presenter:

Gustavo Rohde, PhD
University of Virginia



Seminar Title:

“Transport-Based Morphometry for Predictive Modeling of Biomedical Imaging Data”

Summary: Dr. Rohde discussed a mass transport-based modeling approach that delivers clear, high-accuracy predictions from cancer microscopy and autism brain imaging to uncover key physiological insights.

[WATCH](#)

Thursday, April 3

Presenter:

Erdal Cosgun, PhD
Microsoft Research



Title: “Enhancing GPT Models for Genomic Analysis”

Summary: This seminar explored enhancing GPT-4's genomic expertise using 190 million variant annotations. Dr. Cosgun explained how retrieval-augmented generation outperforms fine-tuning in accuracy, underscoring the promise of large-language models for clinical diagnostics and genomic research.

[WATCH](#)

Friday, April 18

Presenter:

Masoud Rouhizadeh, PhD
University of Florida



Title: “Leveraging LLMs for Practical Healthcare Solutions: Pipelines for Detecting Social Risk Factors”

Summary: Dr. Rouhizadeh discussed using large-language models to identify social determinants of health and introduced a retrieval framework that cuts annotation effort by 90% for practical processing in healthcare.

[WATCH](#)

Friday, May 2

Presenter:

Javed Mostafa, PhD
University of Toronto



Title: “AI and Machine Learning Approaches for Improving Biomedicine and Healthcare”

Summary: Highlighting the vital role of AI in biomedicine, Dr. Mostafa explored its applications from early diagnostics to modern healthcare, addressed key challenges, and emphasized its potential in supporting a learning health system.

[WATCH](#)

Upcoming Events

Monday, June 9
12 p.m. - 1 p.m.

WHAT: AI-IA Seminar:
Yashbir Singh, PhD
Mayo Clinic



TITLE: "What Clinicians Miss in Medical Images: How AI Is Filling the Gaps"

WHERE: [Webex](#)

Wednesday, June 18
12 p.m. - 1 p.m.

WHAT: CALIBIR
Interns & Mentors
Mid-Summer Lunch



WHERE: Wake Forest Biotech Place
(575 Patterson Ave., Winston-Salem)

Wednesday, June 25
4 p.m. - 6 p.m.

WHAT: Summer
Internship Program
Diversity Networking
Reception



WHERE: Wake Forest Biotech Place
(575 Patterson Ave., Winston-Salem)

Thursday, July 3
12 p.m. - 1 p.m.

WHAT: AI-IA Seminar:
Meredith Troutman-
Jordan, PhD
UNC Charlotte



WHERE: Webex

Thursday, July 24
12 p.m. - 1 p.m.

WHAT: AI-IA Seminar:
Khalid Niazi, PhD
Ohio State University



WHERE: Webex

Thursday, July 31
9 a.m. - 4 p.m.

WHAT: Summer
Internship
Symposium



WHERE: Wake Forest Biotech Place
(575 Patterson Ave., Winston-Salem)

Wednesday, September 17
2 p.m. - 6 p.m.

WHAT: Build-a-Thon
Opening Session



WHERE: Wake Forest University
Reynolda Campus

Thursday, September 25
9 a.m. - 2 p.m.

WHAT: CAIR Fall
Colloquium



WHERE: Wake Forest Biotech Place
(575 Patterson Ave., Winston-Salem)

Tuesday, October 14
12 p.m. - 1 p.m.

WHAT: AI-IA Seminar:
François Modave, PhD
WFUSM



WHERE: Webex

Metin Gurcan, PhD

Director, Center for Artificial Intelligence Research
Senior Associate Dean, Artificial Intelligence
Professor, General Internal Medicine
Professor, Wake Forest Institute for Regenerative Medicine



Publications

Camalan S, Langefeld CD, Zinnia A, McKee B, Carlson ML, Deep NL, Harris MS, Jan TA, Kaul VF, Lindquist NR, Mattingly JK, Shah J, Zhan KY, Gurcan MN, Moberly AC, "Digital Otoscopy With Computer-Aided Composite Image Generation: Impact on the Correct Diagnosis, Confidence, and Time," *Otolaryngol Head Neck Surg.*, Sep 2. doi: 10.1002/ohn.965. vol. 172, iss. 1, pp. 152-161 PMID: 39221462, 2025

Rezapour M, Seymour RB, Medda S, Sims SH, Karunakar MA, Habet N, Gurcan MN, "Analyzing Gait Dynamics and Recovery Trajectory in Lower Extremity Fractures Using Linear Mixed Models and Gait Analysis Variables," *Bioengineering*, 2025 Jan 14;12(1):67.

Lu H, Rezapour M, Baha H, Niazi K, Narayanan A, Gurcan MN, "Classification-based pathway analysis using GPNet with novel P-value computation," *Briefings in Bioinformatics*, Jan;26(1):bbaf039, 2025.

Meredith Adams, MD, MS, FASA, FAMIA

Associate Professor, Anesthesiology
Associate Professor, Public Health Sciences



Publications

Adams, M. C. B., Sward, K. A., Perkins, M. L., & Hurley, R. W. (2025). Standardizing research methods for opioid dose comparison: the NIH HEAL morphine milligram equivalent calculator. *Pain*, 10.1097/j.pain.0000000000003529. Advance online publication. <https://doi.org/10.1097/j.pain.0000000000003529>

Adams, M. C. B., Bann, C. M., Bayman, E. O., Chao, M., Hergenroeder, G. W., Knott, C., Lindquist, M. A., Luo, Z. D., Martin, R., Martone, M. E., McCarthy, J., McCumber, M., Meropol, S. B., Ridenour, T. A., Saavedra, L. M., Sarker, A., Anstrom, K. J., & Thompson, W. K. (2025). Building Community Through Data: The value of a Researcher Driven Open Science Ecosystem. *Pain medicine* (Malden, Mass.), pnaf003. Advance online publication. <https://doi.org/10.1093/pm/pnaf003>

Scholarship Without Authorship

Anzalone, A. J., Jackson, L. E., Singh, N., Danila, M. I., Reisher, E., Patel, R. C., Singh, J. A., & National COVID Cohort Collaborative Consortium (2025). Long-Term Mortality Following SARS-CoV-2 Infection in Rural Versus Urban Dwellers With Autoimmune or Inflammatory Rheumatic Disease: A Retrospective Cohort Analysis From the National COVID Cohort Collaborative. *Arthritis care & research*, 77(1), 143-155. <https://doi.org/10.1002/acr.25421>

Accomplishments

Following the publication of, Standardizing research methods for opioid dose comparison: the NIH HEAL morphine milligram equivalent calculator, the HEAL-funded research team released an online tool to calculate Morphine Milligram Equivalents (MME), a standardized metric to report prescribed opioid use. The tool is available for free online here: <https://research-mme.wakehealth.edu/main>.

The HEAL Common Data Elements (CDE) program will be hosting an upcoming webinar on Friday, March 7th from 12:00 pm to 1:00 pm EST to demonstrate the use of the MME online calculator to HEAL investigators and answer questions about the tool.

The NIH HEAL Initiative believes that standardizing opioid measurement across pain research will enable cross-study comparisons and statistical analyses capturing legitimate prescription opioid use and change how the field of pain science understands opioid use. HEAL-funded researchers developed the online calculator for researchers to generate MME values easily from study data.

Standardizing research methods for opioid dose comparison: the NIH HEAL morphine milligram equivalent calculator, describes the development and rationale for the MME Calculator.

Oguz Akbilgic, PhD

Associate Professor, Cardiology



Publications

Time-Dependent ECG-AI Prediction of Fatal Coronary Heart Disease: A Retrospective Study, *Journal of Cardiovascular Development and Disease*, 11 (2), 395

Increasing clinicians' suspicion of ATTR amyloidosis using a retrospective algorithm, *Cardio-Oncology*, 10(1), 78, 2024.

Feasibility of remote monitoring for fatal coronary heart disease using Apple Watch ECGs, *Cardiovascular Digital Health Journal*, 2024, vol. 5 (3), p. 115-121, PMID: NA, <https://doi.org/10.1016/j.cvdhj.2024.03.007>

The fungal microbiota modulate neonatal oxygen-induced lung injury, *Microbiome*, 13 (35), 2025.

Accomplishments

Pilot Award from Center for Remote Health Monitoring: eBNP: A Remote and Noninvasive Monitoring of B-Type Natriuretic Peptides (with co-PIs Gilbert, Karabayir, and McGinnis)

Presented a Demo at opening ceremony of Celebrate Research! on March 4th

Stephen Downs, MD, MS

Professor, Pediatrics - General



Publications

Lehmann CU, Adams WG, Chaparro JD, Fiks AG, Grout RW, Leu MG, Mendonca EA, Michel JJ, Okechukwu K, Salmon J, Sharifi M, Downs SM. Better Guidelines and Policies: AAP's Partnership for Policy Implementation. *Pediatrics*. 2024 Jun 12:e2023061360. doi: 10.1542/peds.2023-061360. Epub ahead of print. PMID: 38864111.

Vincent CL, Poehling KA, Rigdon J, Schaich CL, South AM, Downs SM. Cost-Effectiveness of Intensive Blood Pressure Control in Youth With Chronic Kidney Disease. *Hypertension*. 2024 Dec 5. doi: 10.1161/HYPERTENSIONAHA.124.23437. Epub ahead of print. PMID: 39633564.

Qiong Wu, Bingyu Zhang, Jiayi Tong, L. Charles Bailey, H. Timothy Bunnell, Jiajie Chen, Elizabeth A. Chrischilles, Dimitri A. Christakis, Stephen M. Downs, et al, Real-world effectiveness and causal mediation study of BNT162b2 on long COVID risks in children and adolescents, *eClinicalMedicine*, Volume 79, 2025, 102962, ISSN 2589-5370, <https://doi.org/10.1016/j.eclim.2024.102962>

Abstract

Downs, Pickel, Aguilar, Martindale. Translating Clinical Decision Support Across Disciplines: Still a Sociotechnical Challenge. To be presented at the Pediatric Academic Societies 2025 Annual Meeting, Honolulu.

Accomplishments

RO1 Submission

AAP Partnership for Policy Implementation – current activities

Neuromotor Screening Clinical Report

Febrile Urinary Tract Infections Clinical Practice Guideline

Eating Disorders and Obesity Clinical Report

Early Hearing Detection and Intervention Clinical Report

HRSA National Workgroup on Measuring Language Acquisition Outcomes for 3 year-old Children With Hearing Loss

FACULTY PUBLICATIONS & ACHIEVEMENTS

Eric Kirkendall, MD, MBI

Professor, Pediatrics - Hospitalists



Publications

Manuscript through the Pediatric CDS Collaborative on review of pediatric AI implementations has been accepted. "Pediatric Predictive Artificial Intelligence Implemented in Clinical Practice from 2010-2021: A Systematic Review"

Accomplishments

Ongoing participation in Advocate AI Governance group (with Brian Wells)

Partnered with Stanford Center for Digital Health to administer AI survey to clinicians, to gauge their usage, perception, and predictions on AI tools. Data gathering in progress

Helping set the AI vision and strategy for Advocate Health.

FACULTY PUBLICATIONS & ACHIEVEMENTS

Mostafa Rezapour, PhD

Assistant Professor, Wake Forest Institute for Regenerative Medicine



Publications

Rezapour, Mostafa, Stephen J. Walker, David A. Ornelles, Muhammad Khalid Khan Niazi, Patrick M. McNutt, Anthony Atala, and Metin Nafi Gurcan. "Exploring the host response in infected lung organoids using NanoString technology: A statistical analysis of gene expression data." *PLoS one* 19, no. 11 (2024): e0308849.

Accomplishments

Presentation

- Opportunities and Challenges of AI Integration in Regenerative Medicine, January 27, 2025, Wake Forest Institute for Regenerative Medicine (WFIRM).

Da Ma, PhD

Assistant Professor, Gerontology and Geriatric Medicine



Publications

Conference Paper/Abstract Submission

MICCAI Paper

- Swapnil et al. Multi-modal Multi-Level Neuroimaging Fusion with Modality-Aware Mask-Guided Attention to Improve Dementia Risk Prediction
- Tavakoli et al. A Correlation-based Loss Mitigate Age-dependent Regression Biases in Brain Age Estimation
- Gong et al. Evaluating Foundation Model Architectures for Ocular Disease Detection in Ultra-Widefield Fundus Imaging

AAIC Abstract

- Guo et al. Cortical Graph Neural Networks to Predict Dementia Risk Based on MRI-Derived Cortical Surface Morphology
- Swapnil et al. Multi-modal Neuroimaging Based Dementia Risk Score for Early Detection of Future Risk of Dementia Onset for Alzheimer's Disease
- ARVO Abstract (Accepted)
- Ma et al. AI-assistant Ocular Imaging Biomarkers of Retinal Cytotoxicity, Glaucoma, and Treatment Monitoring
- Chen et al. Automated Retinal Layer and Fluid Segmentation and Cross-sectional Analysis using Spectral Domain Optical Coherence Tomography Images for Diabetic Retinopathy

Accomplishments

Awards

- Alzheimer's Association Research Grant (AARG) Award (2025-2028) - Cardiometabolic-integrated neuroimaging genomics for Alzheimer's disease

Workshop

- CAIR & UNC Charlotte's Collaboration in Action + Joint Pilot Award Program

FACULTY PUBLICATIONS & ACHIEVEMENTS

Arezoo Movaghar, PhD

Assistant Professor, Pediatrics



Accomplishments

Grants and Proposals

Artificial Intelligence (AI)-Driven Data Extraction to Examine Birth Outcomes and Health Disparities in Pregnancy Outcomes, CTSI Translational Research Award, Role: Co-I, Awarded.

- Awarded the supplemental grant from Center for Artificial Intelligence Research (CAIR) Understanding brain circuit dysfunction in autism toward improving medication effectiveness, CTSI Translational Research Award, Role: Co-I, Awarded.
- Awarded the supplemental grant from Center for Artificial Intelligence Research (CAIR)

Conferences

Movaghar, A., "Machine Learning for Early and Equitable Detection of Fragile X Syndrome in Diverse Pediatric Populations", Pediatric Academic Societies 2025 Meeting (Accepted).

Chimire, M., Movaghar, A., "A Data-Driven Analysis of Health Profile Shifts in Down Syndrome Regression Disorder", Gatlinburg Conference on Research and Theory in Intellectual and Developmental Disabilities (Accepted).

FACULTY PUBLICATIONS & ACHIEVEMENTS

Ibrahim Karabayir, PhD

Assistant Professor, Internal Medicine, Cardiovascular Medicine



Grants

Screening for HFP EF in Sickle Cell Disease Using Low-Cost, ECG-Driven AI Models, NIH R01, PI, February 2025. Submitted.

Mohammad J. Moghimi, PhD

Assistant Professor, Biomedical Engineering



Publications

Lim, E., Redleaf, M. & Moghimi, M.J. "Array of micro-epidermal actuators for noninvasive pediatric flexible conductive hearing aids," *Commun Eng* 4 (Nature Portfolio), 28 (2025).

Accomplishments

Article on flexible conductive hearing aids featured on the cover of *Communications Engineering* (Nature Portfolio)

Hearing Health and Technology Matters reported on our pediatric hearing aid technology: [“Researchers Develop Flexible Hearing Aids as Noninvasive Alternative for Pediatric Hearing Loss Treatment”](#)

ARPA-H Consortium Duke University, Johns Hopkins, Yale University, NC State University, Georgia Institute of Technology, University of Wisconsin-Madison, University of Michigan-Ann Arbor for "Monitoring and therapeutic implantable system in eye" \$50M Application, PI at Wake Forest: Mohammad Moghimi, Co-I: Arezoo Movaghah and George Schaaf.

Raaha Kumaresan presented at SPIE Photonics West, BIOS on "Effect of Flexible Substrate Young's Modulus on Vibration Transmission of Micro-Epidermal Actuators," San Francisco, CA.