HOPKINS ON THE HILL

RESEARCH SHOWCASE

June 11, 2025
5:30-7:30 PM
Rayburn Cafeteria
Rayburn House Office Building

EXPLORING THE UNIVERSE

SAVING MILLIONS OF LIVES

EXPANDING HUMAN KNOWLEDGE

JOHNS HOPKINS UNIVERSITY

Hopkins on the Hill is a biennial showcase of the range, value, and impact of federally funded research and programming at Johns Hopkins University. Come meet our researchers and practitioners to learn about their work in artificial intelligence, health care technology, space exploration, education, public health, and more.

MUSIC BY PEABODY INSTITUTE PERFORMERS

Enjoy exceptional performances from Peabody musicians as you explore this celebration of innovation and research.

U.S. Senator Benjamin Cardin (Ret.)

PRESENTERS SUPPORTED BY

Advanced Research Projects Agency for Health (ARPA-H)

Agency for Healthcare Research and Quality (AHRQ)

United States Army Medical Research Acquisition Activity (USAMRAA)

Army Research Laboratory (ARL)

Army Research Office (ARO)

Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)

Centers for Disease Control and Prevention (CDC)

Defense Advanced Research Projects Agency (DARPA)

Department of Defense (DOD)

Department of Education (ED)

Department of Energy (DOE)

Department of Health and Human Services, Administration for Strategic Preparedness and Response (HHS ASPR)

Department of Health and Human Services, Office of Population Affairs (HHS OPA)

Environmental Protection Agency (EPA)

National Aeronautics and Space Administration (NASA)

National Institutes of Health (NIH)

National Science Foundation (NSF)

JOHNS HOPKINS UNIVERSITY IS PROUD TO BE **AMERICA'S FIRST RESEARCH UNIVERSITY**

Founded in 1876, Johns Hopkins has been advancing knowledge and bringing discoveries to the world for nearly 150 years.

Our researchers, clinicians, faculty, and students have pioneered historic discoveries—creating water purification, CPR, corrective surgery for infant heart defects, and a deflection technique to protect Earth from the threat of asteroids. We have championed lifesaving public health interventions like vitamin A and seat belts, authenticated the Dead Sea Scrolls, and explored the farthest reaches of our solar system.

Each year since 1979, a span of 45 years, Johns Hopkins has been the nation's leader in federally funded university research. **Those investments fuel lifesaving innovation and interventions, discoveries that enrich our lives and help position the United States at the forefront of the global scientific enterprise. Simply put: Research Saves Lives.** Backed by federal funding, Johns Hopkins researchers have made significant strides in the treatment and understanding of an enormous range of diseases and disorders, including cancer, Alzheimer's disease, Parkinson's disease, stroke, opioid addiction, and many more.

"Johns Hopkins University exemplifies an unwavering commitment to advancing knowledge and innovation. ... We applaud the collective dedication of our researchers who, fueled largely by federal support, continue to make groundbreaking strides in diverse fields, from animal cognition to cancer treatment innovations and artificial intelligence. This accomplishment speaks to the enduring impact of Johns Hopkins in shaping the forefront of research and underscores our vital role in driving progress and discovery for the betterment of society."

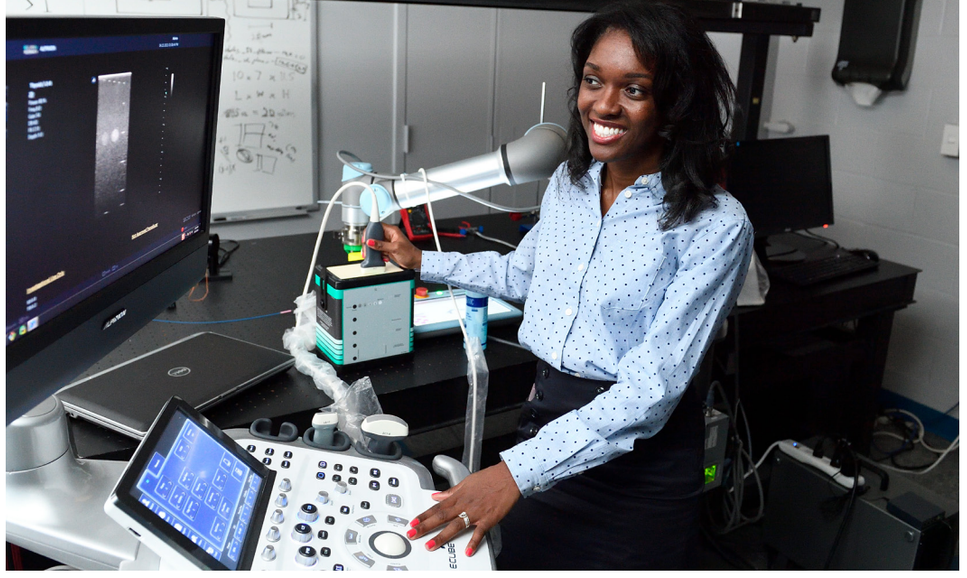
—Denis Wirtz, Vice Provost for Research at Johns Hopkins

This critical work is made possible by the decades-long compact between the federal government and research institutions like Johns Hopkins, an arrangement of mutual benefit that is the envy of the scientific world. Federal investment supercharges the nation's innovation ecosystem and returns a substantial economic benefit—fueling innovation, creating and supporting jobs, and facilitating the delivery of new ideas and technologies to industry. In fiscal year 2024, every dollar in federal research investment by the National Institutes of Health generated approximately $2.56 in economic activity.

Johns Hopkins accounted for more than 100,000 jobs (direct and indirect) and an impact of $16.8 billion on the economy in fiscal year 2022. But our impact is about more than numbers—Johns Hopkins provides outreach, education, training, support services, and much more to families, patients, and neighbors across the country and around the world.

Day in and day out, we pursue new and innovative ideas, prepare the next generation of scientific and civic leaders, and bring knowledge and lifesaving care to the world.

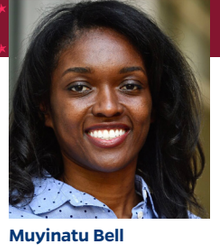
We are proud of what we do and thrilled to share our expertise and excitement with you by hosting Hopkins on the Hill.



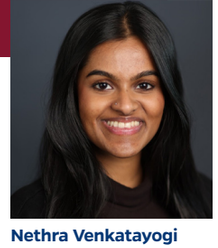
IMAGING THE FUTURE: CUTTING-EDGE TECHNOLOGIES FOR BETTER PATIENT CARE

The Photoacoustic and Ultrasonic Systems Engineering Lab engineers and deploys innovative biomedical imaging systems that address unmet clinical needs, with an emphasis on diagnostic and surgical ultrasound and photoacoustic technologies. The highly interdisciplinary research agenda integrates optics, acoustics, robotics, signal processing, and medical device design to improve the standard of patient care.

Supported by the National Science Foundation (NSF), National Institutes of Health (NIH), and Advanced Research Projects Agency for Health (ARPA-H)



Muyinatu Bell
Whiting School of Engineering and School of Medicine

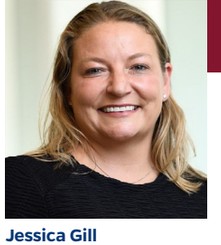


Nethra Venkatayogi
PhD student, Whiting School of Engineering

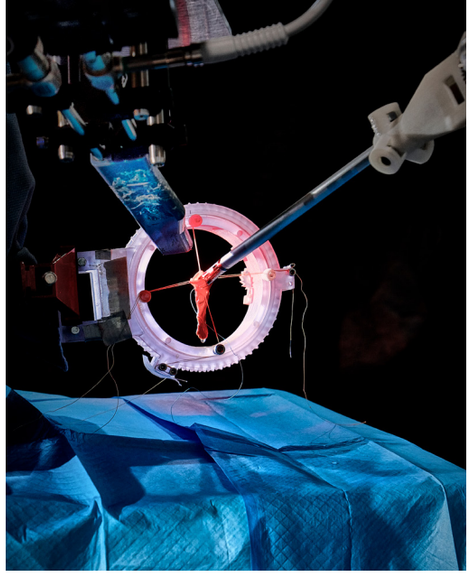
BIOMARKERS TO IMPROVE BRAIN INJURY CARE

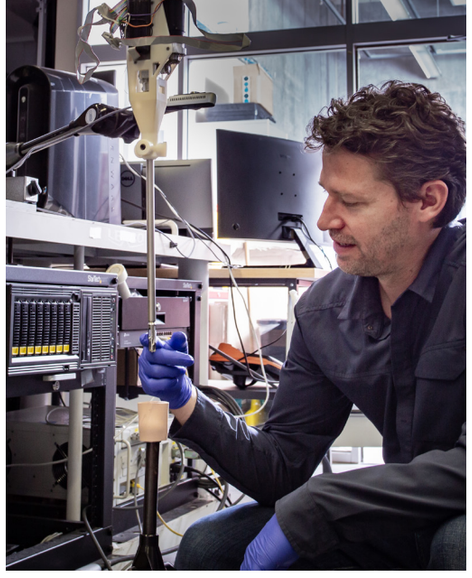
In her research among military personnel, athletes, emergency room patients, and others who have experienced traumatic brain injuries (TBIs), Jessica Gill identifies fluid biomarkers to identify people at higher risk for poor recovery and long-term effects of TBI, including post-traumatic stress disorder, depression, and post-concussive syndrome. Her research informs the development of methods to identify or diagnose a TBI, as well as the use of biomarkers to monitor recovery pathways.

Supported by the Army Medical Research Acquisition Activity (USAMRAA) and National Institutes of Health (NIH)



Jessica Gill
School of Nursing



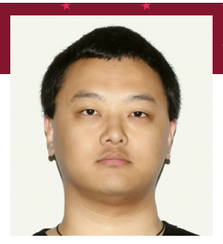


ENHANCING PRECISION IN ROBOTIC SURGERY

Dr. Krieger's research aims to transform surgery by developing robots capable of performing surgical procedures autonomously, reducing the reliance on human surgeons while enhancing precision and eliminating errors. While current robotic surgery systems require surgeons to control every movement, this work emphasizes the creation of intelligent surgical robots that can navigate the challenges associated with unpredictable soft tissues. The ultimate objective is to make surgeries faster, more consistent, and less invasive, resulting in improved patient outcomes.

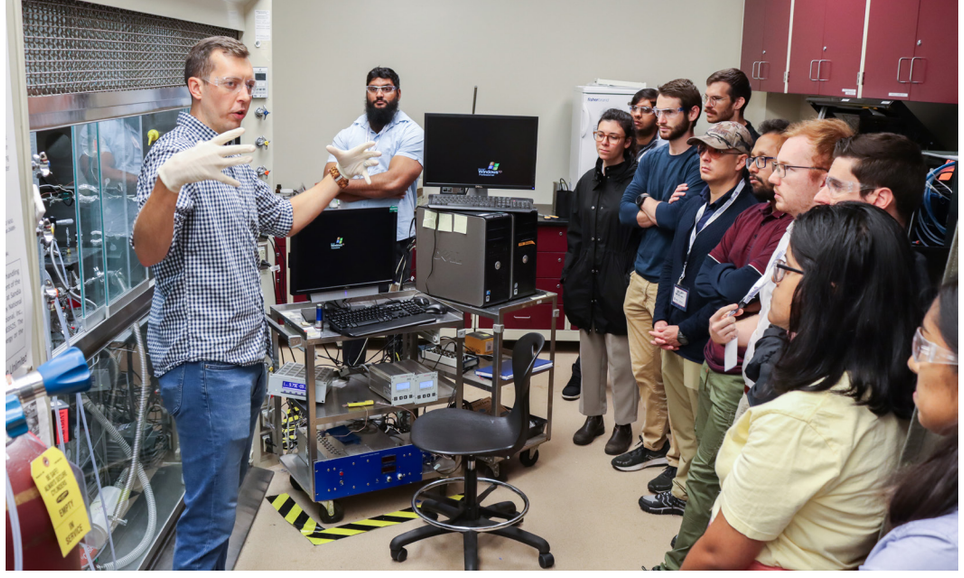
Supported by the Advanced Research Projects Agency for Health (ARPA-H), National Institutes of Health (NIH), and National Science Foundation (NSF)

Axel Krieger
Whiting School of Engineering



Jiawei Ge
Postdoctoral researcher, Whiting School of Engineering

Ethan Kilmer
PhD student, Whiting School of Engineering



BATTLING THE THREAT OF WEAPONS OF MASS DESTRUCTION

The Materials Science in Extreme Environments University Research Alliance (MSEE URA) conducts basic research to understand, predict, and control the behavior of materials in extreme conditions caused by weapons of mass destruction (WMDs). The alliance advances the fundamental knowledge around combating WMDs and prepares the next generation workforce to support national security. Johns Hopkins leads the alliance that includes 18 institutions and 44 researchers across the United States.

Supported by the Defense Threat Reduction Agency (DTRA) and Department of Defense (DOD)

Todd Hufnagel
Whiting School of Engineering

Tim Weihs
Whiting School of Engineering

Megan Bokhoor
PhD student, Whiting School of Engineering

Preetom "Ruku" Borah
PhD candidate, Whiting School of Engineering

SAFEGUARDING HUMANITY AGAINST LETHAL PATHOGENS

The Johns Hopkins Special Pathogens Center, one of 13 in the country, is dedicated to preparing for, monitoring, and treating highly lethal infections and diseases of unknown origin. The center brings together the expertise of three distinct areas at Johns Hopkins Medicine—clinical care, research, and education—to respond to special pathogen threats and safeguard the health care workforce and the public.

Supported by the Department of Health and Human Services, Administration for Strategic Preparedness and Response (HHS ASPR)

Carrie Billman
Johns Hopkins Medicine

Jon Olesen
Johns Hopkins Medicine

Christopher Sulmonte
Johns Hopkins Medicine

IDENTIFYING RISK FACTORS IN BREAST CANCER

The Jenkins-Lord Lab engages in translational research that investigates how a variety of upstream risk factors can directly influence breast tumor biology. The lab aims to characterize drivers of breast cancer disparities across populations and improve outcomes for all.

Supported by the National Institutes of Health (NIH)

Brittany Jenkins-Lord
Bloomberg School of Public Health and School of Medicine

Angel Hokulani Pajimola
PhD student, Bloomberg School of Public Health

Johns Hopkins accounted for more than 100,000 jobs (direct and indirect) and an impact of $16.8 billion on the economy in fiscal year 2022.

HOPKINS ON THE HILL

But our impact is about more than numbers—Johns Hopkins provides outreach, education, training, support services, and much more to families, patients, and neighbors across the country and around the world.

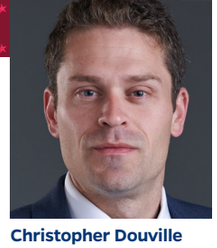
Research Saves Lives

Read more about the critical research work being done at Johns Hopkins University. hub.jhu.edu/research-saves-lives

ANALYTICAL TOOLKIT FOR BUILDING MINIMALLY INVASIVE CANCER TESTS

Finding minimally invasive methods to assess cancers has long been a central goal of oncology research. In the past decade, there have been major advances in our ability to examine tumor-derived material in the circulation and other biofluids, including urine, saliva, and cerebrospinal fluid. This has been possible due to the development of sensitive assays capable of detecting rare cancer-specific analytes immersed in a vast excess of analytes derived from normal cells. Dr. Douville's research explores the role of computational methods and how they can enhance traditional approaches used to build liquid biopsies.

Supported by the National Institutes of Health (NIH)



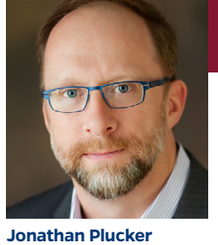
Christopher Douville
School of Medicine

TRANSFORMING EDUCATION FOR TALENTED STUDENTS IN RURAL COMMUNITIES

Project Launch Plus is a multiyear project that supports the learning of high-ability students and their communities in high-poverty rural areas in Kentucky and North Carolina. The project increases the number of identified advanced students living in high-poverty, rural areas, which leads to advanced learning opportunities for those students.

A second Javits grant supports the Project to Transform Advanced Learning (PTAL). This project builds on the lessons learned from Launch Plus by creating strategies for scaling the educator coaching model. In participating districts in New Jersey and North Carolina, the PTAL team uses a combination of online professional learning modules and in-person coaching sessions to help educators learn and apply strategies for identifying and teaching advanced students.

Supported by the Department of Education (ED)



Jonathan Plucker
School of Education

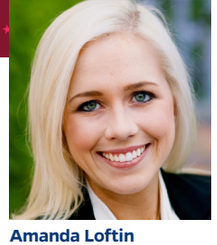
REVOLUTIONIZING ORGAN PRESERVATION AND TRANSPLANTATION

Johns Hopkins University, in partnership with X-Therma Inc., is developing groundbreaking tissue and organ preservation techniques, specifically through next-generation cryoprotective agents that enable ice-free preservation at subzero temperatures. This research aims to address one of the major challenges in transplantation—the limited window for organ preservation—which hampers graft availability and increases the risk of rejection. By extending preservation capabilities from hours to several days, this innovative approach could significantly enhance transplant outcomes.

Supported by the National Institutes of Health Small Business Innovation Research (NIH SBIR) and Department of Defense Congressionally Directed Medical Research Programs (DOD CDMRP)

Gerald Brandacher
School of Medicine

Byoung Chol Oh
School of Medicine

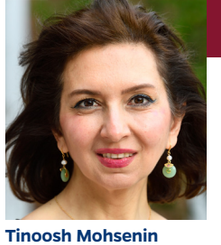


Amanda Loftin
PhD candidate, School of Medicine

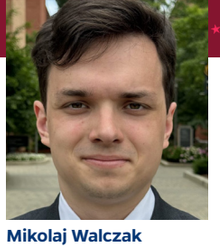
EMPOWERING AUTONOMOUS ROBOTS: ENERGY-EFFICIENT AI FOR LIFE-SAVING MISSIONS

Dr. Tinoosh Mohsenin's research develops energy-efficient AI computing technologies for autonomous robots that can operate in remote and disconnected environments. By enabling real-time on-device AI decision-making under extreme resource constraints, her work aims to accelerate rescue missions, reduce casualties, and save lives, especially during mass casualty incidents in both civilian and military settings where medical resources are limited.

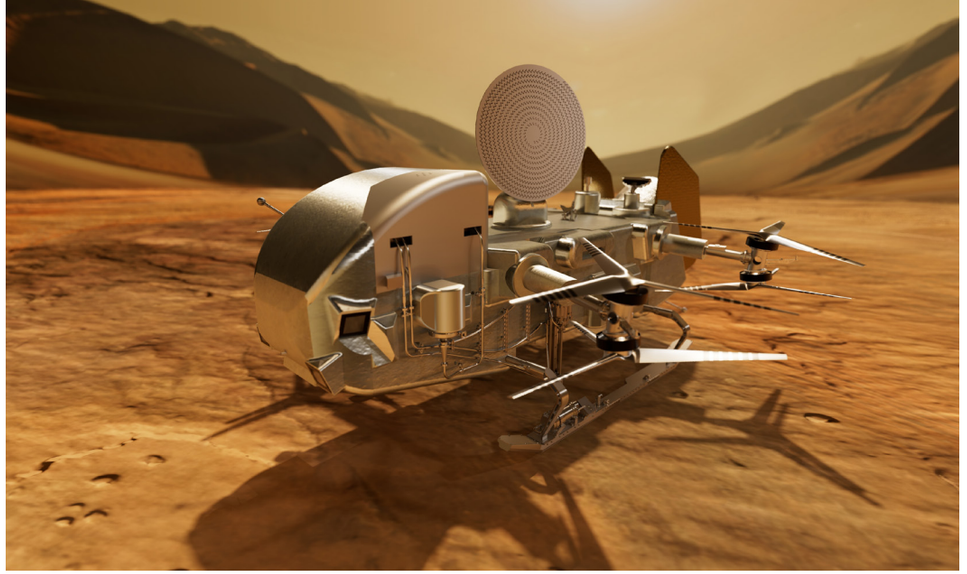
Supported by the National Science Foundation (NSF), Defense Advanced Research Projects Agency (DARPA), Laboratory for Physical Sciences (LPS), U.S. Army Research Office (ARO), and U.S. Army Research Laboratory (ARL)



Tinoosh Mohsenin
Whiting School of Engineering



Mikolaj Walczak
PhD student, Whiting School of Engineering



DRAGONFLY: NASA'S DARING LEAP TO TITAN

Dragonfly may be the most ambitious science mission NASA has ever attempted: sending a car-sized, nuclear-powered octocopter to explore the surface of a distant ocean world. In a voyage straight out of science fiction, Dragonfly will deliver one of the most expansive suites of science instruments ever dispatched to another celestial body. The APL-led mission includes a team of experts from around the world collaborating and partnering with U.S. industry to turn these game-changing space science and flight plans into reality.

Supported by the National Aeronautics and Space Administration (NASA)

Nick DeMatt
Applied Physics Laboratory

Ken Hibbard
Applied Physics Laboratory

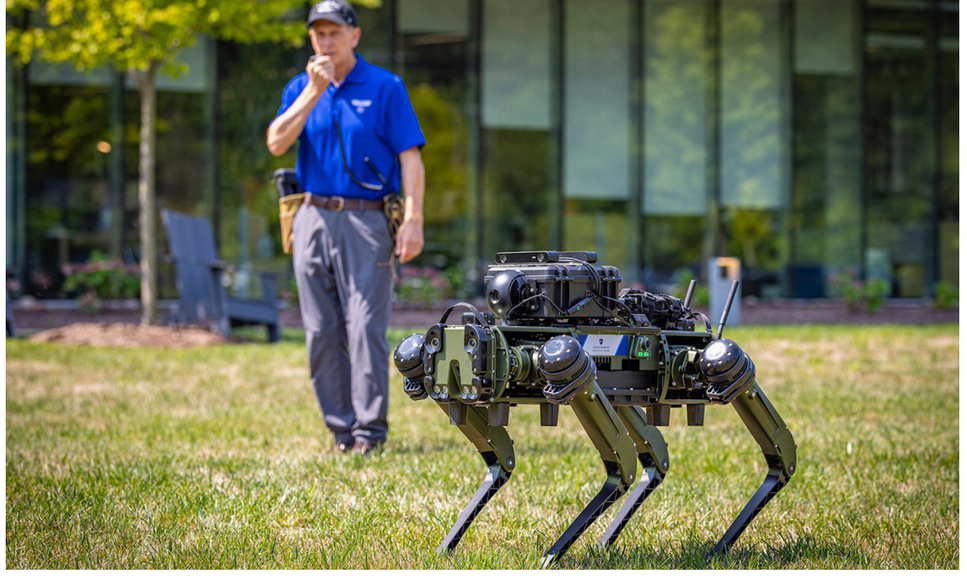
Elizabeth "Zibi" Turtle
Applied Physics Laboratory

AI-ENHANCED STETHOSCOPES TRANSFORMING DIAGNOSTICS IN HEALTHCARE

Innovative research at the intersection of engineering and neuroscience is propelling forward diagnostic and auditory technologies that are effective in complex real-world environments. Mounya Elhilali, in collaboration with clinical colleagues from the Schools of Medicine and Public Health, is developing AI-enhanced stethoscopes capable of accurately identifying respiratory infections, a leading cause of child mortality worldwide. This groundbreaking research is transforming how we listen to and interpret sounds, both from our surroundings and within our own bodies, setting the stage for the next generation of intelligent hearing and diagnostic devices.

Supported by the National Institutes of Health (NIH)

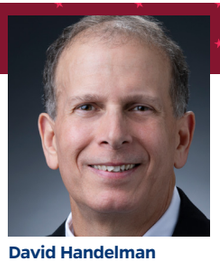
Mounya Elhilali
Whiting School of Engineering and Krieger School of Arts and Sciences



EMBODIED AI

APL is advancing robotics, artificial intelligence, and augmented reality to enhance robot autonomy and human-robot teaming, including medical first responders' effectiveness in high-risk environments. APL experts will showcase how four-legged robots autonomously interpret and execute tasks using natural language commands, a capability that has the potential to support medics in providing critical care at scale with minimal intervention.

Supported by the Department of Defense (DOD)



David Handelman
Applied Physics Laboratory

Emma Holmes
Applied Physics Laboratory

Bethany Kemp
Applied Physics Laboratory

Corban Rivera
Applied Physics Laboratory

POLLUTION MONITORING TECHNOLOGY TO DETECT DISEASES

Using state-of-the-art instrumentation onboard a mobile laboratory, this team measures and assesses the real-world impacts of breathing complex mixtures of these chemicals. Using these data, the team translates the exposures using cumulative risk assessment approaches to understand the risks of developing cancer and other diseases.

Supported by the National Institutes of Health (NIH), Department of Energy (DOE), Environmental Protection Agency (EPA), National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), and Bloomberg Philanthropies

Peter DeCarlo
Whiting School of Engineering

Keeve Nachman
Bloomberg School of Public Health

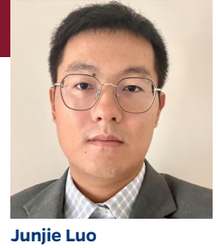
Daniel Blomdahl
Postdoctoral researcher, Environmental Health and Engineering

AI INNOVATIONS FOR EARLY ADHD DIAGNOSIS AND BEYOND

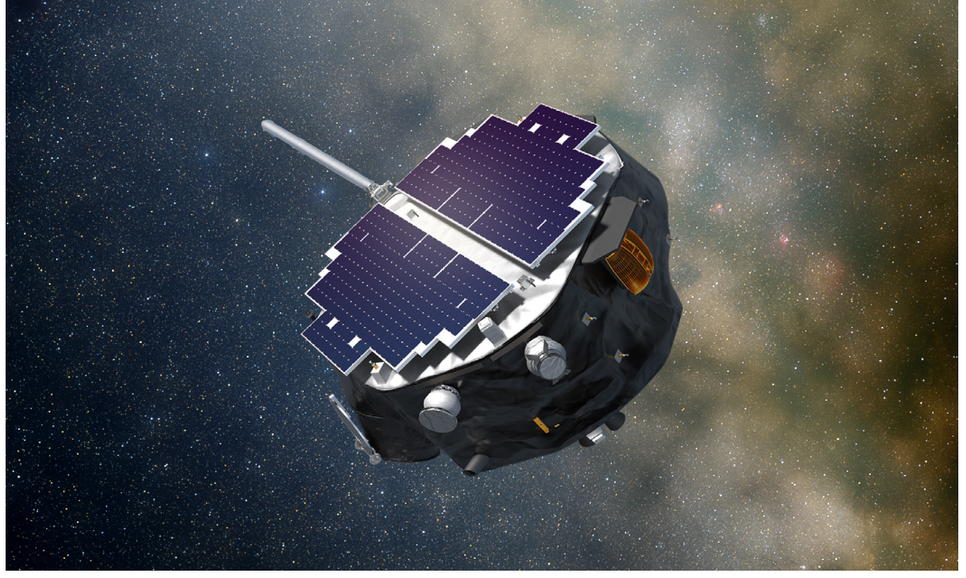
Dr. Gao aims to advance health care with AI solutions for early ADHD diagnosis in children, precise diabetes risk assessment using electronic health records, and powerful foundation models for wearable sensor data. This technology empowers health care providers with unprecedented insights into disease prevention and management, potentially improving patient outcomes and reducing health care spending. Dr. Gao and his team are also establishing AI for Health Research labs nationwide, fostering groundbreaking research and strengthening the national AI workforce in health care.

Supported by the National Institutes of Health (NIH) and Agency for Healthcare Research and Quality (AHRQ)

Gordon Gao
Carey Business School



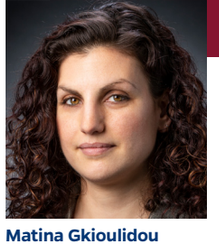
Junjie Luo
PhD student, School of Medicine



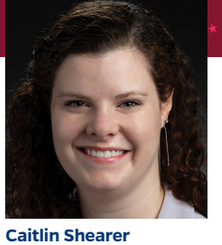
IMAP MISSION: UNLOCKING THE SECRETS OF OUR COSMIC NEIGHBORHOOD

NASA's Interstellar Mapping and Acceleration Probe (IMAP) mission, which APL is building in partnership with principal investigator David McComas of Princeton University, will explore our solar neighborhood, called the heliosphere, decoding the messages in particles from the sun and beyond our cosmic shield. With a set of 10 instruments, IMAP is equipped to observe a vast range of particle energies and types in interplanetary space. The goal is to simultaneously investigate two of the most important overarching issues in heliophysics: the energization of charged particles and the interaction of the solar wind with the winds from other stars and other material that fills our galaxy.

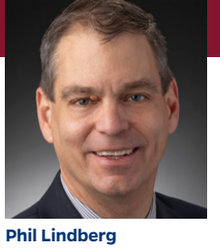
Supported by the National Aeronautics and Space Administration (NASA)



Matina Gkioulidou
Applied Physics Laboratory



Caitlin Shearer
Applied Physics Laboratory

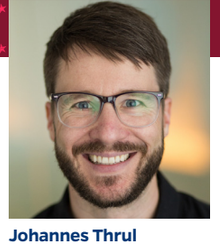


Phil Lindberg
Applied Physics Laboratory

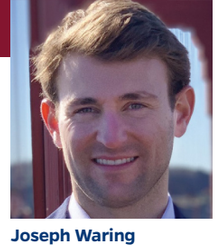
USING MOBILE HEALTH INTERVENTIONS TO ADDRESS TOBACCO AND SUBSTANCE USE

Dr. Thrul's research focuses on digital and mobile health interventions to address substance use and mental health, strongly emphasizing tobacco, cannabis, digital well-being, and real-time data collection methods such as ecological momentary assessment. His work integrates behavioral science, epidemiology, and digital technologies to develop and evaluate innovative interventions for smoking cessation and substance use treatment. Through interdisciplinary collaborations and advanced data collection and analysis approaches, his research informs public health strategies and policies that promote healthier behaviors.

Supported by the National Institutes of Health (NIH)



Johannes Thrul
Bloomberg School of Public Health

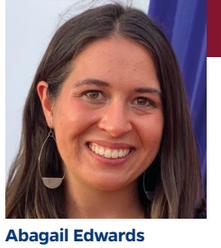


Joseph Waring
PhD student, Bloomberg School of Public Health

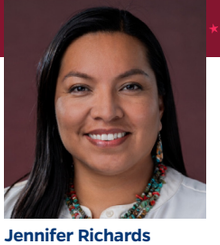
INFORMED SOLUTIONS FOR HEALTH IN NATIVE YOUTH

One of the greatest needs across Indian Country is risk reduction programming for Native youth. The Navajo Nation ranks above the national average on numerous measures of health risks, including sexually transmitted infections and teen birth rates. Of particular concern, syphilis in one county is 10 times the national rate. The program, run by the Johns Hopkins Center for Indigenous Health, leverages community and cultural strengths to help youths make positive decisions as they move through adolescence and improve their long-term health outcomes.

Supported by the Department of Health and Human Services, Office of Population Affairs (HHS OPA)



Abagail Edwards
Bloomberg School of Public Health



Jennifer Richards
Bloomberg School of Public Health

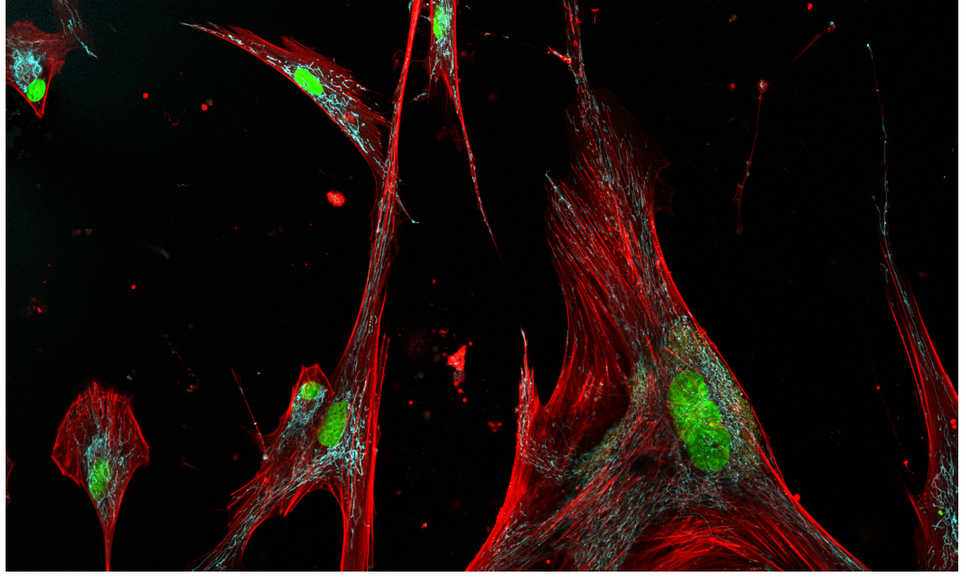
REDEFINING PEDIATRIC SAFETY THROUGH FIREARM STORAGE SOLUTIONS

Firearms are the leading cause of death of children and teens in the United States, and secure storage is known to reduce firearm injuries and suicide. However, clinicians rarely deliver firearm injury prevention counseling. Dr. Hoops and Dr. Houshmand's research studies the implementation of firearm access screening and secure storage counseling supported by the use of the Adopting Comprehensive Training for FireArm Safety in Trauma (ACTFAST) toolkit in six major pediatric and adult trauma centers.

Supported by the Centers for Disease Control and Prevention (CDC), National Institutes of Health (NIH), Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), Bloomberg American Health Initiative, and Henry Schein Cares Foundation

Katherine Hoops
Johns Hopkins Medicine and Bloomberg School of Public Health

Natasha Houshmand
General Surgery resident, Johns Hopkins Medicine; PhD candidate, Bloomberg School of Public Health

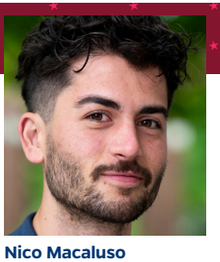


AGING INSIGHTS THROUGH AI-DRIVEN IMAGING

As an overarching theme, the lab studies "why people age differently and why some are more prone to developing aging-associated diseases." Through interdisciplinary approaches that combine experiments with AI and machine learning, imaging-based technology is developed to investigate how cell behaviors can serve as sensors or biomarkers of health, disease, and transitions from health to disease. The long-term goal is to engineer resilience and health in humans by targeting defective properties of aging cells.

Supported by the National Institutes of Health (NIH)

Jude Phillip
Whiting School of Engineering



Nico Macaluso
PhD student, Whiting School of Engineering

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JOHNS HOPKINS UNIVERSITY & MEDICINE
OFFICE OF FEDERAL STRATEGY

Kristen Reek
Director of Federal Strategy
kreek1@jhu.edu

Yvonne Darpoh
Appropriations Analyst
ydarpoh1@jhu.edu

Visit us at federalstrategy.jh.edu

OFFICE OF THE VICE PROVOST FOR RESEARCH

Denis Wirtz
Vice Provost for Research

Nick Wigginton
Associate Vice Provost for Research
nwiggin7@jhu.edu

Visit us at research.jhu.edu

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