ihmc

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FLORIDA INSTITUTE OF TECHNOLOGY

This issue of our newsletter celebrates a significant milestone in IHMC's evolution – 20 years after we became an independent research entity and 34 years since the Institute was founded.

This summer, we marked the ribbon cutting of our new, $40 million research complex dedicated to advancing science around healthspan, resilience, and human performance.

In our featured article you can read more about the translational research that we hoped to undertake in this beautiful facility. In 1990, when IHMC started, we had no notion of a complex like this. This facility and the scientists and engineers who will inhabit it, will bring to life another chapter in IHMC's vision.

The Senior Research Scientists who are engaged in much of our Healthspan, Resilience, and Performance research – Dr. Tim Broderick, Dr. Marcas Bamman, Dr. Jeff Phillips and Dr. Kevin Gluck – lead teams that will pursue clinical and interdisciplinary research to advance knowledge and improve the human condition.

While we laud what the new research complex represents in this issue, we also share some news of our other work at IHMC. This spring, IHMC partnered with California-based nonprofit research institute SRI to take aim at the psychology of cyberattackers to better defend against their efforts.

Summer is a season at IHMC that sees interns and students on our campuses – something to which we are deeply committed. That's why we share stories in this edition about summer robotics camp, our year-round internships, and our interns from the U.S. Air Force Academy's Cadet Summer Research Program.

We believe in place-based innovation and IHMC is a great place to do innovative research. We are proud to have planted our roots in Florida and we look forward to the future that emerges as a result.

Best,

Ken Ford

Ken Ford

Ribbon-cutting marks new era of innovation and boundary-pushing research at IHMC

The new $40 million biomedical-based research complex constructed by the Florida Institute for Human and Machine Cognition (IHMC) will be more than a striking addition to the Pensacola skyline.

The complex will be an accelerant for the pace of discovery that will drive innovations in maximizing the healthspan for everyone from elite military operators and veterans to aging civilians with degenerative neuromuscular diseases, dementia, and chronic conditions.

The Healthspan, Resilience and Performance research complex is another step in the evolution of the vision that has been the bedrock of IHMC since its founding by Dr. Ken Ford, the Institute's Chief Executive Officer.

"Pushing the boundaries of science to maximize the performance and resilience of human beings has long been a foundational tenet at IHMC," Ford says. "In our healthspan, resilience and performance research, the vision has always been to move from the molecular level to the whole human. This facility brings that to life."

Dr. Morley Stone, Chief Strategic Partnership Officer, notes that the research complex gives IHMC's interdisciplinary team of researchers the ability to truly realize that vision.

"The healthcare system as it is set up now puts people on a trajectory to die over 20 years' time," Stone says. "We want to be a home for the science that helps change that framework and focuses instead on extending the period of a person's life over which they are mobile, high-functioning, and healthy."

The complex is a one-of-kind facility unlike anything in the Southeast. It also will be an economic and intellectual beacon for the entire Northwest Florida region, says Dr. Marcas Bamman, Senior Research Scientist and Director of Healthspan, Resilience, and Performance research at IHMC.

The work undertaken here will be an economic engine, drawing in new funding in federal and industry-sponsored research. The facility will become a hub for collaboration with regional institutions and organizations that share an interest in healthspan and performance.

Partners in the project have included Space Florida and Triumph Gulf Coast, the nonprofit corporation funded by a legal settlement with BP following the 2010 Deepwater Horizon oil spill. Funding provided by these agencies helped support the research complex.

It also will be magnet drawing top research talent to the area from all over the world.

A unique research facility

Stone says that biomedical science hubs at Emory University and University of Alabama Birmingham are kin to the complex, but even they bear the limitations that come with being tied to a single university. There are

Georgia Tech researchers visited IHMC in 2024 to run data collection experiments on various EMG sensor types in the new HRP research facility.


IHMC CEO and Founder Dr. Ken Ford

multiple colleges, departments, and the accompanying bureaucracy.

IHMC has none of that.

That collaborative, cross-discipline spirit – which has been a hallmark of IHMC – is an accelerant for the speed of discovery. Healthspan, Resilience, and Performance researchers literally are arm's length reach away from experts in cognitive psychology, computer modeling, data visualization, AI, cybersecurity, exoskeletons, robotics, and more.

The complex is designed to fuel the pace of discovery. The first floor is built around human subject participant testing and intervention. It features rehabilitation facilities, biomedical sampling tools and laboratory space.

"The first floor is clinical and applied science," Bamman says. "The third floor is where we start to understand the effects that we are having on people on the first floor. We now have the capacity – both with people and tools and technology – to understand what effect the interventions we are doing on the first floor have on people in very short order."

In practical terms, it means samples won't be shipped to a lab outside of the area for analysis. They will just be walked upstairs. The huge data sets generated by the therapeutic interventions can be reviewed by IHMC experts in data visualization and modeling to help pinpoint the findings that are key.

"This speed of discovery sets up a virtuous cycle for our funding agencies," Stone says. "The way we execute the research that they fund us to do allows us to achieve results more efficiently. That improves our success rate in answering the questions these agencies are interested in asking, which in turn, we hope, enhances our success rate in getting subsequent follow-up awards to continue the research. That's the virtuous cycle this kind of investment enables."

As the biological sciences have shifted more to become intertwined with information sciences, IHMC is uniquely positioned to accelerate that trend and excel while doing it.

"Every institution that is doing this work is struggling with how to generate meaning from that information," Stone says. "Going back to our legacy, being able to tap into artificial intelligence and machine learning capability that was the foundation of IHMC is an invaluable resource for being able to make meaning out of that information that's generated."

A regional economic hub, a draw of international experts

The complex is not just a magnet for talent. It is a magnet to draw new dollars into the community.

Stone notes that a traditional economic development model just facilitates the speed of a dollar going from a dry cleaner to the restaurant to the grocery store and so on.

"We're bringing in millions of dollars of new research money into the economy that our researchers use to buy houses, go out to eat, to buy cars. That type of impact is hard to match," Stone says.

Attracting top-tier talent goes hand in hand with attracting multimillion dollar grants for research projects.

"When we recruit a researcher in, there's almost always a spouse along, and that spouse also is a professional," Bamman says. "That, too, feeds the talent pool in the community."

Senior Research Associate Kana Meece moved to Pensacola from New York City, where she was senior staff associate at the Columbia University Medical Center.

"I consider it a rare privilege to be part of IHMC, where we handle all research processes internally, from the initial stage to the completion of experiments," Meece says. "I've encountered a wealth of cutting-edge technologies that support our deep dive into research. These resources not only expand our scientific horizons but also fuel our passion for understanding human performance and resilience more comprehensively. These tools not only enhance our ability to analyze data, but also empower us to explore biology at an unprecedented level of detail."

As IHMC looks to add depth to its team in neuroscience and regenerative rehabilitation among other areas, there is no question that the new facility connects IHMC's core competencies of biomechanics and exoskeletons to healthspan, resilience, and performance.

"It's really the perfect bridge between engineering and physiology," Stone says.

Zach Graham is just one of the researchers drawn to IHMC in part because of the possibilities that the new research complex affords.

"The new building and the research it will support were the primary drivers for why I came to IHMC, as well as a general interest in using exoskeletons to improve the function of people that may need them," Graham says.

The new complex supports the work that Graham does in a way that few other facilities around the country could do.

The center is uniquely equipped to do exercise trials and cellular and molecular work under one roof. It creates a space where a person's endurance capacity can be tested and blood and muscle tissue samples can be drawn and analyzed in the mitochondrial energetics and cell culture labs. It means that in a matter of hours — rather than weeks or months — researchers can have data to know whether the VO2 max test score a subject received was reflective of either a very robust or deficient profile in the cells that were analyzed in house and where an intervention is needed.

Graham is interested in studies that utilized the power of exercise in tandem with a drug or nutritional intervention to help improve function during aging, Parkinson's disease, or even otherwise healthy individuals.

"For some people, exercise is enough to improve function. For others, they need other things that boosts them to optimize their potential," Graham says.

"Understanding who needs what type of intervention is an important question and lot of us are interested in this."

In addition to drawing talented researchers, the research complex will allow IHMC to attract projects that bring significant dollars.

"For these high-dollar, highly competitive federally funded research applications to be successful depends on a number of things," Bamman says. "Number one, you must have an important question that the funding agency cares about. Number two, you must demonstrate that you're the right team to answer that question.

"Part of demonstrating that you're the right team to answer that question are the facilities and resources you can bring to bear, but also how quickly you can accurately and reliably generate preliminary data to give some credence to your idea. This facility really allows us to do that," Bamman says.

It's already paying dividends.

Bamman has received a $7.7 million dollar award from the National Institutes of Health (NIH). This project is called "Multidimensional Predictive Modeling to Understand Mechanisms of Exercise Response Heterogeneity in Older Adults."

Age-related functional declines are thought to be caused by hallmark biological processes that ultimately compromise healthspan and quality of life. Exercise is a multipotent treatment with promise to mitigate most aging hallmarks, but there is substantial variability in individual exercise responsiveness.

Senior Research Scientist Dr. Marcas Bamman helps lead the HRP research team

This inter-individual response heterogeneity was first identified in the context of endurance training and later it was established with resistance training.

Bamman and his team propose the innovative, but logical, strategy to use combined endurance training and resistance training to maximize health benefits in aging adults.

Low cardiorespiratory fitness and low functional muscle quality are multi-system manifestations of the deterioration caused by cellular aging. Importantly, both conditions are modifiable with endurance resistance training.

The IHMC team anticipates this research will foster significant advances in the understanding of factors impacting exercise response variability among older adults by determining the role of aging hallmarks and defining multi-dimensional pathways of aging.

While the population at large ultimately will benefit from what the team learns about aging, degenerative and chronic metabolic conditions, the findings could be especially impactful for military operators, a group who are often a target audience of the research done at IHMC.

Bamman notes "the epidemiological data tell us that, for most chronic diseases, they impact veterans earlier and more severely in life. If we extend their healthspan, that's a huge benefit."

Dr. Nicole Stafford, Research Associate

Nicole Stafford is a Research Associate who joined IHMC this summer a member of the exoskeleton team working on controls and device evaluation. Her Ph.D. is from the University of Florida in the Human Neuromechanics Lab. She earned her bachelor's and master's degrees at Stanford University, where she knew Dr. Gwen Bryan, the IHMC Research Scientist who leads the exoskeleton team.

While Stafford was drawn by IHMC's extensive record of innovation and collaborative spirit, the Research Complex itself also was appealing.

"It will allow for a unique opportunity to further explore and understand how humans experience and use exoskeleton/robotic devices from both the traditional engineering development but also physiological/psychological perspectives," Stafford says.

Stafford's research focuses on developing a myoelectric controller for a bionic ankle prosthesis that leverage the residual muscle activity for individuals with transtibial amputations for ankle control. As a Ph.D. student, she spent a one-year internship with X the Moonshot Factory, whose parent company is Alphabet Inc., working on their lower limb exoskeleton project.

"The teamwork of IHMC's science approach will allow me to develop new skills related to understanding how humans and robotic devices interact," Stafford says.

"I see boundless opportunities to collaborate with many excellent researchers to answer challenging questions about how robotic devices can assist humans."

Dr. Zach Graham, Research Scientist

Dr. Zach Graham is a Research Scientist with an interest in how exercise can improve quality of life. Graham's research focuses on spinal cord injury, Parkinson's disease and aging. His postdoctoral training in muscle physiology took place at the National Center for the Medical Consequences of Spinal Cord Injury at the James J. Peters Veterans Administration Medical Center in the Bronx, N.Y. after which he joined the Birmingham VA Health Care System.

He is continuing the work he started at the VA at IHMC. The Research Complex — and the science it will support — was one of the main draws for Graham to come to IHMC.

"There are very few places in the country that will have the capabilities to answer the questions I'm interested in," Graham said.

These questions Graham focuses on include how exercise might be combined with drugs for combinatorial treatments and how we might use novel powered exoskeletons to design new exercise strategies in those that have difficulties walking. For some people, exercise is enough to improve function. Others need a drug or nutritional intervention. Understanding who needs what type of intervention is an important question.

His animal research has focused on how spinal cord injury changes how energy substrates are utilized. The exoskeleton studies have focused on maintaining or improving mitochondrial function in skeletal muscle.

"You're pretty much only as healthy as your muscle is," Graham says. "The hope is to find easily implemented ways for people to improve their health and function."

Kana Meece, Senior Research Associate

Kana Meece came to IHMC from Columbia University Medical Center in New York City, where her research focused on melanocortin neuropeptide systems, which plays a key role in regulating appetite and body weight and is an important target for leptin and insulin in the hypothalamus.

As lab manager, she is working with a research team conducting experiments aimed at advancing molecular biology. She learned about IHMC shortly after moving to Pensacola through word of mouth — and an episode of STEM-Talk.

"The institute's focus on healthspan, resilience, and performance immediately resonated with me," Meece says.

Her father's post-retirement dedication to mountain climbing showed her firsthand how prioritizing activity can drastically improve both physical and mental health. Meece's youth growing up in Japan, a country with a significant aging population, reinforced to her the importance of maintaining well-being.

"At IHMC, I've encountered a wealth of cutting-edge technologies that expand our scientific horizons and fuel our passion for understanding human performance and resilience more comprehensively."

Currently, Meece is working on a project examining multidimensional responses to physical, mental, and psychological stressors in a heterogeneous subject pool.

"By integrating molecular biochemical data and cognitive physiological and behavior data, we hope to advance our understanding of personalized human biology and enhance resilience and individual performance."

Project focused on psychology of cyberdefense

The battle against cyberattackers has often felt like an uphill slog. The Florida Institute for Human and Machine Cognition (IHMC) is part of a team looking to turn that tide.

This spring, IHMC partnered with California-based nonprofit research institute SRI to take aim at the psychology of cyberattackers to better defend against their efforts.

The project is funded by Intelligence Advanced Research Projects Activity (IARPA) — the research and development arm of the Office of the Director of National Intelligence — which launched the program in February 2024. IARPA refers to the project as Reimagining Security with Cyberpsychology-Informed Network Defenses (ReSCIND)

Dr. Brodie Mather

Dr. Anil Raj

SRI is one of five organizations IARPA has contracted with for the effort. As part of SRI's team, IHMC is involved in all aspects of the research, but its unique contribution is the human subjects research expertise Senior Research Scientist Dr. Anil Raj and Research Scientist Dr. Brodie Mather and their IHMC team bring to the project.

The goal is to use psychology-informed defenses to understand cognitive vulnerabilities of an attacker individually and tailor the defenses to the vulnerabilities of that attacker.

"The ultimate goal of the program is to reclaim agency in the battle against cyberattacks," Mather said. "It has felt like a bit of a losing battle, fighting off these attacks for organizations of all sizes. We hope this could be a way for organizations to reclaim some of their time and agency in defending against these attacks."

Cyberattackers typically take advantage of human errors, but most cyberdefenses do not similarly exploit attackers' cognitive weaknesses. The ReSCIND project aims to flip this script.

By combining traditional cybersecurity practices with cyberpsychology expertise, IARPA is set to engineer a first-of-its-kind cybersecurity technology that makes an attacker's job harder.

SRI noted in its news release that the technology at the heart of this project could be revolutionary in the field, by measuring, understanding, and exploiting cognitive vulnerabilities to prevent cyberattackers from achieving their goals effectively and efficiently.

In their news release, SRI noted it is working with experts across fields of psychology, cognition, artificial intelligence, and cybersecurity including IHMC, George Mason University, Margin Research, Research & Assessment Design, Science Solution, Two Six Technologies, University of Florida, and Virtual Reality Medical Center.

The teams will work together to investigate the relevance of five chosen biases of cyberattackers, identify techniques to measure, predict, and influence attackers' cognitive vulnerabilities and behavior, and develop bias sensors and triggers to establish their validity and reliability.

The project will focus on five technical challenges that IHMC will help lead the work in. The challenges include designing bias sensors and triggers, designing the deployment of cyberpsychology informed defenses, and studying the profile of an attacker to predict how they might be deterred in different scenarios.

That work began this spring and phase one is expected to take approximately 18 months to complete.

IHMC is a not-for-profit research institute of the Florida University System where researchers pioneer science and technology aimed at leveraging and extending human capabilities. IHMC researchers and staff collaborate extensively with the government, industry, and academia to conduct ground-breaking science and develop breakthrough technologies. IHMC research partners have included: DARPA, the National Science Foundation, NASA, Army, Navy, Air Force, National Institutes of Health, IBM, Microsoft, Honda, Boeing, Lockheed, and many others.

NATO experts gathered at IHMC for security conference exploring power of technology to safeguard collective security

This May, the Florida Institute for Human and Machine Cognition (IHMC) hosted an international group of experts tasked with innovation and experimentation in the capabilities for members of the North Atlantic Treaty Organization (NATO).

In February 2024, NATO's Allied Command Transformation launched the Innovation Continuum 2024 series with an event in La Spezia, Italy. From that first event, named Spark, came an initial list of operational scenarios and possible technical solutions to be explored further.

The event was the second event in the series. Senior Research Scientist Dr. Niranjan Suri, IHMC's associate director, was the host.

Since 2014, Suri has co-chaired a NATO coalition of experts looking at military domains with an eye toward how the Internet of Things data in the civilian realm could be made readily available to warfighters working on humanitarian or military missions.

"It was a pleasure to host NATO Allied Command Transformation, NATO Communications and Information Agency, NATO Center for Maritime Research and Experimentation, many national representatives, as well as many prominent companies, including IBM, Microsoft, and Amazon Web Services, here in Pensacola," Suri said. "We spent four days planning for the experimentation that will take place in the fall."

The Innovation Continuum is a strategic initiative by Allied Command Transformation to use experimentation and demonstration of cutting-edge science and technology solutions to drive innovation and enhance warfare development through collaboration among NATO enterprise bodies and cooperating nations.

Dr. Niranjan Suri

IEEE names Robert Griffin as co-chairman of Technical Committee on Humanoid Robots

Dr. Robert Griffin has been named co-chairman of the IEEE Robotics and Automation Society Technical Committee on Humanoid Robots, representing North and South America.

The Institute of Electrical and Electronics Engineers (IEEE) is the premier professional organization in the field. Griffin's selection to co-chair the technical committee reflects the high regard for his work and for IHMC's established leadership in the field of humanoid robotics.

The Society's Technical Committee leads the Conference on Humanoid Robots, the leading international event of the humanoid robotics community. Last year, the conference was in Austin, Texas.

The IEEE-RAS includes the flagship conferences of the robotics field, International Conference on Intelligent Robots and Systems (IROS) and International Conference on Robotics and Automation (ICRA), each of which see more than 5,000 attendees annually.

"To be appointed as a co-chair to represent the Americas is a great honor. I am excited to work alongside the other IEEE co-chairs, whose work and impact on the field of humanoid robots cannot be overstated," Griffin said. "To be counted among their ranks is an incredible recognition that I am deeply humbled by."

Dr. Robert Griffin

Science Saturdays launch new season of learning

Science Saturdays are back and ready to turn on new scientific minds.

These 90-minute educational enrichment sessions are a cornerstone piece of community outreach at Florida Institute for Human and Machine Cognition (IHMC). Topics in 2024 will include 3D printing, bottle rockets, secret codes, and more. The sessions are free to the families who attend, thanks to the support of community partners.

For more than 17 years now, Science Saturday has inspired students in grades 3-6 in both Pensacola and on the Institute's Ocala campus. In the 2023-2024 school year, more than 300 students attended the series, said Dr. Ursula Schwuttke, director of educational outreach for IHMC.

"Science Saturdays is so close to IHMC's heart," Schwuttke said. "It is one of our original outreach efforts and reflects the commitment we all feel to giving students of all ages and backgrounds the chance to fall in love with science and technology. We cannot wait to get started."

Sponsors for the Science Saturdays series in Pensacola include NextEra Energy Foundation/Florida Power & Light, Florida Blue Foundation, Cox, Alera Group, and the Escambia County Sheriff's Office (with Law Enforcement Trust Fund monies).

Ocala supporters also include Lockheed Martin, Florida Blue Foundation, Cox, Precision Sidewalk Safety and Ocala Electric Utility.

Students and parents say they enjoy the diversity of subjects covered by Science Saturdays.

Science Saturdays

Save these dates and visit this site for the latest: https://www.ihmc.us/life/science_saturdays/

Pensacola Sessions

September 21

Ozobots Programming, Heath Parr, Brown-Barge Middle School

October 26

Robot Hands, Dr. Gwen Bryan, IHMC

November 23

3-D Printing, Nicole Esposito, IHMC

December 14

Bottle Rockets, Jared Li, IHMC

Ocala Sessions

September 21

Paper Airplanes, Dr. Ian Perera, IHMC

October 12

Secret Codes, Dr. Arash Mahyari, IHMC

November 16

Animal Skull Detectives, Dr. Verity Mathis, Florida Museum of Natural History

December 7

Candy Chromatography, Dr. Manal Fakhoury, Clinical Pharmacologist

IHMC is a not-for-profit research institute of the Florida University System where researchers pioneer science and technology aimed at leveraging and extending human capabilities. IHMC researchers and staff collaborate extensively with the government, industry, and academia to conduct ground-breaking science and develop breakthrough technologies. IHMC research partners have included: DARPA, the National Science Foundation, NASA, Army, Navy, Air Force, National Institutes of Health, IBM, Microsoft, Honda, Boeing, Lockheed, and many others.

Air Force Academy cadets find summer research home

Students have long had a home at the Florida Institute for Human and Machine Cognition (IHMC). This summer's student collaborators included cadets from the U.S. Air Force Academy participating in the Cadet Summer Research Program. This program offered opportunities for cadets to get out of the classroom and experience real-world research and development that align with their majors, interests, and potentially their career fields.

Senior Research Scientist Dr. Kevin Gluck, who worked with the students, says that although they won't all pursue science or engineering in the Air Force, it is certain that research and development will play a role in all their careers.

"Their experiences at IHMC this summer established a foundation they will build on in their senior capstone project, and they will carry those lessons about rigorous scientific processes and advanced methodologies forward with them as new officers and emerging leaders within the Air Force," Gluck says.

All the cadets are majoring in Systems Engineering with a Human Factors focus. They worked on IHMC's Resilience to Optimize Performance (ROPER) project, a three-year grant funded by the Air Force Office of Scientific Research.

ROPER's goal is to improve scientific understanding of the biological, physiological, and cognitive variations in people in response to nutritional stress, sleep stress, and physical stress.

The cadets worked on retrospective modeling, simulation, and analysis on data sets from previous studies in which those stressors were factors in changes in performance over days or even weeks. Research Scientist Dr. Drew Cranford worked closely with the cadets and praised them — and their work ethic.

The students got a crash course on how to create and run cognitive models within a cognitive architecture, then they learned how to optimize parameters of the model to predict individual performance as stress varied over the course of the study, Cranford says.

They focused on changes in cognitive performance because of sleep stress. They also evaluated the validity of computational theories against the human performance data. Their work involved a model for a task often used in sleep research studies called the psychomotor vigilance test.

"This initial focus provided a foundation for their senior capstone project as we extend the methods to model individual performance heterogeneity in stress response across multiple tasks including attention, visual vigilance, working memory, and reasoning/decision making tasks, and other studies that involve different kinds of stressors," Cranford says.

"They surely impressed with their desire to learn and their work ethic."

Intern Weiss O'Connor was surprised to learn the detrimental, cumulative effects of sleep deprivation.

"Before this project, I assumed that long-term sleep deprivation could have some negative effects, but that humans could eventually adapt to those conditions," O'Connor says. "With some context from biomathematical models, I've seen how detrimental effects continue to progress with sustained deprivation."

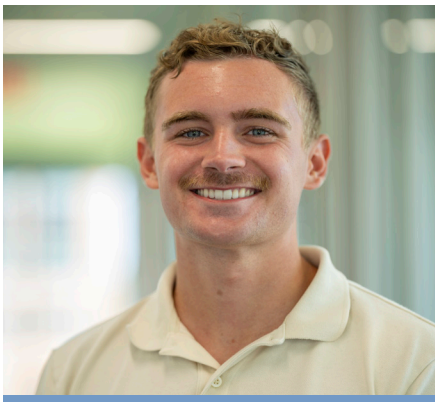
Cadet Kate Judy was intrigued by the use of computational modeling to improve understanding of human performance, as well as the application of this project to real-life projects.

"The idea of using computers to model and help further study the human brain is simply not something I was familiar with up until now," Judy says. "I know I have just barely scratched the surface, and I am excited to continue learning as we progress through our capstone project."

Critical to the success of the ROPER grant and the summer research program was for the students to bite off a substantive but manageable chunk of work to pursue.

Connor Manion, like the others, says the Cadet Research program was a tremendous educational asset that offered

U.S. Air Force Academy Cadets Katherine Judy, Connor Manion, and Weiss O'Connor discuss findings from their data analysis with IHMC Researcher Dr. Kevin Gluck.


Weiss O'Connor


Katherine Judy


Connor Manion

students the chance to gain skills.

Manion says stress and fatigue are frequent topics of discussion at the Air Force Academy. IHMC has given Manion the opportunity to learn more about both in a scientifically meaningful way.

While the intellectual aspects of the research program have been valuable, there are also other benefits.

"The most surprising thing that I have learned is how it is possible to enter a new environment and build a life that suits the way I want to live," Manion says. "The routine at IHMC gave me the opportunity to explore how it will be showing up to my first assignment or subsequent assignments as I go into my career in the operational Air Force. I believe this facet of my Cadet Summer Research Program trip will have the most profound impact on my life."

Meet the Institute's 2024 student interns

At the Institute for Human & Machine Cognition, the best and brightest have a place to shine.

IHMC has carefully built a tradition of rethinking what it means to leverage and extend human capabilities. Our researchers thrive in a collaborative research environment across three integrated pillars — artificial intelligence, robotics and exoskeletons, and healthspan, resilience and performance.

Our team includes experts in artificial intelligence, human-machine teaming, robotics, biology, physiology, rehabilitation, psychology, linguists, engineering, statistics, modeling, and cybersecurity, all exploring ways to improve the human condition.

Learning and mentorship have been long-held values at IHMC. Each year we host dozens of interns to our campuses. Below is a list of our 2024 interns.

Our work is exciting and our standards are high. If you have the passion, skills, and desire to be a part of our team, whether as a summer intern or as a full-time researcher, visit https://www.ihmc.us/about/opportunities/

Paul Barsa, Georgia Institute of Technology, Robotics
Ethan Clark, Arizona State University, Robotics
Andrea Contreras, University of Florida, ASCEND project
Dustin Evans, University of West Florida, ASCEND project
Mason Finnell, Florida State University, Applied machine learning and human performance
Alexandra Foland, Massachusetts Institute of Technology, Robotics
Thomas Giovangrandi, Arizona State University, Human Performance
David Huson, University of West Florida, Augmentics
Gianmarco Innario, University of West Florida, Machine learning team
Chandler Massey, University of Florida, data analysis
Gabriele Muratori, New Jersey Institute of Technology, Human-machine teaming projects
Landon Nelson, University of West Florida, Human-machine teaming
Brianna Perea, University of West Florida, Human performance projects
Arielle Post, University of West Florida, Human performance
Sam Schoedel, Carnegie Mellon University, Robotics
Dhurv Thanki, University of Delaware, Robotics
Elia Veratelli, University of West Florida, Machine Learning.

Cassie Guilliams arrives as Chief Operating Officer

Cassandra Guilliams joined IHMC in September 2024 as Chief Operating Officer.

In her role, she will take a prominent leadership role in overseeing IHMC administrative functions including but not limited to human resources, benefits, immigration, insurance, board functions, affirmative action plans, and other functions. She will report directly to the Chief Executive Officer.

"Cassie will be a valuable addition to the Institute's team," says Chief Strategic Partnership Officer Dr. Morley Stone. "Her strengths will be a tremendous asset to IHMC's already impressive team.

Cassie comes to IHMC from Houston, Texas, where she served as General Counsel, Director of Human Resources & Asset-Management for Star Furniture Company. She earned her bachelor's degree at the University of Houston-Downtown and her law degree from South Texas College of Law.

Cassandra Guilliams

After spending much of her professional life in the private sector, she was drawn to the opportunity to join IHMC's culture.

"(In the private sector) I always knew what my impact was for the team I worked with, but what IHMC does can truly make the world better," she said. "I love being part of an institute that's work impacts everyday life for so many people. The chance to part of a team of that caliber, with that kind of organizational commitment to excellence is an incredibly appealing opportunity."

She is an accomplished General Counsel, Director of Human Resources, Asset Management and a Texas-licensed attorney with 22 years of legal and management experience. She also has a track record of success conceiving strategies toward the brokering of legal agreements, as well as experience in the implementation of organizational process improvements, employee relations and project management.

Outside of work, she enjoys exercise, reading, and being involved in her church. She and her husband, Mark, have visited most U.S. National Parks and still enjoy traveling together.

IHMC welcome new administration team members

JOSHUA RUTH

Director of Facilities and Planning Operations

Joshua joined IHMC as Director of Facilities and Planning Operations in June 2024. In this role, he will oversee the physical plant of all IHMC facilities in Pensacola and Ocala. He brings to the Institute extensive private-sector experience in planning, coordinating, and managing multidimensional projects and facilities for large medical systems, including a mix of ambulatory and business occupancy facilities. His work experience includes management of facilities in several locations for Ascension Health System campuses (and its predecessor in Pensacola, Sacred Heart Health System). He earned a bachelor's degree in applied science in business management from Pensacola State College.

DAVID SELBY

Chief of Security

David joined IHMC as Chief of Security in July 2024. He reports to Dr. Morley Stone and will be responsible for leadership of IHMC security. He brings to this role at IHMC a career track record of cross functional and collaborative leader in the fields of counterintelligence, security, and information technology with 28 years of supervisory experience. His experience includes work with the private sector, the military, the business communities in classified and non-classified domains. He earned a bachelor's degree in intelligence studies from the American Military University, where he also is pursuing a master's degree in cybersecurity studies.

Meet IHMC's new research scientists, associates

The Institute for Human and Machine Cognition (IHMC) is pleased to welcome new colleagues as we mark 20 years as an independent, not-for-profit research institute of the Florida University System and is affiliated with several Florida universities.

IHMC has a main campus in historic downtown Pensacola opened in 1999 as part of the city's urban core revitalization, and a branch campus in Ocala, opened in 2010. The Ocala campus is located near three major university research partners in Florida's centrally located tech corridor.

The Pensacola campus is the primary home to teams investigating and refining artificial intelligence, augmentics, human-centered computing; robotics and exoskeletons; and health, resilience, and performance to maximize biological performance of humans.

The Ocala campus, including a 28,000 square foot facility, support computer scientists, engineers, and linguists engaged in research spanning machine learning, natural language understanding, natural language understanding for social cybersecurity, and speech analysis for physiological state determination.

Our research falls into three broad categories: AI, Machine Learning, and Computational Science; Robotics and Exoskeletons; and Healthspan, Resilience, and Performance.

IHMC pioneered the field of human-centered computing and has long been a leader in AI and related fields. IHMC has had six AI researchers elected as Fellow of the Association for the Advancement of AI. What seemed like science fiction decades ago has now become a reality and IHMC continues to advance these areas.

IHMC researchers are pushing the envelope of what is possible in robotics with a particular focus on bipedal robotics and exoskeletons — from robots that assist first responders, search and rescue, and bomb disposal, to exoskeletons that aid those with lower-limb paralysis and degenerative musculoskeletal diseases. IHMC has an international reputation for excellence in this area.

The third pillar of our research is healthspan, resilience, and performance. This collaborative area of scientific investigation aims to provide a biological and physiological blueprint to help elite military members, athletes, and others in high stress, and physically demanding situations. The research results also will improve life for those with neurodegenerative diseases, musculoskeletal diseases, traumatic injuries, cardiovascular and metabolic diseases, and even cancer.

IHMC researchers work in teams across disciplines. We are pleased to welcome new research team members into the fold.

TAD IHNS

Senior Research Scientist

Tad joined IHMC in August 2024 on a courtesy appointment. He is a highly successful entrepreneur and the founder of Avalex Technologies Corp. in Gulf Breeze, which was purchased by Mercury Systems in 2021. He will collaborate with our team to innovate on, among other things, the commercialization potential of IHMC-created technologies. As Chief Technologist at Mercury Systems, Ihns works with engineers across several disciplines including imaging, optics, EW, processing and sensors, to create novel, market leading products with these technologies. He spent nearly 30 years at Avalex Technologies, a company he founded. While there he created two start-up avionics companies, Avalex Technologies and Lexavia Integrated Systems.

MARK ORR

Senior Research Scientist

Mark joined IHMC as a Senior Research Scientist in July 2024. He also is a contributing faculty member to the joint UWF-IHMC Intelligent Systems and Robotics Ph.D. program. He previously was a professor at the Biocomplexity Institute at the University of Virginia. Orr was originally trained as a cognitive psychologist at the University of Illinois at Chicago. Orr received augmentation to this training with postdoctoral fellowships in computational modeling (Carnegie Mellon), neuroscience (Albert Einstein College of Medicine), and epidemiology/complex systems (Columbia University). Over the past decade, he has become heavily involved in understanding dynamic processes and drivers of risky behavior and decision making, primarily in a public health context, at the scale of the individual and populations. Orr is expanding these ideas into other contexts and for other applications.

SAM LENSGRAF

Research Scientist

Sam joined IHMC in September 2024 as a Research Scientist working in Pensacola and collaborating with principal investigators across the Institute. He also will share time at the University of West Florida. He earned a Ph.D. at Dartmouth College where he worked on autonomous robotic underwater construction. He is interested in applying computational techniques to solve fabrication, engineering, and construction problems. He believes in a holistic approach to robotics research. He developed the first autonomous underwater construction robot, called Droplet, and developed algorithms for analyzing the stability of large systems of loosely connected building blocks.

JAKE SIEDLIK

Research Scientist

Jake joined IHMC as a Research Scientist in August 2024 on a joint appointment with the University of West Florida, where he also will serve as an associate professor of biology. At IHMC, Siedlik joined the healthspan, resilience, and performance team on a funded Air Force Office of Scientific Research project. Siedlik was an associate professor in exercise science and pre-health professions at Creighton University where he is the associate director of the health informatics graduate program. Siedlik is a physiologist focused on statistical methods and leveraging data-driven approaches to advance population health. He earned a bachelor's degree in math at Colorado College, a master's degree in applied physiology at Teachers College at Columbia University, and Ph.D. in exercise physiology at the University of Kansas. He also served as a sergeant in the New York Police Department.

JORDAN ACCARDO

Research Associate

Jordan joined IHMC as a Research Associate in July 2024 working with Dr. Jeff Phillips and his team on human performance research projects. Jordan has been an IHMC intern working primarily with the multimedia team on photography projects and editing the STEM-Talk podcast. He earned bachelor's degree in psychology at the University of West Florida. In his free time, he enjoys drawing, playing cards, and rock wall climbing.

THOMASZ BIALEK

Research Associate

Thomasz joined IHMC in May of 2023 on a paid summer internship in software engineering working with Duncan Calvert on the Breaching project. In September, 2024, he joined the team as a Research Associate working with Dr. Robert Griffin and his team on the SquadBot 2 project, among other research efforts. Thomasz is a University of West Florida student pursuing a bachelor's degree in computer science. He was inspired by robotics as a child, finding inspiration in books, science museums and the television show "BattleBots."

THOMAS KONKEL

Research Associate

Thomas joined IHMC as a Research Associate in August 2024 working with Dr. Matt Johnson, John Carff, and their team on Workbench Phase IV. Thomas has a bachelor's degree in game development and a course director's award from Full Sail University that reflects his lifelong passion for tinkering with electronics, hardware, and software. He graduated as valedictorian and his favorite subjects are engineering and physics. He was in the Scouts of America for many years, ending his scouting career as an Eagle Scout in 2022. In his free time, he enjoys playing video games and bowling, and notes that everything is always better with friends.

NICOLE STAFFORD

Research Associate

Nicole joined IHMC in June 2024 as a Research Associate working with Jared Li and the exoskeleton team as a mechanical engineer. Her interest in working with the complex interactions of human and machines was spurred by her experience as a Division I athlete at Stanford University, where she experienced a functional movement disorder, as well as her research experience working with multiple patient populations. The first-hand experience of the range of possibilities of exoskeletons led her to pursue a Ph.D. in mechanical engineering at the University of Florida. Her research focus is human machine interface for gait biomechanics and locomotor control. She is interested in bionic prosthetics and a career in wearable devices. The culture of creativity and collaboration across disciplines drew her to IHMC. She earned a master's and bachelor's degree at Stanford in mechanical engineering.

VIRGINIA VAUGHAN

Research Associate

Virginia initially joined IHMC as an intern in January 2024 working with Adrien Moucheboeuf and his augmentics team. She became a full-time Research Associate in September 2024 working with Dr. Brodie Mather and Dr. Anil Raj on their ASCEND project and with Drs. Stone and Broderick on the A2PEX project. Virginia is a passionate and professional software designer whose skill set and technical capabilities match the collaborative environment among IHMC's human performance and augmentics teams. She earned a bachelor's degree in software design and development from the University of West Florida.

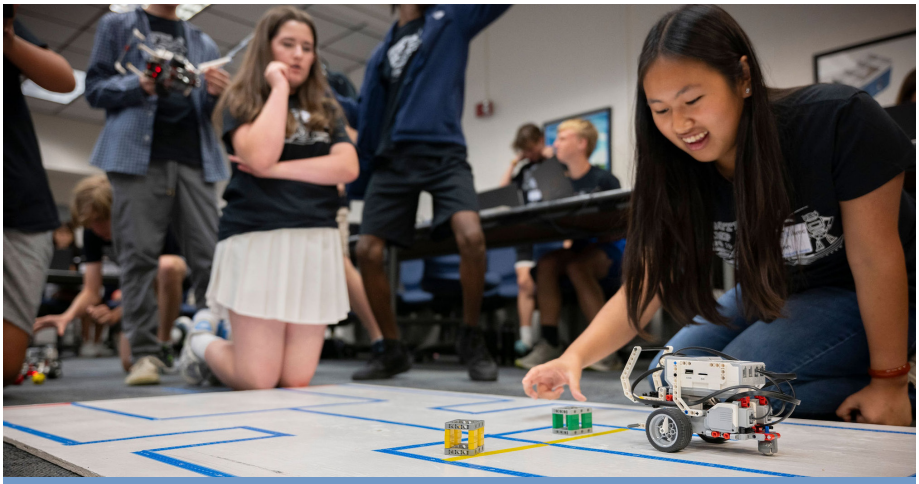
GARRETT WHITCHER

Research Associate

Garrett joined IHMC as a Research Associate in September 2024 working on the KENNEL project. He came to IHMC on a summer internship in 2021 working with Dr. Niranjan Suri and Daniel Duran. His work has focused on the design, integration, and testing of various Internet of Things platforms. In that work he designed low-cost and low-power systems for power managements, sensing, and communication, created minor software for handling sensor data, and embedded programming for sensor and system management. He graduated from Pensacola Christian College with bachelor's degrees in electrical engineering and mathematics. He is interested in designing systems to solve problems in everyday life and specialized applications.

Robotics Camp in Ocala and Pensacola continue to inspire a new generation of science-minded students

The Florida Institute for Human and Machine Cognition (IHMC) continued igniting students' passion for programming at its 2024 Summer Robotics Camp.



The 2024 edition of Summer Robotics Camp inspired students in STEM fields.

Four, week-long sessions introduced middle and high schoolers to the core concepts of computer programming with LEGO robots. Across the Pensacola and Ocala campuses, a total of 75 students exercised their creativity designing their robots and coding them using Scratch.

"My hands hurt from building, but it was a lot of fun," said Fox Ford, a first-time camp attendee.

Under the guidance of IHMC staff and volunteers from local high schools, campers worked in pairs to assemble LEGO Mindstorms robots. Students then used a block-based, visually appealing coding language to guide their creations through mazes and obstacle courses, debugging code and redesigning robots as they went. Campers attending the second Ocala session also learned how to program in Python.

For returning attendees, the camp was a chance to build upon what they've already learned. Davis Coleman, attending camp for his third year, enjoyed experimenting with his "destruction robot," which he engineered to rear up on its back wheels.

After mornings of completing skill-building challenges, like coding their robots to navigate a maze, the daily "Lunch with a Scientist" sessions helped students connect with IHMC researchers.

Pensacola sessions were led by Brown-Barge Middle School teacher Heath Parr, with guest appearances by Research Scientists Dr. Gwen Bryan and Dr. Toshi Miyatsu, who hosted Lunch with a Scientist sessions. These small-group sessions always make a big impression.

"It was really cool, it kind of humanizes them," said Gavin Heddy, who enjoyed getting to ask Miyatsu about anything from how he chose his career to what his tattoos meant.

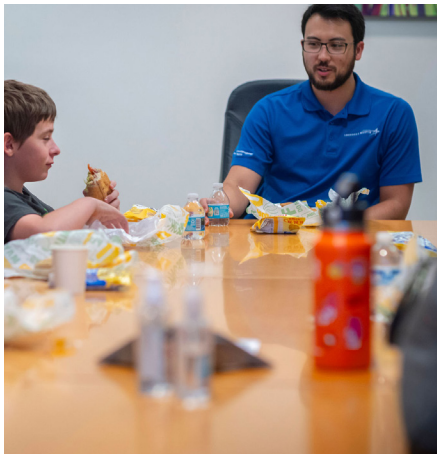
Research Associates Jared Li and Nicole Esposito also participated in camp and, along with Nick Kitchel and Sean Bridges, led a tour of the robotics lab at the Levin Center for IHMC Research.

In Ocala, campers learned from Dr. Ian Pererra, Dr. Archna Bhatia, and Ben Thompson from Lockheed Martin, who shared information about what engineering careers could look like.

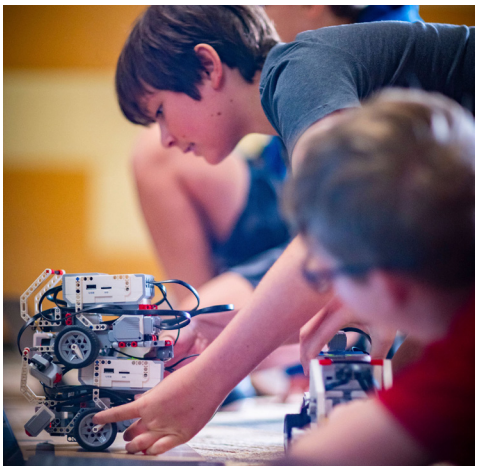
It was evident in the energetic buzz of the students that they discovered the fun of hands-on STEM learning, something made possible thanks to generous sponsors who fund needs-based scholarships to camp to make sure finances are not an obstacle for motivated students. Cox sponsors camp for both the Pensacola and Ocala programs. Ocala has additional sponsors of Lockheed Martin, CareerSource Citrus Levy Marion, Mid-Florida Regional Manufacturers Association, Ocala Electric Utility, Nokia, and OMUG, a community of Apple Technology Users.

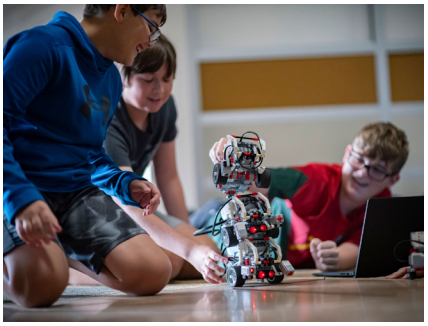
The sponsors, volunteers, and instructors at both Pensacola and Ocala work to ensure that students' feel inspired long after the camp ends.

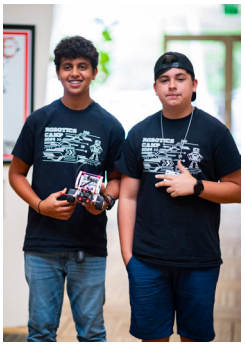
"We hope that the biggest impact will be that STEM is fun, because as soon as you enjoy something it can become a passion," said Dr. Ursula Schwuttke, IHMC's Director of Educational Outreach, "That's what we want to see driving a career in STEM — passion."



Lunch with a Scientist is a popular part of camp.





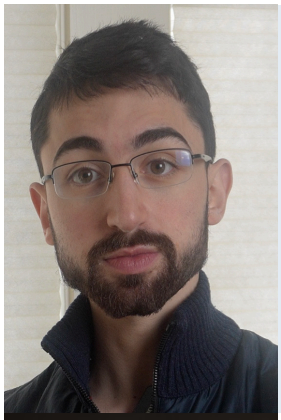


STEM-Talk experts talk new research in celiac disease, gluten disorders, inflammation and much more

STEM-Talk continues to elevate the conversation around science topics with the potential to greatly impact healthspan, resilience, and human performance.

Hosts Dr. Ken Ford, IHMC's founder and CEO, and Research Scientist Dawn Kernagis have substantive and compelling conversations with thought leaders and scientific experts from across multiple disciplines.

Subscribe to STEM-Talk on whatever platform you prefer for your podcasts to keep up with the latest episodes.



DR. NICK NORWITZ, EPISODE 167

Dr. Nicholas Norwitz, 28, a third-year Harvard Medical School student whose research into the applications of a ketogenic diet as metabolic medicine has attracted a significant following. For a number of years during his youth, Nick suffered from a number of debilitating diseases, including osteoporosis, ulcerative colitis, and inflammatory bowel disease. In this interview, Nick talks about research that led him to adopt a ketogenic diet that put him back on the road to metabolic health. After graduating from Dartmouth College in 2018 with a degree in cellular and molecular biology, Nick attended Oxford University where he earned a Ph.D. in metabolism and nutrition. He is the author of peer-reviewed scientific papers and textbook chapters on topics including Alzheimer's disease, cardiovascular disease, diabetes, gastrointestinal health, genetics osteology and Parkinson's disease.

DR. ALESSIO FASANO, EPISODE 168

Dr. Alessio Fasano is considered the world's leading expert in celiac disease and gluten-related disorders and makes his second appearance on STEM-Talk. Although just 2 million Americans have celiac disease, an estimated 20 million Americans suffer from gluten sensitivity. In addition to celiac disease and gluten-related disorders, Alessio's research is also focused on the microbiome, intestinal permeability and autoimmune disorders, which he discussed in his first interview on STEM-Talk, episode 20. Since his first appearance on STEM-Talk in 2016, he has published two books, "Gluten Freedom" and "Gut Feelings: The Microbiome and Our Health." This episode includes discussion of a new project that's bringing together an international consortium of researchers and scientists for a long-term study that will follow infants who are genetically at risk of developing celiac.

DAVE FELDMAN, EPISODE 169

Dave Feldman is the founder of the Citizen Science Foundation and is known for his research into the ketogenic diet. Dave is a software engineer by training who embraced a ketogenic diet to avoid his progression toward type 2 diabetes. He shared his journey on STEM-Talk. After undertaking the high-fat/low-carbohydrate diet, Dave's LDL cholesterol spiked. Dave used his training as an engineer to start learning everything he could about cholesterol and lipids. What he learned led him to create the website Cholesterol Code, a research hub for information and emerging data on cholesterol, particularly in the context of a low-carbohydrate lifestyle. He created the Citizen Science Foundation to support projects and research that promote collaborative efforts across multiple disciplines, both in and outside formal scientific institutions.

DR. CHARLES SERHAN, EPISODE 170

Dr. Charles Serhan is a Harvard professor best known for his discovery of specialized pro-resolving mediators (SPMs), the molecules that can activate the natural resolution of inflammation and help people avoid anti-inflammatory drugs. Inflammation is believed to be a contributing factor to metabolic and chronic diseases across a wide spectrum including diabetes, cardiovascular disease, Alzheimer's disease, asthma, arthritis, and more. Understanding its roots — and the role that SPMs play in switching off the process — is considered a key component to improving healthspan and resilience. The co-host for this episode is Dr. David LeMay, who was a guest on Episode 69 of STEM-Talk, a sports medicine and rehabilitation physician with a Pensacola practice that focuses on lifestyle and performance medicine. He also is a visiting research scientist at IHMC.

ASK ME ANYTHING, EPISODE 171

Episode 171 is another "Ask Me Anything" in which Dr. Ken Ford and co-host Dawn Kernagis answer a slew of questions from listeners. Based on the results, listeners have a lot on their minds. This episode features Ken's takes on the prospects of brain-computer interface research, a recent paper on the role of the APOE4 gene in Alzheimer's Disease, the real-world results of the 2019 National Security Commission on AI of which Ken was part, the dearth of blood flow restriction training in traditional physical therapy, to an update on Dawn's research on the impact of sleep deprivation and the glymphatic system. Listeners also will learn who Ken's favorite science fiction author is and which quote from that writer Ken still finds inspirational.

2024 Fall Evening Lectures

The Evening Lecture series for Fall 2024 at Florida Institute for Human and Machine Cognition (IHMC) features a heavy focus on human performance, workplace culture and related topics.

2024 PENSACOLA LECTURES

Sept. 19: Sarah Robb O'Hagan, the chief executive officer of EXOS, a coaching company focused on human performance.

Oct. 17: Susan Paley and Virginia Galloway on the power of sensory design and its role in creativity and well-being.

Nov. 13: Dr. Tommy Wood, a University of Washington professor who researches health, longevity, and performance.

Dec. 17: Dr. Frank Butler, a retired U.S. Navy captain, innovator of strategies for improving battlefield trauma care.

To stay up to date on future lectures, visit https://www.ihmc.us/life/evening_lectures/ where you will find updated speakers and bios for both Pensacola and Ocala campuses.

2024 OCALA LECTURES

Sept. 12: Dr. Zach Graham, IHMC Research Scientist who examines the impact of exercise on healthspan and disease state.

Oct. 10: Dr. Dave Rabin, a psychiatrist and neuroscientist who studies the impact of chronic stress and resilience.

Nov. 6: Dr. Todd Manini, a University of Florida professor and chief of clinical and population health integration at UF's College of Medicine.

Dec. 10: Dr. Tim Broderick, IHMC's Chief Science Officer and Senior Research Scientist who researches human health and performance in extreme environments.

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