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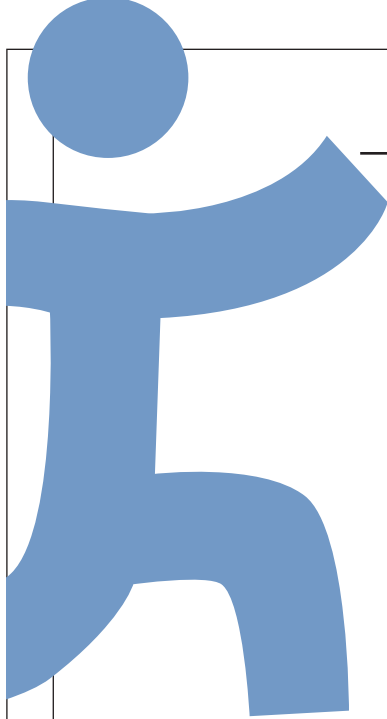
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Dear Friends,

Much of what we do at IHMC requires us to be circumspect. Some of that is by necessity. Sometimes our funders stipulate confidentiality; in other cases, our work with military and defense communities has security applications that must be appreciated. Sometimes, it is simply the nature of what we do. Be it artificial intelligence, cybersecurity, robotics, or our other research areas, some of our work takes place with the external manifestation of the effort months or even years away.

So even if it seems quiet from the outside, rest assured that exciting things have been under way in each of our core disciplines: humanoid robots and exoskeletons; healthspan, resilience, and performance; and artificial intelligence, virtual and augmented reality, and machine learning.

Our IHMC family keeps growing, building on our traditions of excellence and innovation. In this edition, you will learn about the next steps for our exoskeleton team led by Dr. Robert Griffin, Dr. Gwen Bryan, and Dr. Greg Sawicki.

Our scientists and engineers have been awarded research grants to investigate a broad range of topics aimed at understanding and extending human cognition, locomotion, performance, and resilience.

In this issue, we also can share some news about how work has been moving forward on the planned human-performance research complex at our Pensacola campus.

In addition to our research, we can share what we do with the public through the Evening Lecture series and our STEM-Talk podcast, which now tops 3.3 million listens. Both the lecture series and STEM-Talk represent our efforts to share fascinating conversations with experts and thought leaders in the scientific and technical community, and you can always catch conversations you may have missed on our website.

Also, as part of our outreach, we have been helping to cultivate the next generation of science enthusiasts through Summer Robotics Camp, Science Saturday, and fields trips.

So do not let our quiet exterior deceive you. Exciting things are afoot at IHMC. We hope you enjoy the glimpse this newsletter gives you and we look forward to sharing more in the future.

Best wishes,

Ken Ford

Ken Ford



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Exoskeleton research at IHMC moving forward

IHMC has a long legacy of excellence in exoskeleton research. The potential benefits of exoskeletons include increased strength and endurance, reduced joint loading, resistance exercise, rehabilitation after injury, and enabling mobility for those with disease or disability.

Two exoskeleton projects at IHMC — Quix and Eva — are undergoing upgrades thanks to a robotics team that is itself been expanded in the last two years.

Quix is the fourth exoskeleton prototype developed by the IHMC exoskeleton team. It's getting a new lease on life as the team has been upgrading the device and its software.

Quix was designed to increase the mobility and independence of people with lower-body paralysis. The team is now investigating potential applications for rehabilitation therapy.

Team members have now developed another wearable robot, Eva, to help extend healthspan and the quality of life for workers who must use heavy personal protective equipment during physically demanding and hazardous work.

The revamp of Quix and the development of Eva are among the first major projects for the growing robotics team, and Research Scientist Dr. Robert Griffin said it has been exciting to see the way new personnel and ideas have enhanced the projects.

Quix has been at rest since the 2020 Cybathlon, where it finished as a finalist among intense international competition. Griffin and his team have spent the last several months putting Quix through its paces to move toward the next iteration of software governing the exoskeleton.

"Over the next six to nine months, we will be continuing to work on improving the gait," Griffin said. "We will be collecting biomechanical data so that the IHMC team can better understand the physiological demands of using the

device. We also will be exploring methods for increasing the speed and robustness of the existing gait."

While improving the mechanical and software aspects of Quix are important, the team also is deepening the active research areas in the project.

While an exoskeleton offers people with lower-limb paralysis the chance to resume everyday activities, the device is heavy. Understanding how Quix affects the wearer physiologically can lead to improvements that make it easier to wear for longer periods of time.

"This will help us understand how to improve exoskeletons to be more accessible," Griffin said.

Continuing to work on improving Quix's gait while broadening the scope of the effort to tie in IHMC's human performance research program is precisely the kind of cross-discipline, collaborative work that IHMC fosters.

Growing the team

A big part of Quix's next steps — both figuratively and literally — has been to add expertise to the robotics team. Team members Dr. Gwen Bryan and Dr. Greg Sawicki have come on board, bringing with them an important focus on the interface of robotic exoskeletons and human performance.

"Our team has traditionally focused solely on robotics," Griffin said. "Adding people like Gwen — with her experience in robotics and biomechanics — and Greg — who has expertise in both disciplines but has been focused more on biomechanics — will broaden us in a critical way."

Bryan joined IHMC after completing her Ph.D. at Stanford University in 2021. During her doctorate, she developed a hip-knee-ankle exoskeleton emulator and used that device to find optimized exoskeleton assistance. Through human-

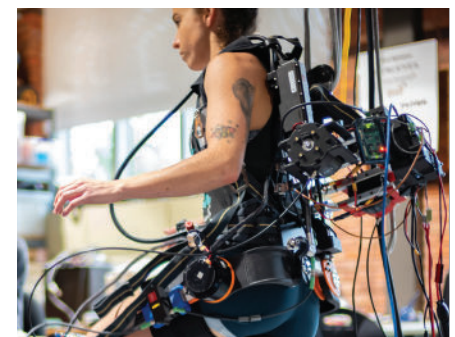
in-the-loop optimization, she found effective exoskeleton assistance for a range of walking speeds as well as with a variety of worn loads. She also investigated if people are sensitive to customized exoskeleton assistance.

"Exoskeletons are a fantastic bridge between the disciplines of robotics and health, resilience, and human performance," Bryan said.

Sawicki says the main innovation the team is hoping to apply to Quix's control is a technique called human in the loop optimization (HiLO).

"Gwen Bryan is a world leader in applying this approach to discover full-leg exoskeleton assistance strategies that can improve human 'gas mileage' in young, healthy people — think soldiers or aid workers," Sawicki says. "We are working to adapt her previous approach to focus on finding walking gaits on Quix that can maximize a pilot's walking speed without de-stabilizing them or overtaxing their body. We are also explicitly including feedback from user's regarding their preference in order to customize the tuning of the exoskeleton's motions."

Sawicki joined IHMC in 2022 while maintaining his home base at the Human Physiology of Wearable Robotics (PoWeR) laboratory at the Georgia Institute of Technology in Atlanta. Sawicki will embed with the robotics,



The IHMC team has been testing improvements in the Eva exoskeleton

exoskeletons and human robotics interdependence group, with Quix among the projects on which he will focus. Sawicki's lab at Georgia Tech has focused on adapting the biological mechanisms that drive human lower-limb joint power output to develop wearable robots that help people walk better.

Sawicki says the team is close to starting testing using Quix to navigate the in-lab "terrain park." The goal is to implement the new optimized control and compare it against baseline "out-of-the-box" exoskeleton gaits.

"If we are successful, pilots should be able to walk faster and with less effort in Quix," he says.

Bryan says the Quix team has been working the last few months on ground contact detection and adjusting exoskeleton gaits to look more natural. Contact detection leverages sensors in Quix to signal when the pilot's foot has made initial contact with the ground, and then algorithms in Quix's controller adjust the gait in response. This could be useful when walking over uneven terrain, climbing 32 stairs, or if the pilot's gait varies step to step or is slightly unstable.

"Currently, (our pilot) is able to adapt to any sort of disturbances while walking, and this feature would reduce the amount of effort needed to maintain stable walking," Bryan says. "Natural gait has adjusted the gait patterns to look more similar to able-bodied walking."

This is easiest to see in foot clearance during swing, Bryan says. In the previous gait pattern, there was a large amount of foot clearance during swing, which made the gait look like marching instead of walking. The new pattern has a lower foot clearance, giving the gait a walking appearance and allowing the pilot to walk faster with fewer disturbances, Bryan says.

That includes incorporating more biomechanical feedback to continue to improve Quix's form and function. This means looking into how gait pattern

impacts self-selected walking speed, muscle activity, metabolic cost, crutch force, torso sway, and more.

"One area that we very much want to explore is how an exoskeleton like Quix could be useful in rehabilitation therapy," Griffin said.

Eva exoskeleton moving forward

Improving quality of life for a specific group of workers is the drive behind the Eva exoskeleton project as well.

Designed for workers at the Hanford Site Tank Farms, Eva is a powered lower-body exoskeleton that is being developed to offload the weight of heavy personal-protective equipment from users' bodies to the ground while also augmenting user motion. The suit is designed to assist throughout the users' natural range of motion so as to not restrict movements and postures common to the Hanford Site as well as many manual materials handling workplaces.

The Eva project is done in collaboration with Sandia National Labs and Georgia Institute of Technology, to examine how wearable robotic systems can be incorporated into nuclear remediation projects. That work is funded by the U.S. Department of Energy.

The collaboration is establishing Eva as an exoskeleton testbed to evaluate the efficiency of existing devices and the effectiveness of modifications to other commercial devices.

The Eva suit provides net positive power to hip and knee flexion/extension as well as ankle plantarflexion while passively allowing motion in other degrees of freedom of the hips. The hips and knees are driven by collocated brushless DC motor actuators, while the ankles are driven by cables attached to actuators located in the backpack. The exoskeleton is built around a common harness used for 60-minute SCBA tanks, and the tank can be removed and attached easily. Eva is also designed to be modular, so that the

linkages connecting each of the joints can be swapped to fit different users.

"The collaboration with Sandia National Labs is an important project for the exoskeleton team," Griffin said. "Work in spaces like nuclear remediation and cleanup is challenging and physically demanding. We believe that Eva and similar devices could help make that work easier on the humans who perform it."


Not only is the work physically demanding, but also the personal protective equipment workers must wear takes a considerable toll on the body over the span of someone's working life. Many of these workers have significant biomechanical damage from their decades of work, Griffin said.

"By offloading that load from the musculoskeletal system and onto the device, we're hoping we can prevent this long-term damage, so that people still have their health when they go into retirement," he said.

IHMC has begun testing the current hardware and control algorithms to explore how Eva can be used to decrease this musculoskeletal load, by measuring muscle activation during activities.

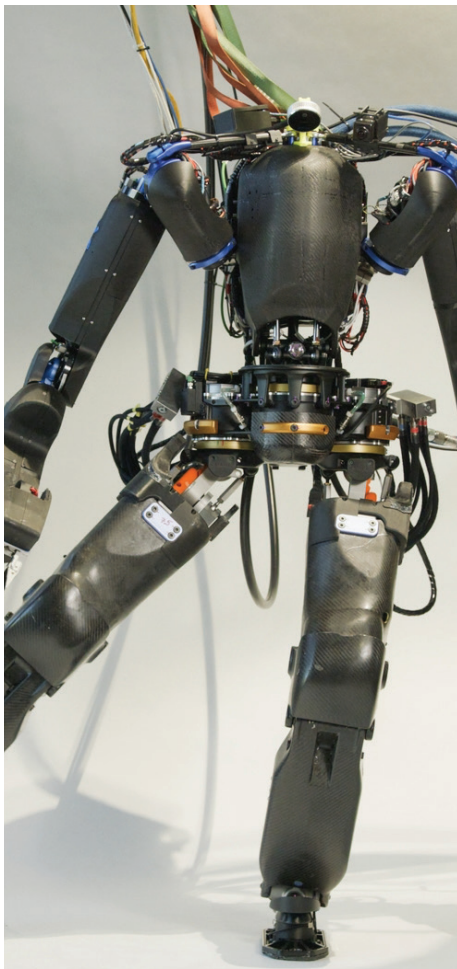
By coupling this with experimentation performed by Georgia Tech on human biomechanics when performing manual labor, the team believes Eva can be a device that genuinely helps during tasks like those performed by Department of Energy workers.

The focus to this point has been on developing a device that is transparent to the user so as to not limit the user's motions and capabilities when performing meaningful work. This is an area that has been traditionally unaddressed by existing exoskeletons, Griffin said, which have suffered from limited adoption.

The team is continuously iterating on the device through improvements to exoskeleton weight, development of custom actuators, and implementation of custom electronics. 

Robotics Team awarded \$3 million grant to support SquadBot 2 project

The Florida Institute for Human and Machine Cognition robotics team lead by Dr. Robert Griffin secured a \$3 million grant from the Office of Naval Research for SquadBot 2. The grant was approved in May 2022.



Improvements to the Nadia robot will help it recover better from falls than previous versions of the robot.

The grant will allow the team to build upon the progress made on the first iteration of the SquadBot platform, named Nadia. A fully functional Nadia would be capable of working alongside

and in place of humans in operations including building search, patrol, and bomb disposal.

“Nadia has the potential to shift the paradigm for urban operations and exploration, with the potential to save lives and reduce collateral damage,” Griffin says.

The SquadBot 2 project will work to improve the hardware platform, as well as enhance Nadia’s semi-autonomous behavior architecture to include persistence, particularly for entering structures and moving objects and obstacles. The work also will focus on developing advanced mobility algorithms focused on high-speed and multicontact locomotion, including multiple approaches for bracing, crawling, and standing up after a fall.

The goal is the design of a robot able to remove debris from its path, capable of multi-contact locomotion, and a high power-to-weight ratio to support fast, dynamic motions.

The innovations of this project will be: **SquadBot 2 will be designed to support arbitrary environmental contact.** Its joint structures and actuators designs will help maintain the high range of motion while making version two better able to survive falls.

Multicontact whole body control for building exploration. The team will extend walking and balance algorithms to include points of contact beyond hands and feet – such as the knees and forearms for balance.

Persistent behaviors for building exploration. These are behaviors including proceeding through a specific door, identifying areas to hide, actively searching, identify people, and climbing and descending stairs. The team will explore how to take these from “skill

level behaviors” to “task-level behaviors” – such as “search and map this building.” Building persistence into these algorithms will be vital.

Autonomous debris clearing for building exploration. IHMC will work with the University of Washington to integrate and improve their autonomous picking and clearing manipulation framework — where the robot seeks to remove constraints preventing it from achieving a goal. The team will design with an eye toward incorporating the option for user interaction so that an operator may intervene and help.

The goal of the project is to create a high-performance humanoid robot platform with the range of motion and power-to-weight ratio approaching that of a human. **Among the questions the team will examine:**

- Can we better emulate nature by designing ball-and-socket joints to give Nadia human-level range of motion?
- Can Nadia’s second-iteration arm perform real-world tasks such as opening doors, clearing debris and moving furniture while being robust enough for multi-contact locomotion?
- Can the team design protection for the hip joint as they have designed a kneecap to protect the knee joint?
- Can the team extend a contact sequence planner for hands and feet to the forearms and knees when crawling?
- Can the same robot capable of crossing rough terrain with precision also move gracefully and dynamically over flatter terrain?

“We want to advance both the capabilities of humanoid robots and their speed of operation,” Griffin says. “The goal is to achieve human-level mobility so that the robots can keep pace with the tempo of real-world action.” ✧

Key Players on the Exoskeleton and Humanoid Robotics Teams



DR. GWEN BRYAN, RESEARCH SCIENTIST

Gwen's work links two of IHMC's core disciplines — robotics and human performance. Her work with exoskeletons is a kind of bridge between those worlds.

She investigates lower-limb wearable robotic devices aimed at augmenting human performance in clinical, occupational, and military applications through a human-centered research approach.

She joined IHMC after completing her Ph.D. at Stanford University in 2021. During her doctorate, Gwen developed a hip-knee-ankle exoskeleton emulator and used that device to find optimized exoskeleton assistance. Through human-in-the-loop optimization, she found effective exoskeleton assistance for a range of walking speeds as well as with a variety of worn loads. She also investigated if people are sensitive to customized exoskeleton assistance.

It is a research field that combines the technical, robotics side supported by her background in mechanical engineering,

with an understanding of physical fitness and human performance. Gwen is developing an exoskeleton to assist workers during nuclear remediation activities to offload some weight of required personal protective equipment.

She got interested in exoskeletons when she was applying to graduate school. "One of the labs I interviewed with was working on exoskeletons and prostheses. This field felt like a natural choice for me because it blended my free time interests (physical fitness) with my academic interests (mechanical engineering)," she said.

She says she has always been interested in science and probably comes by it honestly — her father has a Ph.D. in electrical engineering and her mother was a nurse. "Most of my science fair projects were hypothesis-driven and unique," she said. "One year, we analyzed the effectiveness of different hand washing techniques. We rubbed our hands in dirt, washed them in a variety of ways, touched petri dishes and then watched the bacterial growth."



DR. ROBERT GRIFFIN, RESEARCH SCIENTIST

Robert leads IHMC research efforts in humanoid robotics and is the principal investigator of the SquadBot and FastBehaviors projects. He is also a key member of the NASA Johnson Space Center's Val-EOD project, where the goal is to develop humanoid robots, primarily NASA JSC's Valkyrie, to function as Explosive Ordnance Disposal operators.

He earned his bachelor's degree from Tennessee Tech University, and his Ph.D. from Virginia Polytechnic Institute and State University with a primary research focus on the control of bipedal robotic mobility for humanoids and exoskeletons. Robert was a key software and controls developer in the 2016 Cybathlon, where the IHMC team placed second in the Powered Exoskeleton race. He returned full time to IHMC in 2017.

Robert also led the IHMC team in the Army Research Lab's Robotics Collaborative Technology Alliance, where they aimed to develop robust autonomous locomotion for

quadrupedal robots in complex environments.

Robert was part of the IHMC team that completed the 2020 Cybathlon Powered Exoskeleton Race, where they placed fourth. The same system was used as IHMC's entry in the Mobility Unlimited Challenge held by the Toyota Mobility Foundation, where the team was a finalist.

He looks forward to the work the team is undertaking now as they build on IHMC's tradition of excellence in this field.

"The robotics lab has an international reputation for innovation; the exo team we have in place now is poised to build on our past successes and elevate our research," he said.

Robert's focus includes proposals for assistive and augmentative technology to improve the automatic balance of robots. In humanoids, the team is designing new hardware, new torso and arms — all in an effort to replicate the "engineering marvels" that are the human hips and shoulders.



LUIGI PENCO, SENIOR RESEARCH ASSOCIATE

Luigi joined IHMC as Senior Research Associate in August 2022. As a roboticist, he will work with Dr. Robert Griffin and his team on the SquadBot project.

A native of Rome, he earned his bachelor's degree in Electronics Engineering from Roma Tre University in 2015 and a master's in Artificial Intelligence and Robotics from La Sapienza University of Rome in 2018. In 2022 he received a PhD in robotics from Université de Lorraine, while conducting his doctoral studies at Inria Nancy Grand-Est.

During his doctoral research at Inria, he has contributed to the EU H2020 AnDy project on human-robot collaboration. He has developed a teleoperation system for the humanoid robot iCub with the goal of providing an intuitive way to realize complex tasks and to convey collaborative policies to the robot.

His research focuses on humanoid robotics, with an interest in teleoperation and machine learning techniques used to improve the control

and skills of robots. In addition, his research interests include robot perception, whole-body control, and human-robot interaction.

Luigi says he has admired the IHMC robotics team for years from afar, noting their success in the DARPA Robotics Challenge. "Their continuous efforts in pushing the envelope of what is possible in the domain of robotics is something I truly look up to. Now, I have the opportunity of working for the best robotics team, and I'm looking forward to helping them achieve even more."

The field of robotics excites Luigi because it creates an outlet to pursue the opportunity to fix and program humanoid robots to make them do original things. In his case, Luigi views robots as outlets for expression. "Robots give me the possibility to fully express my creativity and I give them some moments of life in return," he says. "My dream is to create a new sport accessible to everyone, where teleoperated humanoid avatars fight in an MMA competition."



DR. GREG SAWICKI, SENIOR RESEARCH SCIENTIST

Greg has been working on exploiting key principles of locomotion neuromechanics to build wearable devices that improve the economy, stability and agility of human movement. He joined IHMC in January 2022 to bring expertise he's built at Georgia Institute of Technology to IHMC as a senior research scientist.

"One is to help guide current human exoskeleton projects, such as developing exoskeletons for injury prevention in industrial settings for the (U.S. Department of Energy) and improving controllers for the Quix Exoskeleton for improving mobility for people with spinal cord injury," Sawicki said.

The second is to help expand the research portfolio in human-machine robot interaction by consulting on new proposals to the National Science Foundation, the National Institutes of Health and the U.S. Department of Defense.

His work at the Physiology of Wearable Robotics (PoWeR) Lab at Georgia Tech has focused on how the biology behind the power

of lower-limb joints can be adapted to robotic devices to help people walk better. According to their website, The PoWeR lab's goal is creating lower-limb wearable exoskeletons that are "symbiotic" for the wearer, maximizing the energy needed for assisted walking.

"A real draw for me was the investment that IHMC is making in the area of human physiology, with a new building and many new team members planned over the next years," he said.

"Now is the time to formally merge physiology and robotics — and I hope I can help IHMC lead in this area."

He earned a bachelor's degree from Cornell University in Ithaca, NY and a master's in mechanical engineering from the University of California-Davis.

He finished his Ph.D. in human neuromechanics at the University of Michigan at Ann-Arbor. He also worked as a National Institutes of Health-funded post-doctoral Fellow in integrative biology at Brown University.



NICOLE ESPOSITO, RESEARCH ASSOCIATE

Nicole joined IHMC in July 2021 as a research associate focusing on the design and development of lower body exoskeletons for rehabilitative or augmentative use. She is working on the Sandia National Laboratories EVA exoskeleton project funded by the U.S. Department of Energy (DOE).

Before coming to IHMC, Nicole graduated cum laude with her bachelor's degree in mechanical engineering from the University of Florida and then worked under Dr. Daniel Ferris as a laboratory manager for two years, where she got

hands-on experience with different commercially available exoskeletons and tested their capabilities and user impact.

The movie "Iron Man" led her to robotics. "Even at the age of 11, I found myself fascinated with the promise of technological progress and ingenuity the movie showcased," she said. "A pioneer in innovation, very few companies could match IHMC's cutting-edge research and development. Even from the outside, it's clear that IHMC is full of like-minded thinkers with the drive and passion to push the boundaries of the robotics field."



STEFAN FASANO, RESEARCH ASSOCIATE

Stefan, who joined IHMC in July 2021, splits time between the humanoid and exoskeleton teams. He previously performed data science and data processing for IHMC's Artificial Social Intelligence for Successful Teams (ASIST) project funded by the Defense Advanced Research Projects Agency. He also serves as a controls engineer for the Wasp 2.0 quadcopter fleet, as well as the Sandia exoskeleton project. He earned a bachelor's degree in aerospace engineering from the University of Maryland College Park in May of 2021.

In school, he focused on space propulsion and power as well as space systems engineering, putting what he learned to use in the Revolutionary Aerospace Systems Concepts Academic Linkage (RASC-AL), a NASA-sponsored and NIA-managed university-level engineering design competition, that invites students to creatively improve the ability to operate in space.

He joined IHMC to further his engineering development and education through hands-on participation in diverse, innovative, and collaborative projects.



BRIDGET LONGO, RESEARCH ASSOCIATE

Bridget joined IHMC full time in June 2022 after interning for nearly a year with the team. She works with Dr. Robert Griffin and Dr. Anil Raj on the exoskeleton and Proteus projects respectively.

She earned a bachelor's degree in Interactive Design and Game Development in 2021 from Savannah College of Art and Design. She is mainly focused on environmental 3D modeling, as well as staging Computer Aided Design models for presentation in simulations. She is working with Senior Research and Product Development Associate

Adam Bruce on the Sandia Exoskeleton Project to create a VR simulation that can put anyone in the shoes (and exoskeleton) of a worker at the Hanford Tank Farm.

Working at IHMC fulfills a career goal of Bridget's – to incorporate her artistic background into the fields of science and technology.

She is a native of Pottstown, Pa., and in her spare time, Bridget can usually be found with her dog and cat beside her, doing some type of craft—from fiber arts to hand drawing and painting—for her small business.



JARED LI, RESEARCH ASSOCIATE

Jared joined IHMC in April 2021 and is working as the project manager of the exoskeleton team under Dr. Robert Griffin and Dr. Gwen Bryan. He leads the technical development of exoskeletons designed to augment the ability of able-bodied users as well as to restore ambulation to those with paraplegia.

His main research interests include biological-inspired design of soft exosuits, intent recognition control of wearable robotics, and biomechanical analysis of human motion. His master's thesis work was the design,

development, and evaluation of a novel exosuit to aid users in asymmetric lifting. During his undergraduate work, Jared assisted in the early and continued development of a powered prosthetic device to enhance/restore ambulation for those with transfemoral amputations.

He earned both a bachelor's and a master's degree in mechanical engineering from Georgia Institute of Technology. While at Georgia Tech, he worked in the Exoskeleton and Prosthetic Intelligent Controls (EPIC) Lab under Dr. Aaron Young.



ALEXIS MASLYZCYK, RESEARCH ASSOCIATE

Alexis splits time between the exoskeleton and humanoid robotics teams. He joined IHMC in January of 2021. Alexis's top three research interests are sensors, actuators, and electronic design.

While coming to IHMC afforded Alexis the chance to escape Canadian winters for warm shores, it also gave him an opportunity to make a direct impact in the field of robotics.

"I got to join at a time when Nadia was first being assembled. Currently, we're working towards replacing

off-the-shelf electronics found in both the exoskeleton and Nadia with more customized and optimized electronic design which is pretty exciting! Along the way, I have gotten to make great connections in my network, and even better friends. 10 out of 10 – would recommend!"

He is an electrical engineer with degrees from UTBM France and ETS Montreal. A native of Paris, France, Alexis studied in Canada for six years. He began his career in electric vehicles, though robotics is where his interests laid from a young age.



REESE PETERSON, RESEARCH ASSOCIATE

Reese Joined IHMC in August 2022 as a research associate focusing on the development of rehabilitative and/or augmentative controls for lower limb exoskeletons. He is working on the Sandia National Laboratories EVA exoskeleton project funded by the US Department of Energy as well as the Quix exoskeleton.

Before joining IHMC, Reese earned his Bachelor's degree in Engineering from Harvey Mudd College and then earned his Master's in Mechanical Engineering from the Georgia Institute of Technology. During his time at Georgia

Tech, Reese worked in the Exoskeletons and Prosthetics Intelligent Controls (EPIC) Lab under Dr. Aaron Young where he investigated machine learning to detect slip while walking in an exoskeleton.

After completing his Master's, Reese was looking to continue research into exoskeletons and IHMC provided the perfect location to continue. With IHMC's history of pushing innovation in the realm of rehabilitative and augmentative exoskeletons through projects like Quix and EVA, Reese found IHMC to be a great fit.



OWEN WINSHIP, RESEARCH ASSOCIATE

Owen joined the robotics lab at IHMC in November 2021. He writes controls software for the exoskeleton team.

He earned his bachelors and his master's degrees from the University of Michigan, where he worked with the Locomotor Control Systems lab. His research interests centered around parameter estimation and state estimation during different gaits.

Owen has admired IHMC's work for a long time and is excited to be an integral part of the IHMC robotics team as it continues its tradition of excellence in the field.

His background in exoskeleton and prosthetics research made joining IHMC the logical next step. He looks forward to learning a lot from his peers and growing as an engineer and researcher.

At IHMC, Owen is focusing on gravity compensation and model-based controllers in augmentative exoskeletons. He also manages the software on the exoskeletons, and low-level controllers. In the future he hopes to implement robust state estimation for the exoskeletons and investigate intent recognition with exoskeletons.



VISHNU AISHWARYAN, RESEARCH ASSOCIATE

Vishnu joined IHMC as a full-time employee in November 2020. He was a lab volunteer when he started at IHMC and was an intern during the 2020 Cybathlon.

He completed his master's degree in mechanical engineering at Worcester Polytechnic Institute, where he worked on a quasi-passive knee joint for an assistive exoskeleton. During his research he used a trade study approach to design a wrap spring clutch/brake knee joint, which he tested and optimized for better performance. Toward the end of his thesis, he joined IHMC as a

mechanical intern. He focused on designing foot soles, crutch user interface and redesigned backpack and thigh cuffs for the Quix exoskeleton project.

His future goal will be to design a rigid body exoskeleton for able-bodied people. His focus has primarily been on the hip design for the exoskeleton where he prototyped three different generations based on use-case scenarios and comfort. The latest design includes passive hip internal external rotation and abduction and adduction coupled with active flexion/extension.



RYAN HARKINS, RESEARCH ASSOCIATE

Ryan joined IHMC in May 2022 as a research associate, working with Dr. Robert Griffin and Brandon Shrewsbury on the robotics team. He will work on the SquadBot projects.

His bachelor's degree is in mechanical engineering from Virginia Polytechnic Institute and State University.

While in college, Ryan was a volunteer undergraduate research assistant for the Terrestrial Robotics, Engineering,

& Controls Lab aiding in their humanoid robotics projects. He also competed in the International Submarine Races as a member of the Virginia Tech Human Powered Submarine team. The team designed and built fully enclosed, pedal-powered submarines for SCUBA divers.

After graduation, Ryan worked for Apptronik as a mechanical design engineer, developing exoskeletons for the TALOS program along with humanoid robotics.



JAE SEOK OH, RESEARCH ASSOCIATE

Jae joined IHMC in April 2022 as a research associate and software developer working with Dr. Robert Griffin and Dr. Sylvain Bertrand on SquadBot, Rough Terrain, and Val2 projects in the robotics lab.

He earned a bachelor's and a master's degree in mechanical engineering at Carnegie Mellon University. His interest in software developed while working at the CMU Computational Engineering and Robotics Lab.

"IHMC has various exciting projects involving leading edge humanoid robots. What's really great about them is you get to see the robots everyday and check the results of your work or programming in person, and also talk to the people who actually made the robots to better understand them. I felt it could be a great opportunity for me to learn and participate in studying and finding solutions to various obstacles in the world of robotics and engineering."



EVAN YU, RESEARCH ASSOCIATE

Evan is an interdisciplinary integration engineer for the Nadia group. His research interests are in mathematical optimization, mathematical modelling, and creating tools for mechanical design automation/analysis.

He joined IHMC in September of 2020. He graduated from the California Institute of Technology with a bachelor's in mechanical engineering. During that time, he interned with various robotics groups including the Jet Propulsion

Laboratory and Caltech's CAST, in which he focused on mechanical integration and structural design.

Evan also works on personal robotics projects at home, including the design/control of a cable driven finger and applying machine learning to quadrupedal locomotion.

In his free time, he greatly enjoys cooking Chinese cuisine, longboarding, and hanging out with his cats, Basket and Piddles.



SIEGFRIED WEIGL, RESEARCH ASSOCIATE

Siegfried joined IHMC in August 2022 as a research associate. He is working in the robotics lab with Dr. Robert Griffin, Alexis Maslyczyk and the rest of the team on the Squadbot v1/v2 project and other IHMC research projects.

He is an electrical engineer with a degree from University of Missouri at Rolla. His past experiences are with HVAC, Battery formation equipment and test equipment, Avionics, LED and LCD displays, Scada systems,

PLC equipment, power electronics design, manufacturing automation systems, motor control electronics, and serial communications. He has extensive experience with high volume manufacturing of electronic controls, and third-party suppliers with attention to total quality management and return on investment.

His hobbies include running, hiking, church, and spending time with his wife at the beach.



NICK KITCHEL, RESEARCH ASSOCIATE

Nick joined IHMC in August 2022 as a software engineer working at the robotics lab on the humanoid's software team. Within the team, he is working on software autonomy and simulation testing for the humanoid robots.

His interests within technology include virtual reality, augmented reality, machine learning, and cybersecurity.

He received his bachelor's degree in computer science with a concentration in data science from the University

of Montana. While he was an intern at the school's IT department, he helped to maintain a secure and up-to-date website and domain for the University.

Growing up in the Northwest, Nick enjoys being outside during the summer and doing things like camping, biking, and tennis. During the winter months Nick would spend most weekends skiing up in the mountains. When Nick is not outside, he loves playing video games and board games.

Progress is continuing on the new building project for IHMC's Pensacola campus

The new IHMC Healthspan, Resilience and Performance Research Complex will be a leading-edge lab and office building.

An architect was chosen in March 2022 for the project, which will create a research hub for human healthspan, resilience, and performance work. The winning team was DAG Architects, whose principal, Dave Luttrell, is partnered with Brent Amos from Cooper Carry, headquartered in Atlanta, with substantial experience in biomedical facilities. The science and technology construction team from Brasfield & Gorrie was chosen to lead pre-construction and construction services for the new facility, planned at the corner of Garden and Alcaniz streets in Pensacola.

Phillip Turner, IHMC's director of architectural and engineering services,

said construction will start in the next few months with a groundbreaking in January 2023. Completion is scheduled for March of 2024.

When complete, it will expand IHMC's downtown Pensacola campus to three primary buildings and dedicates a space for the center's research into improving the healthspan, resilience, and performance of people. It will be consistent with, and complementary to, the Levin Center for IHMC Research.

Since IHMC's founding in 1990, it has built an international reputation for excellence and innovation in robotics and artificial intelligence. The HRP team's work is focused on improving the performance of elite military members given the stressors they face. But the ultimate applications could be far-reaching, offering substantial healthspan

benefits to the general population. The HRP Complex will be a leading-edge laboratory and office building integrating research laboratories with administrative support and outreach/training spaces in what is projected to be an expansive three-story building.

The project will provide more than 30 offices, multifunction research laboratories, and life sciences. The site will provide for approximately 46 parking spaces, including handicapped parking, and electric vehicle charging stations.

The new facility will be designed to enable research across the spectrum from molecules to humans, with some research space having a high ceiling height surrounded by overlooking laboratories and offices. The design includes premanufactured demising walls for future reconfiguration. ✦



Construction of the new IHMC Healthspan, Resilience, and Performance Research Complex should begin early 2023

Niranjan Suri named IHMC associate director

Dr. Niranjan Suri has been named an associate director at the Florida Institute for Human and Machine Cognition. Suri is an IHMC Senior Research Scientist and Associate for Research for the Information Sciences Division at the U.S. Army Research Laboratory.

Suri has been part of the IHMC family since 1994 and was part of its beginnings at the University of West Florida. It is a fitting chapter in the career of Suri, who first connected with IHMC founder Dr. Ken Ford as a UWF student and teaching assistant in the early 1990s.

"I have known Niranjan since he was a student long ago and have enjoyed watching his development as a colleague and successful senior research scientist at IHMC," Ford says. "He has always been a joy to work with and a team player. He has contributed to IHMC in many ways and now, while continuing his important research, he steps into a leadership role."

"One of the best parts of being with the IHMC team is to be able to work with a diverse, interdisciplinary group of people, with expertise in a wide variety of subject matters," Suri says. "I think another excellent attribute at IHMC is that everyone is trying to be helpful – so that all of us can succeed in our research."

Suri's recent research focuses on Agile Computing, which supports the discovery, management, and exploitation of resources and information in highly dynamic networked environments. His other research interests include Distributed Systems, Networking, Communications Protocols, and Internet of Things.

He recalls that his first IHMC-related job was back when IHMC was in a small section of Building 79, which was then

the Computer Science department. At the time, he worked for Dr. Alberto Canas, IHMC Associate Director and Senior Research Scientist, for a project called Quorum.

"(Quorum's) goal was to enable kids in South and Central America to collaborate and exchange information," Suri says. "I was also a Teaching Assistant to Dr. Ford for his Introduction to AI course."



Dr. Niranjan Suri

While working on his master's degree at UWF, Suri started focusing more on his own research and working with others, like Dr. Jeffrey Bradshaw, on Software Agents. They first started working with the Defense Advanced Research Projects Agency (DARPA), and then branched out to do more work with the U.S. Army, Navy/Marine Corps, and Air Force.

"My research has since mostly evolved to focus on Distributed Systems, Intelligent Networking, and Communications, and the area of Agile Computing," Suri says.

In his work with the Army Research Lab, Suri works with a number of North Atlantic Treaty Organization (NATO) Research Task Groups. He also supports the Internet of Battlefield Things (IoBT) program at the Army Research Lab and was responsible for setting up the Distributed Virtual Proving Ground (DVPG), an experimental testbed that connects multiple university and government sites together for joint experimentation.

He has taught undergraduate and graduate courses in Computer Science at UWF for over 10 years and currently mentors two students in the joint IHMC-UWF Intelligent Systems and Robotics Ph.D. program.

He has been a principal investigator of numerous research projects sponsored by agencies including the U.S. Army Research Laboratory, the U.S. Air Force Research Laboratory, the Defense Advanced Research Projects Agency, the Office of Naval Research, and the National Science Foundation.

Suri has authored or co-authored more than 200 papers, has been on the technical program committees of several international conferences, and has been a reviewer for NSF as well as several international journals.

While assuming a leadership role at IHMC, Suri will continue his research work. He hopes to continue the traditions that have made IHMC a compelling and unique place to work.

"Compared to other organizations, a great part of IHMC is the freedom for researchers to focus on their work with minimal overhead and interference," Suri says. "Leadership is there to help all the researchers succeed, not to get in their way. As an Associate Director, I hope to continue that trend." ✧

IHMC New Hires



ANDY BELLINA, SENIOR RESEARCH ASSOCIATE

Andy joined IHMC as a research associate in September 2022 where he works with the administrative team on project management and grant and contract administration as well as with IHMC scientists on human performance research projects.

Recently he retired after 20 years in the Navy as an F-18 Hornet and Instructor Pilot.

Andy earned a bachelor's degree in computer science from the U.S. Naval Academy and earned his executive MBA from the Naval Postgraduate School.

Andy lives in Pensacola with his wife, Kelly, and their two children. Andy is a member of the Satori Foundation board of trustees and the chairman of the Pensacola Yacht Club Junior Sailing Committee.



BRADY DECOUTO, SENIOR RESEARCH ASSOCIATE

Brady joined IHMC in June 2022 after completing his Ph.D. to work with Dr. Mark Williams and other members of the human performance team. He has a bachelor's and master's degree in kinesiology from Jacksonville University and a Ph.D. in cognitive and motor neuroscience at the University of Utah. At Jacksonville, he focused on perceptual-cognitive components of expertise. In Utah,

he worked with U.S. Ski and Snowboard Team to research developmental and psychosocial factors contributing to performance and mental health in alpine ski racers. His research assesses the role of expertise in perceptual processing.

Brady joined IHMC to pursue his interest in the optimization of human performance.



MEREDITH YEAGER, SENIOR RESEARCH ASSOCIATE

Meredith joins IHMC as a senior research associate through the U.S. Department of Defense's Skillbridge program. Through Skillbridge, Meredith worked with IHMC senior research scientist Jeff Phillips. With Jeff, she worked on studies to counter the impacts of dehydration and hypercapnia on aviators; to develop a pressure-resistant, diver mask-fitted oculometric neurologic assessment tool; and other projects.

"This has been a wonderful opportunity and experience for me," she says.

She retired as a captain in the U.S. Navy Medical Service Corps. She earned a bachelor's degree in kinesiology at Louisiana State University, and a master's degree in education from the University of New Orleans. She earned an executive MBA from the Naval Post Graduate School, Monterey, California.



DEXTON ANDERSON, RESEARCH ASSOCIATE

Dexton joined IHMC in August 2022 as a Software/DevOps Engineer working with Dr. Robert Griffin. He will be working on IHMC's open-source projects as well as maintaining continuous integration systems at IHMC.

He is proud to be a part of an institution that puts Pensacola at the forefront of research in science and technology. He earned a bachelor's degree in computer

science from the University of West Florida in 2022. While working on his computer science degree, he joined the National Flight Academy as a programmer. There, he worked with Lockheed Martin's Prepar3D flight simulation software creating content for the Academy including add-ons, flight instrument panels, and simulation missions. Dex contributes to open-source projects in his free time.



EMILY BOWERS, RESEARCH ASSOCIATE

Emily joined IHMC in August 2022 as a research associate. She is a University of West Florida graduate with a bachelor's degree in psychology and health promotion. She joined IHMC full-time after being an intern working with Dr. Jeff Phillips and the human healthspan, resilience, and performance team. She is working on dehydration and breath sounds studies.

She came to IHMC after applying to UWF's joint capstone-internship program through the psychology department in the Fall of 2021. She rejoined the healthspan, resilience, and performance team after graduation to continue her research.

Outside of work, Emily enjoys going to the beach, exercising, and being with family and friends.



TATUM HACKLER, RESEARCH ASSOCIATE

Tatum joined IHMC as an intern and has now transitioned to a research associate. She graduated from the University of West Florida in May of 2022 with a bachelor's degree in computer science and a minor in statistics. Her undergraduate tenure included computer science studies that were focused around software engineering. She now is working as a part of Dr. Niranjani

Suri's NOMADS research group that focuses on Agile Computing. She develops software applications to support information management and information dissemination between peers in tactical environments.

Tatum is originally from Fort Walton Beach, Florida. She swam competitively for 11 years, and now in her free time she likes to go to the beach, paint and try new restaurants.



AUSTIN MUSIC, RESEARCH ASSOCIATE

Austin joined IHMC in August 2022 to work with Dr. Matt Johnson and the Workbench team.

He earned a master's degree in computer science and a bachelor's degree in digital arts and sciences at the University of Florida.

At UF, he worked on a Virtual Reality Unity application for prosthesis control configuration testing to include eye tracking and performance metric logging for determination

of cognitive workload and to handle electromyography-based input.

At UF, he was a Machen Florida Opportunity Scholars Peer Mentor, mentoring first-year scholarship recipients to ensure a smooth home-to-university transition for first-generation college students. Austin joined IHMC to get experience with cutting edge research and learn from a diverse team.



SAVANNAH RICHARDSON, RESEARCH ASSOCIATE

Savannah joins IHMC from Fayetteville, N.C. As a research associate, she is working on underwater eye tracking research with Senior Research Scientist Dr. Jeffery Phillips. She also has worked on studies examining the effects of ketone esters on subjects in hypoxia and cold-water exposure.

She has worked on projects including on an Underwater Oculometric Assessment Tool and on the development of

tactile gloves to maintain optimal hand performance in cold-weather flight operations.

Savannah earned a bachelor's degree in mechanical engineering from the University of West Florida. She recently started a graduate program at UWF to pursue a master's degree in engineering with a concentration in robotics and systems.

She enjoys hiking and exploring new places.



ANNA JOHNSON, RESEARCH COORDINATOR

Anna "AJ" Johnson joined IHMC as a research coordinator working with the robotics lab in March 2022. She graduated with a bachelor's degree in theatre for Youth from Samford University in 2021.

While there, she stage-managed many productions, which taught her the organization, communication, and time-management skills she uses every day at IHMC as a research coordinator.

From 2015-2019, AJ spent her summers volunteering at The Children of Christ Home in Galette Chambon, Haiti, where she taught (reading, dance, music, and English), and organized a trilingual library for the orphanage. Before that, she studied at Ballet Pensacola for nine years where she learned the importance of staying flexible under pressure.

AJ spends her free time teaching at local theatres, writing in coffee shops, and dancing.

IHMC data visualization tools powering, enhancing data analysis for military analysts

Nearly 70 years ago, when the Department of Defense (DoD) needed to test and evaluate its weapons and warfighting systems, military computers could handle about 10 kilobytes of information.

Today, a full-scale DoD test exercise can generate a petabyte of data — the equivalent of a quarter-million DVD-quality movies, or Netflix's entire video library.

Analysts could drown in that volume of data. Yet, the stakes could not be higher for DoD Test & Evaluation (T&E) teams to find errors, anomalies, and vulnerabilities. That's why the work IHMC Senior Research Associates Larry Bunch and Micael Vignati have been doing for a DoD grant is so important.

Bunch is the principal investigator for this project, which will empower DoD Operational T&E personnel with unprecedented interactive multidimensional data visualization technologies for high-performance multivariate data analysis.

The project involves generalizing IHMC's existing Data Observatory advanced visualization technology from the cybersecurity domain to the Test & Evaluation domain. By creating dynamically-generated visual models of data, analysts can rapidly and interactively explore large datasets of operational tests involving warfighter systems.

A key aspect of supporting human-machine collaboration is providing a mediating representation for people to interact with their analytical tools and explore the data in a meaningful way; IHMC's visualization tools make this possible by bringing together the computing power of machines and a human's uncanny ability to discover and recognize visual patterns.

Bunch said the visual mediating representation is critical here because

it generates an interactive 3D model providing an elegant and compact data representation that facilitates communication and observability of both the data and analytical results, much like concrete examples help people discuss and explore complex ideas.



Larry Bunch and Micael Vignati

Both the software and the data analyst can flag, annotate, and direct more resources toward interesting parts of the data through the IHMC visualization tools, he added.

"The datasets that these DoD T&E teams must analyze today are enormous," Bunch said. "For a complex system such as an aircraft with thousands of sensors and multiple video streams, these tests generate such massive amounts of data that it's impractical for humans alone to evaluate it all. This is where leveraging AI technologies and high-performance

computing systems to assist analysts becomes essential."

It is work with roots that date to 2014, when Bunch, Vignati, and Senior Research Scientist Jeff Bradshaw started working toward a vision where humans and machines work together as a team, leveraging each other's strengths to make sense of large-scale data. People bring vital contextual understanding, intuition, and amazing pattern recognition capabilities. Machines augment this by applying powerful analytics and AI techniques like machine learning at incredible speeds to sift through the data identifying trends, outliers, and anomalies.

The tool Bunch, Vignati, and team are now working on that makes this possible is the Data Observatory visualization technology invented, patented, and developed by IHMC. This technology combines insights from data science with human vision science to enable analysts to view millions of data points at a glance and watch how the data changes.

The Test & Evaluation Data Observatory project is divided into four phases. Bunch and his team just completed phase two of the project, which focused on enhancing the capabilities of IHMC's software. This included improvements that will enable T&E analysts to configure visualization scenes for testing aircraft systems and run data analytics to enhance the ability of humans to make sense of the underlying data.

Now that the visualization tech is working well, Bunch said that phases three and four primarily involve making it intuitive for analysts to build new visualization scenes for any type of data and incorporating powerful data analysis tools plus AI-based software that analysts can direct through the visualization and overlay the results on their data. ✚

Robotics Camp helps fuel students' love of science, engineering, and technology fields through fun

If Jones Moore grows up to be an engineer, IHMC might be able to take a little credit.

Jones, 12, has been to nearly every Science Saturday session Florida Institute for Human and Machine Cognition has hosted in Pensacola. This month, he spent his first week at Summer Robotics Camp as a rising eighth-grader. He was one of nearly 40 students who spent a week learning from the best at IHMC's 2022 summer camp experience.

Jones says the best part of robotics camp was building robots and learning to code.

Anthony Gentry, a rising eighth-grader at Howard Middle School in Ocala agreed that learning to code was the best part of camp. So was building his teamwork skills.

"With all the robot challenges, there was always something to do," he said.

Robotics Camp is one of IHMC's signature community outreach efforts for students, which also includes Science Saturdays, a school-year science enrichment program, and school-year field trips.

Robotics Camp is one of the best times of the year at IHMC. It is when the doors open wide — and the next generation of scientists walk through. Instructor Heath Parr, an Escambia County middle school teacher and robotics club instructor, led some 40 students in grades 8-10 through

the basics of robotics, coding, and problem-solving.

Dr. Ursula Schwuttke is the director of educational outreach for both IHMC's Pensacola and Ocala campuses. She organizes Robotics Camp and the Science Saturday series, both of which are meant to spur a love of science in students so that the best and brightest minds are inspired to look for what's next.

"Fun science gives kids the ability to discover their interest and ability in science, and to develop self-confidence," says Schwuttke. "Opportunity is vitally important for kids. Without the opportunity to discover their interest, they can't know that it's something they should pursue."

While assembling and programming the robots is of course the fun part, a highlight of camp is the chance to meet and mingle with researchers on the IHMC team. In Pensacola, Senior Research Scientist Dr. Jeff Phillips, Research Scientist Dr. Gwen Bryan, and Research Associates Duncan Calvert, Nicole Esposito and Josh Farina all took time out of their schedules to visit with campers, have lunch and share information on their current research, as well as how they launched their own science careers.

They made a big impression on Jones.

"I think since they had professionals on hand it helped that you could talk



Students at IHMC Robotics Camp 2022

to them and learn new things," said the Pensacola middle schooler.

In Ocala, Research Scientists Archana Bhatia, Ian Perera, and Arash Mahyari made presentations to campers about their research at IHMC and afterwards, sat for "lunch with a scientist." Ben Thompson and Rachael Martin from Lockheed Martin also made a presentation about engineering careers and did lunch with an engineer.

The impression they left on students such as Luiz Agustin-Sanchez, a rising sophomore at North Marion High School, was clear.

"I've been interested in robots since I was a kid," Luis said. "Thanks to this camp, I now have an idea of what I want to be." 🤖

In Pensacola, Camp is sponsored by Cox, the Escambia Sheriff's Office, Barnes Insurance, and Florida Blue. Their support made camp possible and allowed IHMC to include students from the Educational Talent Search Program at Pensacola State College and Pace Center for Girls. In Ocala, Robotics Camp is sponsored by Cox, Lockheed Martin, Renasant Bank, CareerSource Florida, Ocala electric Utility and Mid-Florida Regional Manufacturers Association. Sponsors in both communities are helping to create a pipeline for IHMC to share a love about science with students in every corner of the community.

Science Saturdays show positive impact on students' curiosity and confidence in science

Serving the broader community is an important component of IHMC's outreach, and this spring's successful return of Science Saturdays was a valuable part of that.

Science Saturdays is a series of 90-minute educational enrichment sessions. Topics in 2022 included computer game design, robotics, roller coasters, butterflies, circuits and more. All are aimed at educating and inspiring the next generation of scientific minds.

Srirama Masih can't wait for the Fall series of sessions to begin, according to his mother, Prerna Masih of Pensacola.

"We all enjoyed Science Saturdays a lot. It is something Srirama looks forward to. He liked it a lot because the sessions were engaging and provided hands-on activities. We are looking forward to the upcoming fall sessions."

Dr. Ursula Schwuttke is the director of educational outreach for both IHMC's Pensacola and Ocala campuses. She surveys Science Saturdays parents to try to gauge the impact of the sessions.

All families report that the sessions boost their children's scientific curiosity, motivation in science class, enjoyment of science and self-confidence in general. But families whose children qualify for free and reduced-price lunch uniformly report more impact on motivation and self-confidence in science class than other participating families.

"We see that Science Saturdays are impactful for all families, but we see that we continue to make the most difference among families of more limited means — families who might not be able to offer their children the regular experience of hands-on science if our events weren't free," Schwuttke said.

Schwuttke says she is eager to resume Science Saturdays in the fall — and hopes

many more young science enthusiasts out there will join in.

"Students who become interested in science in elementary school are more likely to be ready to pursue science and related subjects in high school and beyond," Schwuttke said.

Students from 15 Escambia and Santa Rosa elementary schools attended these weekend enrichment sessions at the Pensacola campus. In Ocala, students from 32 schools participated in Science Saturdays.

Parents surveyed share that the diversity of programming and consistent high-quality are important, but the excitement their children share once they return from the workshops is what keeps them coming back.

"IHMC's outreach efforts provide a continuum of engaging hands-on science and technology events to give students the opportunity to nurture their interest, independent of family resources," Schwuttke said.

Visit ihmc.us/life/science_saturdays for the most recent updates. 🚀



Science Saturdays build science curiosity in students

Science Saturdays

Thanks to those IHMC staffers who have offered their time to teach these sessions and share the love of science with students.

Please share the link to sign up for more info to friends with children in grades 3-6.

ihmc.us/life/science_saturdays

Pensacola Sessions

9/24: Jeff Phillips, Paper Airplanes

10/22: Heath Parr, Sphero Robots

11/19: Pat Hayes, Bottle Rockets

12/17: Nicole Esposito, 3D Printing

Ocala Sessions

9/10: Arash Mahyari, Electric Circuits

10/15: Manal Fakhoury, Reaction Time

11/12: Archana Bhatia, Harry Potter and Programming in Python

12/10: Erin Benavides, TBD



Fall 2022 IHMC Evening Lecture series kicks off in September

The award winning IHMC Evening Lecture Series provides a community forum where individuals gather to hear engaging and enlightening conversations. Speakers present an ongoing series of fascinating lectures on meaningful topics in subject areas including science and technology, civic leadership, and urban planning.

The series, which features speakers at both the Pensacola and Ocala campuses, began in September and ends in December 2022. Lectures are free and open to the public, but registration is suggested. Visit https://www.ihmc.us/life/evening_lectures/ to register and learn more.

PENSACOLA LECTURES

**Dr. Dan Pardi, Sept. 22**

"Actual Health – Realizing Untapped Potential." Pardi's work looks to create major structural changes to better address lifestyle health in society.

**Dr. Gwen Bryan, Nov. 2**

Bryan's work is focused on developing an augmentative exoskeleton for U.S. Department of Energy workers and a rehabilitative exoskeleton for those with spinal cord injuries.

**Dr. Art DeVany, Oct. 13**

"On Being a Long-Lived, Lean, Muscular, Fast-Twitch Phenotype." DeVany is professor emeritus of economics and the Institute for Mathematical Behavioral Sciences at the university of California, Irvine. Considered the "Grandfather of Paleo," he is working on a book on aging.

**Dr. Marcos Bamman, Dec. 13**

"Human Health and Performance: Assembling the Puzzle Pieces toward Optimization." Bamman is Senior Research Scientist and Director of Healthspan, Resilience, and Performance Research at IHMC.

Pensacola lectures are supported by sponsors Dry Farm Wines, Ed and Judy Galbavy, Dr. Roger and Barbara Orth, Joanne Bujnoski and Martin Kandes, Clark Partington, and Garlan Sisco.

OCALA LECTURES

**Dr. Jeff Phillips, Oct. 20**

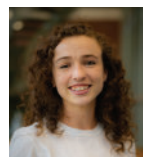
"Science, Knowledge, Belief, and Human Nature." Phillips is Senior Research Scientist at IHMC. He is interested in developing mitigation strategies for common environmental, physiological, and cognitive stressors that break down optimal performance of humans in extreme conditions.

**Todd White, Dec. 6**

White is the Founder of Dry Farm Wines, the only health quantified wine merchant in the world and the largest retailer of pure natural wines in the world.

**Dr. Natalie Ebner, Nov. 17**

Ebner is an expert in experimental aging research using a multi-methods approach that includes self-report, cognitive-behavioral measures, neuroimaging techniques, and hormone/neuropeptide markers.

**Dr. Gwen Bryan, Jan. 19**

"Improving Human Performance Through Wearable Robotics." Bryan is a research scientist at IHMC whose work is focused on powered exoskeletons.

Ocala Lectures are supported by sponsors Duke Energy, College of Central Florida, Stella's Modern Pantry, La Casella Catering, Ocala Electric Utility, Rasmussen University, Ocala Gazette, Ocala Style, and Hotel Development and Management Group.

2022 Evening Lectures focus on science of expertise, immunotherapy, water quality and more

The 2022 calendar of IHMC's popular Evening Lecture Series includes experts in brain disease, trauma and health; obesity; human performance and resilience; award-winning authors and more. These lectures — in both Pensacola and Ocala — allow the community to hear from scientific thought leaders on a range of topics. Visit ihmc.us/life/evening_lectures for the most updated schedule.



DR. MARK WILLIAMS

What makes an expert athlete? Mark's talk centered on the physical, cognitive and psychological factors that influence how experts are built. Environment, birth order, adaptations, learning and practice are all factors that build sports expertise. There is more room for science to explore the psychological and cognitive differences in sports experts compared to sub-experts, he said. Experts devote more time to practicing weaker skills, exhibit more self-reflection, use more physical and mental effort during practice, and may find practice less enjoyable. Understanding how expertise is built can improve coaching and teaching strategies.



DR. DUANE MITCHELL

Dr. Duane Mitchell, a professor of neurosurgery at the University of Florida, is an expert in the development of innovative immunotherapy treatments for children and adults with malignant brain tumors. He has pioneered therapies that have been translated into first-in-human clinical trials and multi-center phase 2 studies. His talk in April 2022 reviewed advances in immunotherapy treatments for more than 15 types of cancer including prostate, lung, breast, and melanoma. His team and others are continuing to work on ways to harness this powerful tool to treat glioblastoma.



DR. VYVYANE LOH

Dr. Vyvyane Loh is board-certified in obesity medicine and internal medicine. She graduated from Boston University School of Medicine and trained at Newton-Wellesley Hospital where she also served as chief resident. In her talk, she spoke about the unsung heroes of the human immune system — macrophages. These "big eater" cells play often unheralded roles in the progression of cardiovascular disease, gastrointestinal disorders, obesity and sepsis to tissue trauma and osteoarthritis, neurodegenerative diseases and more. She is currently the medical director of the Transform Alliance for Health.



JOHN DUNN

Writer John M. Dunn spoke about the state of Florida's water woes. He noted how restoration efforts, green infrastructure, and more can be deployed to help mitigate negative environmental impacts and help preserve our freshwater supply. Dunn is a prolific author and a teacher of history, law, sociology, and philosophy. He has written more than 400 articles and authored 16 nonfiction young adult books. In February of 2020, his book, "Drying Up: The Fresh Water Crisis in Florida" was winner of the Florida Historical Society's Stetson Kennedy Award for writing about Florida's natural environment in 2019.



MARCAS BAMMAN

Marcas Bamman is a Senior Research Scientist and Director of Healthspan, Resilience, and Performance Research at IHMC. In this capacity he helps catalyze high-impact research development and leads clinical and translational research to advance knowledge across the spectrum from elite performers to chronic disease populations, and from biological underpinnings to clinical outcomes. At his May Ocala lecture, Bamman shared an update on how IHMC's healthspan, resilience and performance research has grown in recent years and what the future might hold for this most biologically focused human research program of IHMC's pillars.

From hypersonic weapons to circadian biology, STEM-Talk guests have shared it with listeners

STEM-Talk hosts Dr. Ken Ford, IHMC's CEO and founder, and Dawn Kernagis, research scientist, converse with some of the most fascinating scientific minds. With more than 3.3 million total show listens over 140 episodes, STEM Talk continues to be a home for full and frank conversations. Visit <https://www.ihmc.us/stemtalks/> to keep up with the latest episode.



DR. MICHAEL GRIFFIN, EPISODE 134

Dr. Michael Griffin is the Pentagon's former Undersecretary of Defense for Research and Engineering. In this STEM-Talk episode, Griffin discusses the history of hypersonic technology; why he made it his priority at the Department of Defense; and why Russia's and China's growing hypersonic capability represents a serious threat to America's national security. The interview came weeks after reports that Russia had used hypersonic weapons in its war on Ukraine.



DR. ELAINE LEE, EPISODE 135

Dr. Elaine Choung-Hee Lee, an assistant professor in the Department of Kinesiology at the University of Connecticut focuses her research on understanding the mechanisms of resilience and investigating ways to help humans improve their stress resistance, adaptation and healthspan. At her UConn research center, called the EC Lee Laboratory, she and her colleagues use genomic and other technologies to ask questions about what makes high-performing athletes and warfighters so elite.



DR. GREG POTTER, EPISODES 136 AND 137

Your body's "master clock" evolved to help keep you alive and safe. And when it's disrupted, it doesn't take long at all for the negative impacts of that circadian rhythm shift to be felt in your health and well-being. Dr. Greg Potter shared a deep-dive into the intricate connections between your body's circadian biology, sleep, diet, and metabolism. Potter also shared science that cautions about just how quickly disruptions to that clock can have negative biological and physiological effects on us.



DR. MARK LEWIS, EPISODE 138

Failure is a critical part of research – but the U.S. defense infrastructure is operating in such a risk-averse atmosphere that it is hampering our capabilities. Episode 138 returns to the topics of hypersonics in a conversation with Dr. Mark Lewis, who says that the U.S. is woefully behind the curve in research and development of these weapons – an area in which we used to be the world leader. Lewis is executive director of National Defense Industrial Association's Emerging Technologies Institute, a nonpartisan think-tank.



DR. MATT KAEBERLEIN, EPISODE 139

Aging may be inevitable, but some of the cognitive and physical declines that are associated with it may not be. In Episode 139, Dr. Matt Kaeberlein, a professor of pathology at the University of Washington, talks about what he's learned about the molecular mechanisms of aging. Some of Matt's most recent investigations have been into rapamycin, the only known pharmacological agent to extend lifespan. His research has shed new light on the role it plays in delaying age-related dysfunction in rodents, dogs, and humans.



DR. KALEEN LAVIN, EPISODE 140

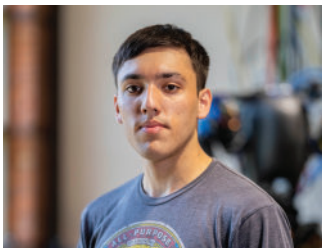
The benefits of exercise to human physiology and cognitive ability are well-documented, but too few people take advantage of this prophylactic against "inflammaging" – chronic low-grade inflammation in the aging process that impedes health and diminishes quality of life. In Episode 140 IHMC's Dr. Kaleen Lavin shares what she has learned from the molecular effects of exercise training in skeletal muscle and in people with Parkinson's. She also talks about working with machine learning experts at IHMC to glean new insights into the large data sets her research generates.

IHMC's summer and fall interns for 2022

Learning is an ongoing part of what makes IHMC special. Each year, we host dozens of interns on our campuses. These students gain valuable research experience at a world-leading institution of excellence.

From the Robotics Lab at the Levin Center for IHMC Research to the Human Healthspan, Resilience, and Performance team, to our AI and virtual reality work, interns in 2022 made great contributions to the work of our researchers.

With opportunities for students from high school through graduate school, we were pleased to welcome these talented and motivated students to our campus — and we wanted to share a bit about them here.



Kian Agrawala

Research: DARPA Artificial Social Intelligence for Successful Teams
School: Rutgers University Honors College



Muddasar Ali

Research: Intelligent Systems
School: University of West Florida



Bruno Ariza

Research: Electrical engineering and software development
School: University of West Florida



Alessandro Amato

Research: Agile Computing
School: University of West Florida and the University of Ferrara



Sophia Bamman

Research: Human Performance
School: University of Alabama at Birmingham



Kai Becraft

Research: Robotics
School: University of California Los Angeles



Jackson Brewer

Research: Computer Science
School: Pensacola Catholic High School



Sean Bridges

Research: Quix exoskeleton
School: University of West Florida



Kevin Carff

Research: VR Workbench
School: University of West Florida



Davi Carmago

Research: Robotics
School: University of West Florida



Zachary Carter

Research: PROTEUS project
School: University of West Florida

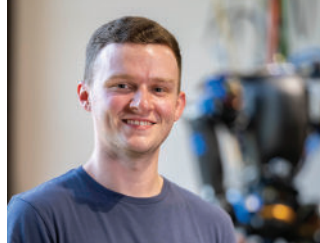
If you are a student with the passion, discipline and creativity to join our team, IHMC researchers have internship opportunities available throughout the year. Visit www.ihmc.us/about/opportunities to learn more about all of the opportunities that are available.



Thomas Cook

Research: Computer science and cybersecurity

School: Pensacola Catholic High School



Sam Dinnart

Research: Robotics

School: Louisiana Tech University



Raffaele Galliera

Research: Intelligent Systems and Robotics

School: University of Ferrara and University of West Florida



Joseph Godwin

Research: Robotics

School: University of West Florida



Bryan Gonzalez

Research: Exoskeleton knee and ankle joints and Proteus

School: Embry-Riddle Aeronautical University



Porter Hanley

Research: Data visualization software

School: Pensacola Catholic High School



Lana Kader

Research: OptiTrack motion capturing

School: Pensacola High School



Heidi Keiser

Research: Human Performance Breath Sounds Study

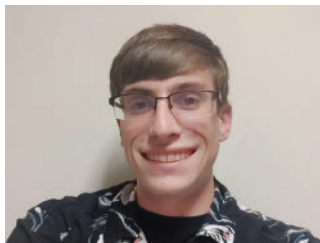
School: Indiana University School of Medicine



Davin Landry

Research: Exoskeleton

School: Northwestern University



Zachary Lovell

Research: Coding/Computer Science

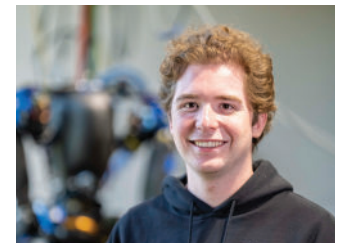
School: University of West Florida



Iain Mackeith

Research: Robotics

School: Georgia Institute of Technology



Perry MacMurray

Research: Robotics

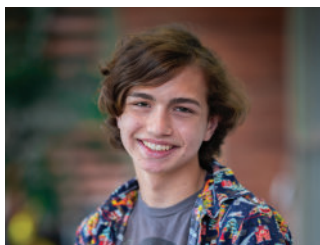
School: University of Michigan



Mark Maddox

Research: Staff Assistant

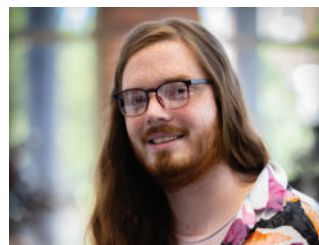
School: University of West Florida



Gabriel McLendon

Research: Advanced Visualization Team

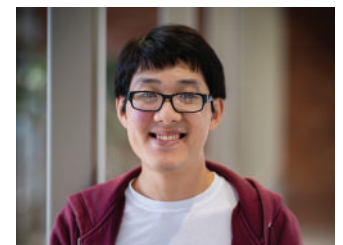
School: West Florida High School



Kain Miller

Research: Exoskeletons

School: Graduate of Corry Area High School



Jack Nguyen

Research: Human Performance

School: Embry-Riddle Aeronautical University



Anmol Ligan Gouda Patil

Research: Natural language processing and stance detection

School: University of Florida



Alexander Phipps

Research: Natural language processing

School: College of Central Florida



Ravi Raj

Research: Human Performance dehydration and breath sounds studies

School: Florida Institute of Technology



Deesha Rajiv

Research: Staff Assistant

School: University of West Florida



Esha Rajiv

Research: Staff Assistant

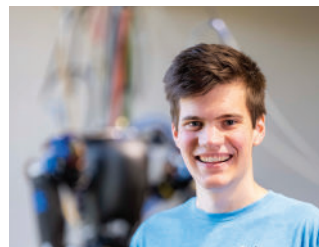
School: University of West Florida



Vishweshwar Ramanakumar

Research: Natural language processing

School: University of Florida



Allen Reed

Research: Robotics team and Fast Behaviors

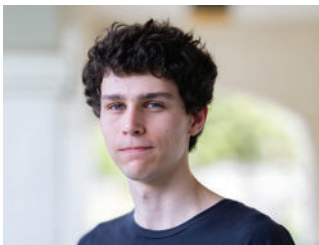
School: Penn State University



Jajaira Reynaga

Research: Cognitive testing and natural language processing

School: University of California Santa Cruz



Ben Shinnick

Research: Software engineering for DARPA Artificial Social Intelligence for Successful Teams

School: University of West Florida



Sarasit Sirawattanakul

Research: Exoskeleton

School: Georgia Institute of Technology



Daniel Strach

Research: Data visualization software

School: University of Hradec Kralove



Chase VanderZawn

Research: VR Workbench

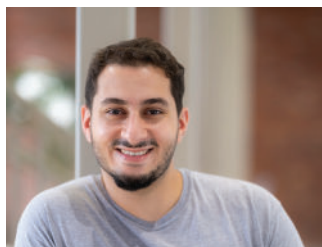
School: California Polytechnic State University



Luke Vincent

Research: Coding for VR Workbench

School: University of Utah



Husam Wadi

Research: Exoskeleton

School: Carnegie Mellon University



Garrett Whitcher

Research: Computer Science

School: Pensacola Christian College



Ryan Zhang

Research: Augmentics

School: Pensacola High School



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