FLORIDA INSTITUTE FOR HUMAN & MACHINE COGNITION

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Florida Institute for Human & Machine Cognition

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Dear Friends,

As we often point out in the newsletter, the work and research we do at IHMC is about amplifying and extending human cognition, perception, locomotion and resilience.

Now, more than ever, this type of research is needed as humans explore new frontiers that are increasingly exposing us to extreme environments. As our cover story in this edition of the newsletter points out, our bodies are pushing back.

An important two-year $800,000 grant is allowing IHMC Research Scientist Dr. Dawn Kernagis to put together a team to look into the matter and investigate the impact of brain lymphatic function in response to simulated microgravity.

The NASA Translational Research Institute grant is particularly focused on understanding how exposure to long-duration space missions can affect the brains of astronauts. But the research also will have possible implications for a wide range of people ranging from pilots engaged in high-altitude flight, to mountain climbers, to professional divers both Navy and commercial. The research may also provide insights on neurodegenerative disorders as well as traumatic brain injury.

This edition of our newsletter also highlights how our scientists are increasingly being recognized for their work and their careers.

Just recently, it was announced that IHMC Senior Scientist Dr. Thomas Jones is being inducted into the United States Astronaut Hall of Fame. Tom is a three-time spacewalker who logged 53 days in Earth orbit and helped install the U.S. laboratory on the International Space Station.

The National Academy of Inventors announced the induction of IHMC Senior Scientist Dr. Peter Pirolli and 154 other inventors from around the world into its class of 2017 fellows. Peter joins six previously elected NAI Fellows who are affiliated with IHMC.

Last fall, Dr. Dwayne McCay and I were inducted into the Florida Inventors Hall of Fame. Dwayne is a member of IHMC's scientific advisory board.

Some other good news we received was the announcement that IHMC's podcast STEM-Talk won first place in the science and medicine category of last year's international People's Choice Podcast Awards.

IHMC is fortunate to attract, develop and retain such world-class talent. And it's because of this talent that we are able to build upon the momentum that our scientists and researchers are able to create year after year.

Best wishes,

Ken Ford

Kenneth M. Ford, Director

Helping humans thrive in extreme conditions

Riding new technology and scientific knowledge, humans are pushing the envelope of exploration with longer missions in increasingly extreme environments. And our bodies — and brains — are pushing back.

The response: Use advances in technology and data gathering and analysis to find answers to physiological problems stemming from human activities on the leading edge of our knowledge and expertise.

At IHMC, Dr. Dawn Kernagis is leading a research team on a prestigious two-year, $800,000 grant from the NASA Translational Research Institute to investigate the impact of brain lymphatic function in response to simulated microgravity. Clearance of the brain in astronauts, high-altitude pilots, and other populations exposed to long duration missions in extreme environments could be impaired. Similar concerns extend to mountain climbers, commercial divers, and even technicians working in hypobaric chambers to train pilots.

However, the implications of the research easily extend to the general population, especially with problems like Alzheimer's Disease or traumatic brain injury. The research could even extend to space tourism, looking forward to the day when entrepreneurs offer joyrides into outer space.

"Astronauts and other people working in extreme environments are seeing changes to the structure of the eye, the brain, and development of high numbers of white matter lesions, or spots, on the brain," Dr. Kernagis said. "Most of us get these lesions as we age, and we see them in relatively normal, healthy aging populations; but they are being seen in numbers that are seemingly higher compared to age-matched controls.

"We don't know why that is, but the hypothesis we are working from is that when individuals go into these extreme

Dr. Dawn Kernagis is leading the 2-year initiative

Grant Details

Title: Cervical Lymphatic Function Quantification and Associated Molecular Changes in Response to Simulated Microgravity.

Sponsor: NASA Translational Research Institute for Space Health

Lead Researcher: IHMC Research Scientist Dr. Dawn Kernagis, PhD. She is co-host of IHMC's podcast, STEM-Talk, and a member of the Department of Defense Biotechnologies for Human Performance Council.

Team members:
IHMC Senior Research Scientist Dr. Jonathan Clark, M.D. He is also an Associate Professor of Neurology and Space Medicine at Baylor College of Medicine (BCM), and was previously a NASA and Navy Flight Surgeon.

Dr. Eva Sevick-Muraca, PhD. She is a Professor and the Nancy and Rich Kinder Distinguished Chair of Cardiovascular Disease Research at the University of Texas Health Science Center's Institute of Molecular Medicine (IMM), where she directs the Center for Molecular Imaging. At the IMM she leads the National Cancer Institute Center for Translational Research.

Dr. David Crandall, PhD., Indiana University. He earned his PhD in computer science from Cornell University, and is an associate professor in the School of Informatics, Computing and Engineering and directs the IU Computer Vision Lab.

environments, because of microgravity or fluid shifts, or potentially hypoxia (low levels of oxygen) for high altitude exposures, you get a backup of the brain's lymphatic system, which leads to some of the changes we are seeing in astronauts."

For Kernagis' study, healthy volunteers, who match the age range and demographics of the astronaut population, will be tested on tilt tables that can produce a head-down position, as well as head-out immersion exposures in which volunteers are immersed in water up to their neck for extended periods of time.

"We think the acute changes in fluid shift in these models are going to be similar to what you see in microgravity," Dr. Kernagis said. "They have used these models extensively in the past to simulate microgravity, so we are going to use these methods and see if these simulated microgravity exposures impact peripheral and brain lymphatic function."

Research into the brain's lymphatic system is in its infancy. "We have learned much in the last five years," she said. "We didn't even really know the brain lymphatic system existed until recently."

What research is showing, she said, is that when the brain lymphatic system gets "backed up," it doesn't clear out metabolic waste efficiently. These new findings paint the lymphatic system as the waste clearance system in the brain.

"All of the metabolites that are generated during the day as your brain is working get flushed out at night, specifically when you sleep, which is one of the big reasons that sleep is important - it seems to flush at peak when you are sleeping," she said. "And the thought is that if it gets backed up, you get this accumulation of waste material, which can do additional damage to different areas of the brain."

This research quickly became a focus for problems such as Alzheimer's disease and traumatic brain injury as well.

"We are just starting to learn how the brain lymphatic system works, and what it means if it doesn't work properly," she said. "Researchers have found that it is connected to the rest of our lymphatic system, so that is interesting because we always thought of the brain itself as being isolated from the rest of the body in terms of immune response, and now it looks as if that is not the case. The research on the brain lymphatic system is still in its infancy. It will certainly be interesting to see what comes out in the next five years as more and more researchers begin to roll out the results of their studies."

Part of the challenge is simply setting the benchmarks.

"We don't even know what a normal "healthy" brain is with respect to lymphatic function or white matter lesions," Dr. Kernagis said. "People are exposed to all sorts of things over a lifetime, but what is the normal variation for a healthy brain, not aged, but for someone in their 40s or 50s, across the population? We know you get these lesions as you age, but what is within normal range and what is considered outside of that range?

"There are still a lot of questions out there about the brain lymphatic system. It's really fascinating to go through the literature – there is still a lot we don't understand about this."

Meanwhile, Dr. Kernagis said astronauts and other extreme environment operators face additional challenges. In addition to the white matter lesions, astronauts experience a shift in their brain position and develop vision changes during long duration space missions. These changes appear related to intracranial hypertension, which could be related to the same brain fluid back up issue.

She also said that when it comes to the lesions and other brain effects, "we don't really know what it all means. Do these changes have an impact on cognition?

Kernagis and NASA astronaut Megan McArthur Behnken on a dive doing NEEMO research

Or is it that they are just there and are asymptomatic. Are they permanent or do they resolve over time? We are learning all of that as researchers and physicians track astronauts longitudinally, as well."

She said she expects the test-subject phase of the project to start in spring 2018. First comes development of software designed to quantify lymphatic function to provide a metric for how well the lymphatic system is working. IHMC is collaborating with Dr. David Crandall of Indiana University for the software development. The cutting-edge technology that captures the lymphatic function through imaging comes out of the lab of collaborator Dr. Eva Sevick-Muraca of the University of Texas Health Science Center.

Dr. Kernagis said the study's goal is development of countermeasures for the fluid shifts that could be causing the white matter hyperintensities, brain shift, and visual problems. The countermeasure could be mechanical, such as a device astronauts would wear to restore or stimulate lymphatic pumping, or it might be pharmaceutical if the cause of the problems turns out to be changes at the cellular or molecular level.

There might also be engineering solutions, such as designing long-duration mission vessels to provide induced gravity.

Dawn joined IHMC in 2015

Former NASA and Navy flight surgeon Dr. Jonathan Clark will work with Kernagis on the project

"We are definitely meant to be under gravity," she said. "We evolved that way, our systems developed that way, and there are a lot of issues that crop up in a microgravity setting, such as bone issues, cardiovascular issues, renal issues, brain effects, immune system dysfunction - it pretty much goes across the board. Our bodies are not at their happiest when they don't have gravity."

More immediately, the goal is to produce a flight-ready monitoring device and a research protocol that astronauts can take into space to allow measurement of lymphatic function under actual microgravity conditions as opposed to simulated microgravity in an earth-bound laboratory environment.

This sort of research is exactly why Dr. Kernagis was recruited to IHMC, said Dr. Ken Ford, CEO of the institute. "IHMC has always been about leveraging and extending human performance," he said. "But the means were primarily computational and electromechanical. Dawn and some of our other colleagues are particularly focused on human performance and resilience in extreme environments. It's a great fit."

Dr. Kernagis sees this study as one piece of a complex puzzle being assembled by researchers in many institutions, and it is aimed at supporting the increasingly extreme frontiers of exploration. With a background in deep-sea diving, she understands the risks and rewards of operating in an extreme environment.

"As technology develops, just tracking these impacts is going to be crucial," she said. "I think explorers are focused on the risk versus reward curve, and I think some people are willing to take more risks. Those people know that there are these additional risks that might crop up but are willing to go into the extreme environment or perform the mission because of the potential reward. So, I think the big priority is having the knowledge in hand and doing the best we can to figure out what the potential issues are, in addition to finding the best ways to treat or prevent these issues.

"On the operational side of things, I think we all face the decision on whether the risk is worth the reward. I think the best scenario is if the operator can have an informed choice."

STEM-Talk wins People's Choice award

The Florida Institute for Human and Machine Cognition's podcast STEM-Talk won first-place in the science and medicine category at the 12th Annual People's Choice Podcast Awards. The international competition featured more than 2,000 nominees in 20 categories. STEM-Talk also was a runner-up in the People's Choice Award, the grand prize of the competition.

STEM-Talk, which bills itself as "conversations with some of the most interesting people in the world of science and technology," is the brainchild of IHMC co-founder and CEO Dr. Ken Ford. For several years, Ford had been thinking of a STEM-based podcast that would give people the feeling that they were eavesdropping on conversations between scientists.

And as he cooked up the idea of a podcast, he was thinking of curious 20- and 30-year-olds interested in learning more about the world around them.

It was a conversation Ford had a couple of years ago in Silicon Valley with a group of technology experts that nudged him to start thinking about a podcast called STEM-Talk. During the conversation, someone mentioned that podcasts took up nearly half of the storage on young people's iPhones.

One of goals of IHMC is to make science more accessible to the public. For years the institute has been hosting an evening lecture series at its Pensacola and Ocala branches, which for the most part draws an older, baby-boomer crowd.

"Young people don't get information from traditional methods, like our newsletter and lecture series" said Ford. "You can really see it at our evening lectures. The average age of the audience is maybe 60."

After that trip to Silicon Valley, Ford rounded up Dawn Kernagis, an IHMC research scientist who co-hosts the podcast with Ford, and Billy Howell, a multimedia specialist at IHMC who is the audio and technical brains behind STEM-Talk, and former Pensacola News Journal columnist and IHMC writer Carl Wernicke to brainstorm the idea of having a podcast. The idea was to have a podcast that would allow listeners to feel as if they were eavesdropping on a conversation of scientists interviewing other scientists.

"Typically for a research person, it's often fun when you get to talk to somebody who is really good in a field that isn't your field," said Ford. "But you share the language of science and so the communication is easy, and the more you listen, the more you become fascinated by what other scientists do."

The podcast launched in the spring of 2016 and has featured interviews with top scientists and researchers from around the world as well as astronauts and NASA executives. The interviews have covered topics ranging from dark energy to dark matter to humanoid robots and manned missions to Mars to the role of ketogenic diets in the treatment of type-2 diabetes.

Dr. Ken Ford regularly co-hosts STEM-Talk

"We tend to Balkanize science too much in these modern times," said Ford. "I know we're not going to fix that issue with podcasts, but the idea was to be broad, not just have the podcast be about nutrition or space or genetics or artificial intelligence, but to have it be broadly about science and engineering and…well, be about STEM."

A review of the podcast that was posted on iTunes by a listener nicknamed Jonnybro8 wrote:

"As I'm beginning my education in STEM, these episodes truly give me inspiration for my career. Listening to these podcasts has been an opening into the minds of some of the most brilliant minds in the world today. It truly is fascinating being able to dissect the minds of these people, hearing their stories and the revolutionary things they have done and plan to do. This is by far my favorite podcast, and I find myself listening to it on days when I need inspiration. I can't thank you guys enough for giving me insight into these brilliant minds."

Kernagis, who has helped co-host every episode of STEM-Talk, said she looks forward to reading the five-star reviews of the podcast that have piled up on iTunes.

"Sometimes as researchers and scientists we get our heads so buried in the work that it feels pretty lonely," she said. "So it's great to be able to do a podcast like this and read the reviews and see that we're not only reaching people, but how much people enjoy the show and learning about science."

STEM-Talk, which uploads to iTunes every other Tuesday, was barely a year old when it won first place at People's Choice Podcast Awards.

"We really didn't expect the podcast to be this popular so quickly," said Ford. "The response has been great. I don't think any of us who work on the podcast expected this kind of success and recognition to come so soon. But it's a good thing because it pushes us to keep getting better."

Peter Pirolli honored as a world-class inventor

The National Academy of Inventors (NAI) has named IHMC Senior Scientist Dr. Peter Pirolli and 154 other inventors from around the world to its class of 2017 fellows.

Election as an NAI fellow is one of the highest professional accolades bestowed to academic inventors at universities and research institutions worldwide. NAI choses inductees whose patents and research are geared toward improving the world's quality of life.

Pirolli joins IHMC co-founder and CEO Ken Ford and five previously elected NAI Fellows who are affiliated with IHMC: William J. Clancey and David P. Fries; and board members William S. Dalton, Alain T. Rappaport and T. Dwayne McKay.

Before joining IHMC last year, Pirolli was a research fellow in the Interactive Intelligence Area at the Palo Alto Research Center (PARC) where he studied human information interaction.

"This is a wonderful recognition for Peter," said Ford. "Peter is a leader in the field of complex human-information interaction systems. It doesn't surprise me that NAI would name Peter a fellow. Peter holds 74 patents and is among the most talented and versatile researchers that I know."

Dr. Peter Pirolli

With the election of the 2017 class, there are now 912 NAI Fellows worldwide who collectively hold more than 32,000 patents. NAI fellows have helped create more than 9,400 technologies and companies which have generated 1.3 million jobs and more than $137 billion in revenue.

"To say I'm humbled by being named an NAI Fellow is an understatement," said Pirolli. "I have worked with so many great people over the years and this recognition would have never happened without their friendship and support."

Before working at IHMC and PARC, Pirolli was a professor in the School of Education at the University of California Berkeley. He received his doctorate in cognitive psychology from Carnegie Mellon University in 1985 and is the author of "Information Foraging Theory: Adaptive Interaction with Information." He also is currently an associate editor and writes for the journal Human Computer Interaction.

> "To say I'm humbled by being named an NAI Fellow is an understatement."

Astronaut Hall of Fame inducts IHMC's Thomas Jones

The United States Astronaut Hall of Fame announced that veteran astronaut and IHMC Senior Scientist Dr. Thomas Jones will be inducted in ceremonies at the Kennedy Space Center in April.

A graduate of the Air Force Academy and former B-52 bomber pilot, Jones is a three-time spacewalker who logged 53 days in Earth orbit and helped install the U.S. laboratory on the International Space Station.

Jones flew B-52D "Stratofortress" combat missions for the Air Force and served as a program management engineer in the CIA's Office of Development and Engineering before becoming a NASA astronaut in 1990. His four space shuttle flights as a mission specialist were on board the orbiters Atlantis, Columbia and Endeavour.

In addition to Jones, the hall of fame is also inducting Capt. Scott Altman, who was the commander of the final space shuttle mission to repair the Hubble Space Telescope. They join an elite group of 95 other people who have been inducted into the hall of fame, which was founded in 1990.

Dr. Thomas Jones

Florida Inventors Hall of Fame inducts Ken Ford

The Florida Inventors Hall of Fame inducted Florida Institute for Human and Machine Cognition co-founder and CEO Dr. Ken Ford into the Florida Inventors Hall of Fame.

Ford was recognized for his pioneering work in artificial intelligence and human-centered computing as well as his significant contributions to the United States and Florida's technology and research communities. The Hall of Fame particularly highlighted Ford's role in 1990 co-founding of IHMC.

IHMC, which is headquartered in Pensacola and has a second location in Ocala, has grown into one of the world's premier research organizations. Ford was instrumental in bringing scientists and engineers from around the world to Florida and IHMC to investigate a board range of topics related to building technological systems aimed at amplifying and extending human cognition, perception, locomotion and resilience.

"The list of inductees and their accomplishments is quite amazing," said Ford. "I am very honored to be included with such a distinguished group."

Ford holds two patents and is the author of hundreds of scientific papers and six books whose topics include artificial intelligence, cognitive science, human-centered computing, and entrepreneurship in government and academic institutions.

Joining Ford in the 2017 class was Dr. T. Dwayne and Dr. Mary Helen McCay, who became the first scientist couple to be inducted into the Florida Inventors Hall of Fame.

Dwayne McCay is a member of IHMC's scientific advisory board. He and his wife jointly hold 15 U.S. patents in the area of metallurgical engineering.

Dr. Ken Ford

The couple's patented work involving laser-induced surface improvement has contributed to increased patient safety and improved medical outcomes in facilities nationwide.

Ford and McCay join others from IHMC who have been inducted, including IHMC senior research scientist Jerry Pratt who was inducted into the 2015 Hall of Fame class, and William Dalton, IHMC's board chair who was part of the 2016 class.

Inductees must have at least one U.S. patent and a connection to Florida, and are nominated through an open process and elected by a selection committee comprised of distinguished leaders in research and innovation throughout the state of Florida.

"Collectively, the 2017 inductees hold more than 260 U.S. patents," said Randy Berridge, who serves on the Florida Inventors Hall of Fame advisory board and chairs the selection committee. "Among them are two industry inventors, the founder of one of the nation's premier research institutes, and representatives of four Florida universities."

Short videos celebrating the achievements and careers of Ford, McCay and other inductees are available at www.FloridaInvents.org.

Dr. Ken Ford gives speech at Inventors Hall of Fame

Publishers release three books by Robert Hoffman

IHMC Senior Scientist Robert Hoffman has three books that were recently released:

• "Cognitive Systems Engineering: The Future for a Changing World," which was released by CRC Press.

• "Accelerated Expertise: Training for High Proficiency in a Complex World," which was published by Psychology Press.

• "Minding the Weather: How Expert Forecasters Think," which was published by MIT Press.

"Cognitive Systems Engineering" is a state-of-the-art report consisting of chapters written by leaders of the field. Philip Smith of Ohio State University co-edited the book with Hoffman.

The book features chapters by nearly two dozen leading scientists who provide historical perspectives on the evolution and drivers of cognitive systems engineering (CSE). The book also describes the major insights of CSE and how it contributes to the understanding of how the design and integration of cognitive tools influence human and emergent system performance.

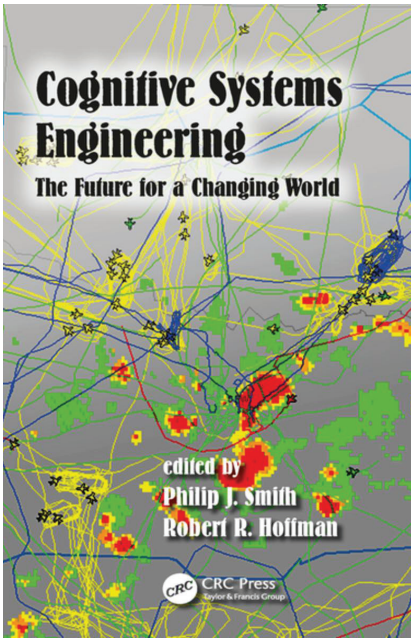
"Back when I agreed to join IHMC, Ken Ford tasked me with establishing the principles of human-centered computing," said Hoffman. "The first project I undertook was to develop the human-centered computing (HCC) concepts in the context of weather forecasting, especially severe weather in the Gulf Coast.

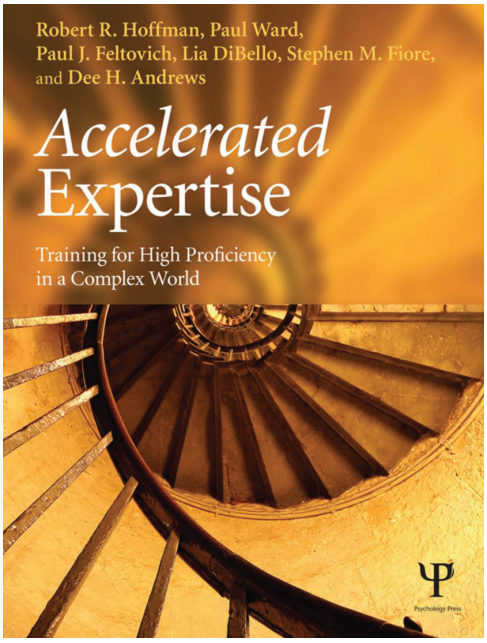
"The report on that project consisted of two parts. One part was the principles and methodology of HCC. That eventually became a series of essays in IEEE: Intelligent Systems. In fact, HCC is now the longest running regular department in any IEEE periodical. And the second part of that first project of mine became Minding the Weather."

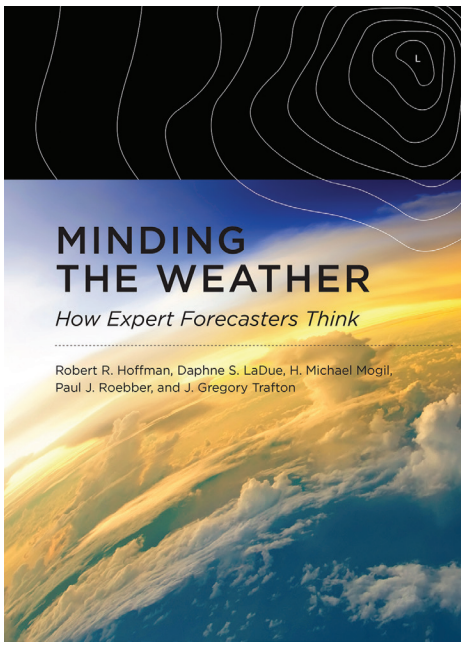
The theme of HCC is to build technologies and methods to help humans be better humans. "Accelerated Expertise" takes the principles of HCC and applies them to the question of how to train people to high levels of proficiency. Efficiency in acquiring knowledge and skills is more critical today than ever before, yet it ordinarily takes several years to achieve high proficiency in countless jobs.

Robert Hoffman

"I'm very proud of these books," said Hoffman. "The HCC essays and the book on forecasting expertise are crowning achievements of my career. The CSE book provides insights by top scientists around the world. The Accelerated Expertise book also provides concrete methods and roadmaps for the design of complex cognitive work systems."







Hotel Developer Jay Patel joins IHMC board of directors

Real estate developer and entrepreneur Jay Patel has joined the board of directors of the Florida Institute for Human and Machine Cognition.

Patel manages multiple franchised hotels and various related assets in West Florida and throughout the nation. He is an early member of the Asian American Hotel Owners Association and for three decades has been instrumental in bringing together Asian hoteliers and other Asian associations to become the world's largest hotel association with more than 22,000 hotels and 16,000 members.

"Jay has developed an incredible network over the decades that has given him a rather unique local, state and national perspective on the impact that technology is having on businesses and communities," said IHMC co-founder and CEO Kenneth Ford. "He also has a deep understanding of the unique and valuable role of research through his service to the State University System and we feel very fortunate to have him serve on our board."

Patel was recently appointed by Gov. Rick Scott to serve on the State University System's board of governors which oversees Florida's twelve public universities and the statewide research institutes. Patel also served for two consecutive terms on the board of trustees of the University of West Florida from 2010 through 2016.

"For several years now, I have observed first-hand the amazing breadth of research that goes on at IHMC," said Patel. "It's an honor to be part of an organization that has people who are on the cutting edge of science and technology."

Patel has been a leader in facilitating the transition of the hospitality industry to the 21st century by testing, promoting and using various blockchain technologies through smart contracts,

Jay Patel

smart hotels, iOt (Internet of Things), distributed ledgers, reservation systems, payments; including cryptocurrencies and smart hotel monitoring, while capitalizing on and monetizing hotels' underperforming assets.

He is the author of "Franchising: Is It Fair? Or How to Negotiate an Equitable Franchise Agreement." A private banking partner and Patel have donated more than 15,000 copies of his book to franchises and hospitality students across the country.

Patel has received three honorary doctorate degrees over the years. He is a co-founder of the National Association of Black Hotel Owners, Operators and Developers, and has been the recipient of multiple hospitality industry awards, including the prestigious Outstanding Service Award, The Award of Excellence, The Spirit Award, The Strategic Partnership Award, and The Chairman's Award. Most recently, he received the Hispanic Industry Leadership Award from the International Association of Hispanic Meeting Professionals.

Ken Ford gives Patel a tour of the Levin Center for IHMC Research

Alberto Cañas receives honorary doctorate

IHMC Associate Director, co-founder and Senior Research Scientist Alberto J. Cañas received the Doctorate Honoris Causa from the Universidad Castro Carazo, in Costa Rica, for his contributions to education, and in particular to the innovative use of educational technology.

"We recognize the contributions that Alberto Cañas has made to education and its strengthening as a transforming element of society in both the international and national levels," said Eleonora Badilla Saxe, Rector of Castro Carazo. "Dr. Cañas is a rigorous thinker and a scientist with a long history of contributions to human knowledge."

Cañas was born in Costa Rica and received a bachelor's degree in Computer Systems Engineering from the Instituto Tecnológico de Monterrey, Mexico, and a Masters in Mathematics degree

Dr. Alberto Cañas

in Computer Science and a Ph.D. in Management Sciences from the University of Waterloo, Canada.

The Castro Carazo university emphasized Cañas' development of CmapTools, a software suite of tools to construct, represent and share knowledge using concept maps, that is used extensively in educational institutions throughout the world by students of all ages, from elementary schools to universities, as well as by professionals in all kinds of organizations and companies.

"I feel truly honored and moved by the Doctorate Honoris Causa that the Universidad Castro Carazo granted me," said Cañas. "For many years, I have tried to support education at all levels and all over the world, but in particular I have worked to support those who really want to improve and improve the level of learning of their students, and that desire to excel and create quality is something I have found at Castro Carazo."

In addition to leading work on CmapTools, Cañas also participates in IHMC research projects in knowledge modeling and sharing, collaborative tools for education and research; knowledge and navigation tools based on multimedia; distance learning; and corporate memory.

Science Saturdays

IHMC's Science Saturdays featured 15 hands-on science events in 2017 for Escambia, Santa Rosa and Marion county students in grades 3, 4, and 5.

Science Saturdays are offered to spark a long-term interest in science. According to education research, students who become interested in science at younger ages are more likely to persist in science, technology, engineering and math classes through high school and beyond.

Nearly 400 students from 47 elementary schools attended the sessions at IHMC's Pensacola and Ocala branches. The hands-on science events ranged from designing and testing paper helicopters to using 3-D software and pens to create designs that the students then produced on 3-D printers.

The 2018 Science Saturdays are well underway and feature opportunities for students to learn how to write code, construct roller coasters and participate in other hands-on STEM demonstrations.

Science Saturday sponsors in Escambia include the Escambia County Sheriff's Office, Gulf Power and Cox Communications. In Marion County, sponsors include Cox Communications, Lockheed Martin, Ron and Phyllis Ewers, Publix Supermarket Charities, and the College of Central Florida.

Balloon Cars by Dr. Chris Schmidt-Wetekam

New arrivals at IHMC

Dr. Peter Pirolli joins IHMC as a senior research scientist. He previously was a Research Fellow in the Interactive Intelligence Area at the Palo Alto Research Center (PARC) and a professor in the School of Education at the University of California Berkeley. Peter just had a paper published in the Journal of Medical Internet Research titled "Implementation Intention and Reminder Effects on Behavior Change in a Mobile Health System: A Predictive Cognitive Model." Peter is a Fellow of the American Association for the Advancement of Science, the American Psychological Association, the Association for Psychological Science, the National Academy of Education, and the ACM Computer-Human Interaction Academy. He is the author of "Information Foraging Theory: Adaptive Interaction with Information" and is currently associate editor for Human Computer Interaction.

Dr. Jon Clark is no stranger to IHMC, but now he's a senior research scientist at IHMC who is in the process of moving from Houston to Pensacola. Jon is a six-time Space Shuttle crew surgeon who served in top roles at Johnson Space Center. In addition to his new role at IHMC, Jon is an associate professor of Neurology and Space Medicine at Baylor College of Medicine and teaches operation space medicine at BCM's Center for Space Medicine. He also is the space medicine advisor for the National Space Biomedical Research Institute (NSBRI), and is a clinical assistant professor at the University of Texas Medical Branch in Galveston where he teaches at the Aerospace Medicine Residency. Prior to his time at NASA, Jon spent 26 years of active service with the U.S. Navy and spent part of his naval career heading the Spatial Orientation Systems Department at the Naval Aerospace Medical Research Laboratory in Pensacola.

Joe Gomes joins IHMC as High Performance Director. He is a former strength and conditioning coach for the Oakland Raiders who also worked with the Department of Defense on pioneering human-performance programs. Joe Gomes has 17 years of international experience as a head coach and high-performance director responsible for evaluating and preparing professional athletes and military troops for peak performance. Prior to joining the Oakland Raiders in 2015, Gomes was the senior advisor and performance director for the United States Army Special Operations Command at Fort Bragg, N.C. As the NFL combine preparation director for EXOS from 2007 to 2010, Joe worked with 35 first-round draft picks.

Dr. Jeff Phillips comes onboard as a research scientist. For the past six years, he has been a research psychologist at the Naval Medical Research Unit in Dayton, Ohio. He worked almost exclusively on hypoxia in tactical aviation and served on a team that was instrumental in getting the F-22 Raptors back in operation. The Navy recognized Jeff's contributions to the F-22 project with the Navy's 2012 Delores M. Etter Top Scientists and Engineers Award. Prior to working in Dayton, Jeff served as a research psychologist at the Naval Aerospace Medical Research Laboratory in Pensacola. He worked on projects that ranged from motion sickness to fatigue and hypoxia mitigation as well as the relationship between cognitive workload and decision making.

Connor Tate joins IHMC as a research associate who works with IHMC Research Scientist David Fries on the development of innovative marine technology. She is a Pensacola native who returned home after graduating from the University of Florida. She assists in project management, geo-informed design, education and outreach. She is pursuing a master's in sustainability with a focus in coastal engineering and enjoys hiking, painting and volunteering.

Jessica Valek joins IHMC as a research assistant and field technician working with Research Scientist David Fries and Research Associate Connor Tate on the artificial reef and stinger projects. She moved from Minnesota to Pensacola to pursue a career in marine biology and received her bachelor's degree in marine biology from University of West Florida. Her interests include scuba diving, paddle boarding, outdoor activities, and studying corals.

Mattia Mantovani

joins IHMC as an IT engineer. He's a graduate of the University of Ferrara in northern Italy. At IHMC he collaborates in the development of distributed software. He enjoys team sports and is passionate about new technologies.

Giovana Patitucci

is an MBA student at the University of West Florida who joins IHMC to work with David Fries on different projects. Originally from Brazil, Giovana was a student-athlete at UWF and currently works at the UWF Center for Entrepreneurship. Giovana enjoys playing tennis, soccer, and exploring Pensacola.

Gina Rodriguez

is an intern working with IHMC Research Scientist David Fries on the artificial reef project. She is researching local fish species and their preferred habitats in order to emulate similar structures in IHMC's 3D reefs. Gina is a University of West Florida sophomore majoring in biology.

Elyse Barker

is a University of West Florida intern working with IHMC Research Scientist David Fries on the artificial reef project. Her main role in the project is assessing the biodiversity, sediment chemistry, and bioactive components that benefits life on the deployment reef. In her spare time she works with Washington High School's Marine Science Academy that focuses on analyzing the gut content of Lionfish, an invasive species in the area.

Sonia Yanovsky

is a research assistant on Dr. Anil Raj's team and is currently pursuing a bachelor's degree in psychology at the University of West Florida. She is on a team that is studying fatigue, stress, and workload using a flight simulator. Sonia, who grew up in Pensacola, enjoys writing, singing, and spending time with family and friends.

Nikolaos Garske

is an IHMC intern working on projects involving spatial lighting, waterproofing, and programming. He enjoys video gaming, scuba diving, playing music, and snowboarding. He is currently enrolled at West Florida High School.

Drew Pate

joins IHMC as a mechanical systems intern who is part of a team that is working with Research Scientist David Fries on the artificial reef project. He is researching technology that will extend the human relationship with marine life using technology as the catalyst. He is a Pensacola native who attended Pensacola State College. In his spare time, Drew is a robotics hobbyist who likes to tinker on various projects.

Madison King

is addressing maritime bioaccumulation in Pensacola's waterways as an intern on IHMC Research Scientist David Fries' artificial reef project. She is a junior at the University of West Florida majoring in biological sciences. She enjoys soccer, running, scuba diving and researching oceanic mitigation practices.

Lorenzo Campioni

is an Italian IT engineer who graduated from the University of Ferrara in northern Italy. At IHMC, he's involved in the Nomads' projects. Lorenzo enjoys music, art, swimming and especially loves juggling.

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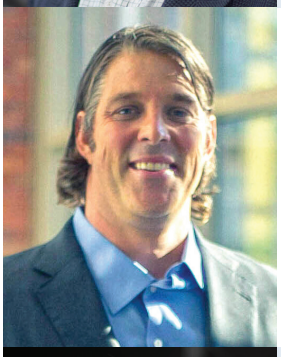
DAVID DIAMOND

Diamond is a professor in the Departments of Psychology and Molecular Pharmacology and Physiology at the University of South Florida, where he has directed his research program on post-traumatic stress disorder (PTSD). Diamond has served on federal government study sections and committees evaluating research on the neurobiology of stress and memory, and has over 100 publications, reviews, and book chapters on the brain and memory. Diamond has expanded his research program to include cardiovascular disease and nutrition. His controversial research is an extension of an advanced seminar he directs at the University of South Florida entitled, "Myths and Deception in Medical Research", which emphasizes the critical evaluation of methods and conflicts of interest in health-related fields and research.



JOHN WELBOURN

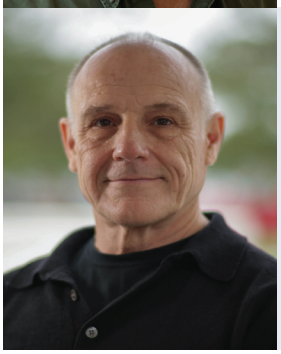
Welbourn is a 9-year veteran of the National Football League and CEO of Power Athlete. He graduated from the University of California at Berkeley with a BA in Rhetoric and did his masters work in Education at the University of California. Between 1999 and 2009, Welbourn played for the Philadelphia Eagles, Kansas City Chiefs, and New England Patriots until a pre-season injury ended his season. In 2008, Welbourn competed in the CrossFit Games and after retiring in 2009, was approached to start a sport called CrossFit Football. He now works as a consultant for PowerDot, Form Lifting Collar, NeuroArmour, and other fitness technologies to help develop cutting edge training products for performance based athletes. John travels the world lecturing on performance and nutrition as an expert on food for performance.

FLORA MCCONNELL HAMMOND,

Dr. Hammond is a board-certified physiatrist who is an active clinician, researcher, and administrator. She is professor and Chair of Physical Medicine and Rehabilitation at Indiana University School of Medicine; Chief of Medical Affairs and Brain Injury Medical Director at the Rehabilitation Hospital of Indiana; and project director of the Indiana Traumatic Brain Injury Model System. Dr. Hammond's research focuses on the long-term issues confronting individuals with disability and treatment effectiveness. Dr. Hammond, who is a Pensacola native, returned home to give a talk to a packed house about the common misconceptions about brain injury and busted myths to move ahead towards better outcomes. Real-world examples were used to explain what life is often like after brain injury and to explain how the field of Physical Medicine and Rehabilitation can help.

MARK EMERY

Emery grew up in Florida and worked at Silver Springs wrestling alligators and milking rattlesnakes for Ross Allen's Reptile Institute. Emery went on to work for Jordan Klein Film and Video. Jordan Klein Senior invented underwater cinematography and made many of the technical advancements with Jacques Cousteau to make scuba possible. Emery and his music partner Tracy Collins have written and performed music for over 320 national television shows and commercials, including numerous scores for National Geographic Television, The Discovery Channel, Walker's Cay Chronicles, Ford Commercials, and many others. Emery's still photography has been published in National Geographic Magazine, Newsweek, The London Times, and other publications. Emery spent a portion of his summer guiding fishermen and film crews in Alaska when he was not working on his films.



JIM STRAY-GUNDERSON,

Dr. Stray-Gunderson has helped pioneer the use of blood flow restriction training in the US and Europe. Board Certified in General Surgery, Dr. Stray-Gunderson's background is both academic and athletic. His "day job" has been as a research faculty in Cardiology and Orthopedics at the University of Texas Southwestern Medical School in Dallas, Texas. He has also worked for 35+ years in Olympic and Professional Sports, focusing on winter and summer endurance sports as a physician, physiologist and nutritionist for the United States, Norwegian, German and Canadian National teams. His current focus is on the understanding and application of Blood Flow Restriction (BFR) Training. Dr. Stray-Gunderson presented that regular BFR Training is the solution for many of the chronic health problems of the nation.

DAVID SPIEGEL

Dr. Spiegal is a Willson Professor and Associate Chair of Psychiatry and Behavioral Sciences, Director of the Center on Stress and Health, and Medical Director of the Center for Integrative Medicine at Stanford University School of Medicine, where he has been a member of the academic faculty since 1975. Dr. Spiegal has 40 years of clinical and research experience studying hypnosis, psycho-oncology, stress and health, pain control, psychoneuroendocrinology, and sleep. Dr. Spiegal discussed that hypnosis is a specific form of brain activity that involves highly focused attention, coupled with dissociation, openness to suggestion, and an enhanced ability to modulate perception. He presented new evidence regarding the neural activity underlying hypnosis, including studies employing event-related potentials, PET, and fMRI.

STEVE ANTON

Dr. Anton's research interests are in the role that lifestyle factors have in influencing obesity, cardiovascular disease, and metabolic disease conditions. Following the completion of his post-doctoral fellowship at the Pennington Biomedical Research Center in 2007, he accepted a joint Assistant Professor position within the Department of Aging and Geriatric Research and Department of Clinical and Health Psychology at the University of Florida. Since joining the University of Florida, he has obtained multiple grants examining the effects that lifestyle-based interventions have on biological and functional outcomes relevant to obesity, cardiovascular disease, and metabolic disease conditions related to aging. Dr. Anton's presentation provided an overview of promising therapeutic approaches, including lifestyle interventions and hormonal replacement.

GREG SMITH

Smith is Professor of Microbiology and Immunology at the Northwestern Feinberg School of Medicine. He spent most of his childhood learning to code games on computers, but while attending college at the University of California Santa Barbara, he became entranced by the genetic code found in nature. Smith is particularly intrigued by viruses and the elegant clockwork mechanisms built into these nanomachines. Smith's research is focused at the interface of human-pathogen interactions, and along the way, he has produced tools to genetically reprogram viruses that are being used to develop vaccines and cancer treatments at several biotech companies and in his own lab. Smith's talk examined the tactics that one of these viruses, herpes simplex virus, uses to invade our nervous system, and how a vaccine is nearly at hand.

JOAN VERNIKOS

Vernikos is former Director of Life Sciences at NASA and a well-known expert in stress research and healthy aging. Recruited from Ohio State University by a nascent NASA for her stress expertise, Vernikos later pioneered research on how living in a microgravity environment adversely affected the health of astronauts. Her research led her to believe there were similarities between the effects of microgravity on the physiology of astronauts living in Space and the aging process here on Earth. Bringing her ideas to the public eye, Vernikos has published a series of books that present simple effective plans for maintaining good health throughout life. Her last two books show how sedentary lifestyles contribute to poor health and early death and how movement that challenges gravity can dramatically improve health and longevity.

KEN FORD

After decades of pundits and philosophers arguing that artificial intelligence (AI) is impossible, suddenly that argument has been replaced with the assertion that not only is artificial intelligence possible, but that it is inevitable, perhaps imminent, and apocalyptically dangerous. IHMC co-founder and CEO, Ken gave evening lectures in Pensacola and Ocala that put the debate about AI into historical context and compared the controversy over it to another technology that was thought to be a danger to the human race: artificial flight. Dr. Ford received his Ph.D. in computer science from Tulane University and is a fellow of the Association for the Advancement of Artificial Intelligence. He has held numerous positions with NASA and was appointed to the National Science Foundation by President George W. Bush.

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