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FLORIDA INSTITUTE FOR HUMAN & MACHINE COGNITION

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1	SCHAFT	27	10	UNIVERSITY OF CALIFORNIA	8
2	IHMC ROBOTICS	20	11	UNIVERSITY OF CALIFORNIA	7
3	TARTAN RESCUE	18	12	UNIVERSITY OF CALIFORNIA	3
4	MIT	16	13	UNIVERSITY OF CALIFORNIA	3
5	ROBOSIMIAN	11	14	UNIVERSITY OF CALIFORNIA	0
6	TEAM TRACLABS	11	15	UNIVERSITY OF CALIFORNIA	0
7	TEAM TROOPER	9	16	UNIVERSITY OF CALIFORNIA	0
8	WRECS	9	17	UNIVERSITY OF CALIFORNIA	0
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Dear Friends:

There is no question that 2013 was a good year for IHMC. And we ended the year with some of the best news yet. In this issue of the newsletter we report on some of the year's many highlights.

We are very pleased to announce the hiring of Dr. Bonnie Dorr as a new associate director and senior research scientist. Dr. Dorr is a leading researcher in natural language processing, a growing area of strength for IHMC. She joins us from the University of Maryland, where she has been named emeritus professor, and from the Defense Advanced Research Projects Agency (DARPA), where she has worked as a program manager overseeing research in human language technology.

We are also very happy to report the exciting news of IHMC Robotics' really strong showing in the DARPA Robotics Challenge (DRC) at Homestead Miami Speedway in December. Our team finished first among the teams using the Atlas humanoid robot, and second overall. It was a great team effort, and comes on the heels of a first-place finish in the initial DRC trials in June. Now the team is preparing for the final challenge event, tentatively scheduled for early to mid-2015.

Just as exciting is news of the major expansion underway at IHMC Pensacola. Construction should begin in the spring for construction of a three-story building on what is currently a parking lot, followed by expansion of the lecture hall the following summer. The expansion will allow us to grow and improve our labs, and provide needed new office and research space, as well as give us new collaboration space.

As always, IHMC's people continued to excel in 2013.

Dr. William J. Clancey was named the winner of the prestigious Gardner-Lasser Aerospace History Literature Award. Dr. Robert Hoffman was named a Fellow of the Human Factors and Ergonomics Society. And Dr. Brent Venable brought a distinguished group of international visitors to IHMC by organizing and hosting the 20th Annual TIME International Symposium in Pensacola.

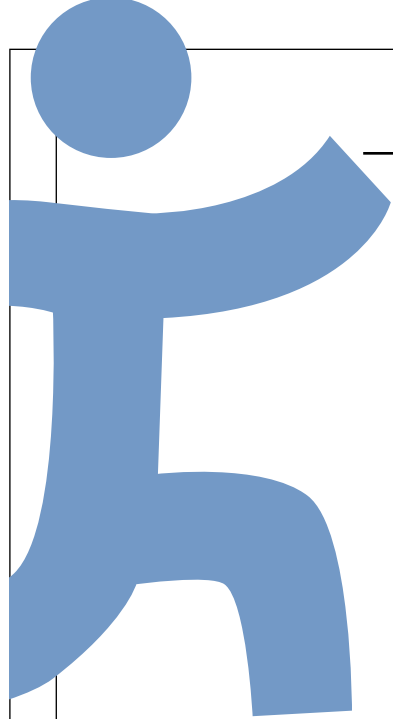
Yes, 2013 was a very good year for IHMC. It makes us all the more excited to see what 2014 will bring.



Best Wishes,



Kenneth M. Ford, Director



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# Robotics team scores at DRC trials

IHMC Robotics' overall second-place finish in the second round of the DARPA Robotics Challenge (DRC) in South Florida in December provided an international showcase for the institute's cutting-edge research.

"It was an incredible two days—full of ups and downs," said IHMC Director/CEO Ken Ford. "As with most of the teams, we had our problems. But the IHMC team persevered. I am amazingly proud of these young people. It was a really wonderful showing for IHMC Robotics against the best from all around the world."

IHMC was the top-scoring team among the seven using the Atlas humanoid robot, built by Boston Dynamics, a private company recently

purchased by Google. (Google also has purchased SCHAFT, Inc., a Japanese company that finished first overall, using a robot it developed and built.) In total, 16 teams competed. (IHMC finished first in the initial phase of the DRC, a computer simulation that was conducted in June 2013.)

In addition to demonstrating IHMC's prowess in robotics, the team's performance guaranteed continued funding from DARPA for the next phase of the DRC.

But back in Pensacola after the trials, which took place at Homestead Miami Speedway, the robotics team turned its focus to more than just the final phase of the competition, tentatively scheduled for early 2015, or the \$2 million prize

for the winning team.

"We're interested in doing well in the finals, but we also want to do well in meeting our research goals," said Senior Research Scientist Dr. Jerry Pratt, one of the leaders of the IHMC Robotics team. "And the challenges do push some of our research goals."

Among the primary IHMC research goals cited by Dr. Pratt are developing faster, more dynamic, more human-like walking for bipedal robots; developing an algorithm that will allow a robot to balance on a peaked surface, such as a rock; and an improved user interface for multiple human operators working together to eliminate the long pauses that made completing tasks in the DRC trials

**continued >>**



The members of the IHMC Robotics team at Homestead Miami Speedway for the DARPA Robotics Challenge in December.



Competition officials observe the IHMC Robotics team in action.

so time-consuming.

“For each task we had 30 minutes, and some of them we took the entire 30 minutes,” Dr. Pratt said. “The door task required getting through three doors; we got through the third door with four seconds left. It shouldn’t take 30 minutes to walk through three doors.”

The problem is obvious, he said, when you notice that the robot was actually moving for only four or five of the 30 minutes. “All of the other time was just delays for the operator and the sensors, trying to determine where the next step should be.”

Meanwhile, he said, the team intends to focus on IHMC’s forte: research on human-machine teamwork that leverages the strengths of both to solve problems. At the trials, the attention of the media and online viewers watching the action was focused on the robots themselves. But behind the scenes, teams of humans in the speedway garages manning computer screens were guiding the robots’ actions.

“Some of the teams are focused on reducing the amount the operator does through more autonomy,” Dr. Pratt said. “We realize that you have a supercomputer on the shoulders of the (human) operators, and if there are humans in the loop, you might as well use their cognitive abilities, especially for anything that requires high-level

perception and creativity.”

For example, he said, programming a robot to recognize a door, understand how the latch works, and figure out in which direction the door will open is a difficult research task. But a human understands at a glance.

“That’s the theme of IHMC, enhancing human cognitive and physical

abilities,” Dr. Pratt said. “So instead of making a fully autonomous humanoid, we’re making a system that combines the human and the machine to remotely give the human a presence without having to actually be there.

“With all our machines, the ones that are built well become extensions of our bodies. So a pair of glasses is a part of you; a prosthetic limb is definitely part of you. It’s the same thing if you can build a robot that’s part of you, but in a different location; you can get to the point where you can operate it so well that you start

to forget that you are not actually there.”

DARPA created the Robotics Challenge to push the development of robots that can function in human

environments where using people might be too risky, such as disaster sites like the Fukushima nuclear plant in Japan. Dr. Pratt said that goal was advanced at Homestead Miami Speedway. “Probably the biggest thing it demonstrated to the world is that humanoid robots are feasible for doing real-world things,” he said. “I think before this project there were scattered results, but no one ever really demonstrated anything at this scale outside of a lab environment. There is still a lot of research to be done, and challenges to be met. ☆



Dr. Jerry Pratt



The Atlas robot stands silent after completing the wall drilling task at the DARPA competition.

# IHMC Pensacola to expand

IHMC Pensacola will more than double the size of its Pensacola campus in an expansion project expected to be completed by early 2015. The major components include a new three-story building and extensive renovation of the current building.

“We’re growing and we need more room,” said IHMC Director/CEO Ken Ford. “We’re really pleased to see the plans finally coming together. We love being in downtown Pensacola and couldn’t be happier about being part of its continued growth.”

Dr. Ford said that the new facilities will help in recruiting researchers from around the world, and more importantly, provide improved research facilities for the scientists and engineers.

The construction, scheduled to begin in spring 2014, will allow consolidation of research and administrative functions at the main campus at 40 S. Alcaniz Street in the Pensacola Historic District, and allow for future growth. IHMC’s operations are currently spread over four separate sites in downtown.

It will also bring a much-needed expansion of the lecture hall in the main office building, which has become a popular meeting site for a wide range of local organizations. In addition to IHMC internal events and the popular Evening Lecture Series, which is open to the public, the lecture hall hosts some 300 events a year. The hall will be expanded to seat more than 300 people.

The first floor of the new building will largely consist of research labs, including an expanded Robotics Lab and a multi-modal interfaces lab focused on sensory displays and human-centered interfaces.

The second floor will feature a glass-walled observation area for public tour groups and others to observe the Robotics Lab safely and without interfering with the work. The lab is an increasingly popular tour destination for school and community groups and other visitors.

The third floor will hold additional administrative offices, conference rooms and research space.


The construction will proceed in two phases, including the expansion of the lecture hall. The new building will be elevated to avoid the flooding problems that affected IHMC during Hurricane Ivan in 2004. It will house sensitive electronic and computer equipment.

The campus sits at the northern entrance to Pensacola’s oldest historic district, and is bordered on the north by St. Michael’s Cemetery, in use since the mid-1700s and listed on the National Register of Historic Places. Dr. Ford said it was important for the appearance of the new building to fit the historic nature of the area, as well as to be compatible with homes in the nearby

residential neighborhoods.

That includes the adjacent Aragon development to the east of IHMC. Modeled on New Urbanism, Aragon’s architecture and street grid blend with that in the nearby historic district, and is home to a number of IHMC employees.

“We’re working very hard to make the project fit into the historic neighborhood,” said architect Carter Quina of Quina Grundhoefer Architects, the Pensacola firm handling the project. “By zoning, IHMC is in the brick warehouse district, so (the new building) reflects the warehouse appearance, updated with modern touches. We’re using brick, steel and concrete—all historical materials used in the area—and adding glass to allow natural daylight inside and to make the interior accessible to the public.”

The project will preserve IHMC’s organic garden, relocating it to a new location on site. The garden provides fresh vegetables for employees and for use in IHMC functions. 



An architectural rendition of the new three-story building planned for IHMC Pensacola.

## Dr. Bonnie Dorr named an IHMC associate director

After a groundbreaking career in academia and government, Dr. Bonnie J. Dorr is joining IHMC as an associate director and senior research scientist at IHMC's facility in Ocala.

"We're clearly pleased to add someone of Bonnie's expertise and accomplishments," said IHMC Director/CEO Dr. Ken Ford. "Her vision, passion, and experience make her a perfect fit for IHMC."

Dr. Dorr is a leading researcher in natural language processing, a growing field at IHMC. Her expertise includes deep language understanding and semantics, large-scale multilingual processing (including machine translation), and summarization.

She joins IHMC from the University of Maryland, where she was a professor in the Institute for Advanced Computer Studies and the Department of Computer Science. She was an associate dean of the College of Computer, Mathematical and Natural Sciences (CMNS), and co-founded the Computational Linguistics and Information

Processing Laboratory. She was also principal scientist for two years at the Johns Hopkins University Human Language Technology Center of Excellence.

In 2011 she became a program manager at the Defense Advanced Research Projects Agency (DARPA), overseeing research in human language technology. Her significant DARPA projects include Broad Operational Language Translation (BOLT), Deep Exploration and Filtering of Text (DEFT), Multilingual Automatic Document Classification, Analysis, and Translation (MADCAT), and Robust Automatic Transcription of Speech (RATS).

"I'm thrilled to be joining IHMC," said Dr. Dorr. "It's the part of the country where I want to live and work, and it's exactly the position I'd like to be in. I believe IHMC is the gem of human-centered technology research in Florida. I see a huge opportunity to make a difference. I just want to build to that level of excellence we have seen in IHMC robotics, and I know we can do that."

Dr. Dorr, who will retain collaborations with UM as emeritus professor, called IHMC "the perfect place" to continue liaising with both government and universities while also broadening her overall impact. "It lets me work in the applied world where I can help address real-world problems of national importance."

She holds both a Master's and a Ph.D. in computer science from the Massachusetts Institute of Technology, with a bachelor's from Boston University. She is a Sloan Fellow, a NSF Presidential Faculty (PECASE) Fellow, and a former president of the Association for Computational Linguistics.

Dr. Dorr is married (Stephen Martin) and has three children. ✨



Dr. Bonnie J. Dorr

## Dr. Ken Ford named to NFL-led brain injury panel

IHMC Director/CEO Dr. Ken Ford was named to a panel of judges to select winners of up to \$10 million in challenge awards to develop innovations and materials to protect the human brain from traumatic injury, and to develop innovative new tools for tracking head impacts in real time.

It marks the second round of the Head Health Initiative, a four-year collaboration to help speed diagnosis of, and improve treatment for, mild traumatic brain injury. The National Football League, Under Armour and General Electric are sponsoring the effort.

The goal is to improve the safety of athletes, military personnel and society overall. It includes a four-year, \$40

million research and development program from the NFL and GE to develop next-generation imaging technologies to improve diagnosis and treatment of traumatic brain injury.

Dr. Ford joins a distinguished eight-member judges panel with both military officers and civilians, including medical doctors and researchers with expertise in traumatic brain injuries.

"Traumatic brain injuries are a growing cause for concern, whether from the increased use of powerful improvised explosive devices (IEDs) or the increased awareness of concussions in football and



Dr. Ken Ford

other sports," Dr. Ford said. "This collaboration by the NFL, GE and Under Armour will stimulate needed research on this serious problem."

Dr. Ford was named to the panel due to his expertise and experience in cognitive functioning, rehabilitation and research, much of which is the focus of researchers at IHMC. An international leader in research on human cognition and artificial intelligence (AI), Dr. Ford holds a Ph.D. in computer science. He served as chairman of the NASA Advisory Council (Oct. 2008-Oct. 2011), received a presidential appointment in 2002 to the National Science Board, and currently serves on the Defense Science Board. ✨

## Dr. Robert Hoffman recognized as an HFES Fellow

IHMC Senior Research Scientist Dr. Robert Hoffman has been elected a Fellow of the Human Factors and Ergonomics Society (HFES). It is one of the highest honors bestowed by HFES.

“Recognition by one’s peers is something that makes a scientific career rewarding,” Dr. Hoffman said.

Dr. Hoffman is also a Fellow of the American Psychological Society, recipient of a Fulbright Scholar Award, and an Honorary Fellow of The British Library, Eccles Center for American Studies. He holds a Master’s and a Ph.D. in experimental psychology from the University of Cincinnati, and helped pioneer the experimental study of the comprehension of figurative language (metaphor, proverbs).

His first book, “Cognition and Figurative Language,” co-edited by Richard Honeck of the University of Cincinnati, is regarded as a classic in the field. Dr. Hoffman’s latest book, which he edited and is a co-author of, is “Collected Essays on Human-Centered Computing, 2001-2011.”

His selection was formally recognized Oct. 1 at the Opening Plenary Session of the 2013 HFES Annual Meeting in San Diego. HFES, founded in 1957 as a federation of international ergonomics associations, has more than 4,500 members in the United States and around the world. According to its website, its membership includes

psychologists, engineers, designers and scientists who share “a common interest in designing systems and equipment to be safe and effective for the people who operate and maintain them.”



IHMC Senior Research Scientist Dr. Robert Hoffman, right, receives his award as a Fellow from Lynne Strother, executive director of the Human Factors and Ergonomics Society.

## IHMC hosts 20th annual TIME International Symposium

In September IHMC Pensacola hosted an international group of researchers for the 20th annual TIME International Symposium. It marked a homecoming for the symposium, which held its first meeting on Pensacola Beach in 1994.

IHMC Research Scientist Dr. Brent Venable organized the event, which featured an invited talk by Dr. James Allen, IHMC associate director and senior research scientist, on temporal reasoning, a subject he pioneered. The topics featured at the conference included Temporal Representation and Reasoning in Artificial Intelligence (AI); Temporal Database Management; and Temporal Logic and Verification in Computer Science.

The three-day symposium was held at the IHMC facility in downtown Pensacola, drawing 23 researchers from around the world.

The TIME Symposium is the only yearly multidisciplinary international


event dedicated to the topic of time in computer science, bringing together researchers in areas involving temporal representation and reasoning. It also welcomes research papers on the related topics of spatial and spatio-temporal representation and reasoning.

“IHMC was the perfect venue because of the atmosphere and the importance of the research done there,” Dr. Venable said. “The concept of time, the focus of the symposium, ties in well with a lot of the research at IHMC, starting of course with James Allen but also in robotics.”

She said that the visitors were impressed with IHMC. “They were impressed with the actual content of the research, but were also amazed at the place itself, how IHMC came to be and how Ken (IHMC cofounder and CEO Dr. Ken Ford) put it together,” Dr. Venable said. “It’s a huge research center compared to the standards most of them are accustomed to.”

The first six annual meetings were

held as workshops in conjunction with FLAIRS (Florida Artificial Intelligence Research Society). IHMC co-founder Dr. Alberto Cañas, then with the University of West Florida, served as a co-chair for the FLAIRS symposium in 1994. Today he is associate director of IHMC and a senior research scientist. Dr. Ford, also then with UWF, served as FLAIRS workshop liaison.

The 2014 symposium is scheduled for Verona, Italy. 



Left: Dr. Sharon Heise, IHMC associate director, and Dr. Brent Venable, IHMC research scientist and the organizer of the 20th annual TIME International Symposium.

## Dr. Clancey wins prestigious science literature award for 2014

IHMC Senior Research Scientist Dr. William J. Clancey was named in October as the winner of the 2014 Gardner-Lasser Aerospace History Literature Award. It comes for his latest book, "Working on Mars: Voyages of Scientific Discovery with The Mars Exploration Rovers." The award is from the American Institute of Aeronautics and Astronautics (AIAA).

The Gardner-Lasser Award honors the best original contribution to the field of aeronautical or astronautical historical non-fiction literature published in the last five years, and dealing with the science, technology and/or impact of aeronautics and astronautics on society.

The book was hailed as giving a new perspective on remote planetary exploration. It details how scientists in the Mars Exploration Rovers (MER) program conducted field science using mobile robotic labs to conduct the first overland expeditions on another planet. Dr. Clancey conducted extensive interviews for an inside look at the groundbreaking program.

"I have always thought of this book as being co-authored by the scientists and engineers I interviewed," Dr. Clancey said. "They provided the expertise, the tales, and the fervor that made every moment of writing and editing a pleasure. I started with the question, 'What is it like to work with a rover?' and they revealed the world of planetary science in all its dimensions."

Dr. Steve Squyres, the Goldwin Smith Professor of Astronomy at Cornell University, and principal investigator for the Mars mission, contributed an endorsement of the book.

"When we conceived the Mars Exploration Rover Mission, it became our science project, the thing we wanted to do on Mars," he wrote. "Little did we know that we would in turn become someone else's science project! William Clancey watched MER as it unfolded. He did it from the inside, but with an outsider's perspective. The result, 'Working on Mars,' is a marvelous



Dr. William J. Clancey, center, receives his Gardner-Lasser Award from James Keenan (left), Aerospace Sciences technical director, and Mike Griffin, president of AIAA.

description not just of what we did, but of how we did it—and why we did it the way we did."

Dr. Clancey is a computer scientist whose research relates cognitive and social science in the study of work practices and the design of agent systems. His work on heuristic classification and model construction operators has been influential in the design of expert systems and instructional programs. He has been with IHMC for 16 years, and also served as chief scientist of Human-Centered Computing in the Intelligent Systems Division at NASA Ames Research Center. He has published seven books. ★

## Visiting professor from the University of Texas at Austin: Dr. Randolph Bias

After vacationing annually in Pensacola for 30 years, University of Texas at Austin professor Dr. Randolph Bias brought his career to his second home by joining IHMC as a visiting research scientist over the summer and fall.

Dr. Bias holds a Ph.D. in cognitive psychology from UT, where he is a professor in the School of Information and director of the Information Experience Lab. He has spent the last 12 years at UT, following a 20-year business career that led from Bell Labs in New Jersey to IBM and then BMC Software, both in Austin, and then as co-founder of Austin Usability, a usability lab and

consulting firm.

Dr. Bias describes usability as "the process, the approach, whereby we make products user-friendly. If people can't figure out how to use a great website or a wonderful radio, it has no value. It is just as broken as if there is a software defect or a knob has fallen off. The usability guy is the advocate for the user."

That's not always a welcome role. "We are in the business of telling people their baby is ugly," he said. But the point of



Dr. Randolph Bias

a book he co-edited, "Cost-Justifying Usability," is that "you don't do this to be a good citizen, say 'oh let's make this more usable,' you do this for business reasons. You'll sell more, and have lower customer support costs."

Dr. Bias is married (Cheryl, a social worker and psychotherapist) and has two sons, Travis, 31, a doctor in Austin, and Drew, 27, a recent law school graduate.

He lists his hobbies as swimming, reading (he's a childhood friend of Florida novelist Carl Hiaasen) and fishing. He is on the board of the Bonefish and Tarpon Trust in South Florida, where he spent his early childhood.



## Dr. Bradshaw helping advance Navy technical training program

Senior Research Scientist Dr. Jeff Bradshaw is collaborating with the Pensacola branch of an international communications technology firm to develop advanced technical training programs at the U.S. Navy's Center for Information Dominance in Pensacola.

Dr. Bradshaw brings his high level of expertise in cyber security, ontology-based models (a way of structuring knowledge in a form that can be "understood" and used by machines), and the science of learning to the project with the company, Telecommunications Systems, Inc.

The goal is to develop the Intelligent Tutoring Authoring and Delivery System (ITADS), with the ability to develop, maintain and reuse technologically and pedagogically advanced instructional content at a reasonable cost. Intelligent tutoring technologies have demonstrated strong

potential for improving training effectiveness as compared to more traditional methods.

"It is an R&D project," said TCS Senior Director Keith Pabst, who heads the 65-employee Pensacola office. "Over the next two years we will build a proof of concept demonstrating that we can build an affordable, effective intelligent tutoring system for the Navy."

The Center for Information Dominance handles about 1,000 student technicians a year. But "if it works for the IT technicians, then the electronic technicians can maybe use it over on NAS Pensacola, and the cryptologic technicians could maybe use the same technology," Pabst said. "The bigger



Dr. Jeff Bradshaw

picture from the Navy standpoint is let's prove this concept, build the system and then propagate it throughout all the Navy's training domains. Then you are getting into the tens of thousands of students."

Pabst called it "the perfect marriage" for collaboration with IHMC. "We have been looking for a good project to partner with them on," he said. "IHMC has good cyber security experience as well as obviously good Artificial Intelligence experience, and with the human-machine interface, that's three things we really need for ITADS."

The collaboration is a good fit for the institute too, said Dr. Bradshaw.

"IHMC has a long-standing interest in learning of all kinds, and particularly technology-assisted learning," he said. "The more intelligent it gets, the more interesting it becomes. And the more challenging." ★

## Dr. Pratt, Dr. Neuhaus earn promotion to senior research scientist

Dr. Jerry Pratt and Dr. Peter Neuhaus, two of IHMC's most respected robotics researchers, have earned promotions to senior research scientist.

They are innovative researchers who are among the leaders in their fields. They were instrumental in helping lead the IHMC Robotics team to strong showings against an international field in the first two phases of the DARPA Robotics Challenge, initiated to advance the use of humanoid robots in high-risk disaster scenarios such as the Fukushima nuclear plant in Japan.

"It's a well-deserved promotion for both of them," said IHMC Director/CEO Ken Ford. "They are among the best in the world at what they do, and we're very happy to have them here at IHMC."

Dr. Pratt, who joined IHMC in 2003, holds a Ph.D. in mechanical engineering, and bachelor's degrees in mechanical engineering and computer science from M.I.T. He leads a



Dr. Jerry Pratt



Dr. Peter Neuhaus

research group focused on the understanding and modeling of human gait and the applications of that understanding in the fields of robotics, human assistive devices and man-machine interfaces.

Prior to coming to IHMC, Jerry co-founded Yobotics, Inc., a small company where he helped develop RoboWalker, an exoskeleton intended to enhance the gait of individuals with disabilities.

"IHMC has been a fantastic place to work," Dr. Pratt said. "We've been able to build an amazingly talented team of researchers who have made significant contributions to

robotics. I'm excited to see what the next decade has in store."

Dr. Neuhaus also joined IHMC in 2003. He holds a Ph.D. in mechanical engineering from UC Berkely, and a bachelor's in mechanical engineering from M.I.T. His focus is on research on lower extremity robotic exoskeleton and orthotic devices. These devices have application in mobility assistance for people with paralysis and paresis; gait rehabilitation; strength and endurance enhancement; and smart exercise devices. Peter is also involved in researching legged locomotion. Among the projects he has worked on are Learning Locomotion, Mina and the M2V2 bipedal robot.

"Working at IHMC has been a great opportunity to pursue cutting edge research on robotics," Dr. Neuhaus said. "I've had the privilege of working with bright, talented individuals who make coming to work every day a real pleasure." ★

# Science Saturdays report



Professor Bertha Freeman from the College of Central Florida leads “The Biology of Heart and Lung”, the October Science Saturday in Ocala. Eyes were wide when students were able to hear their own heartbeats using a stethoscope in a hands-on activity.

Science Saturdays, offered to students in both Pensacola and Ocala by IHMC staff, continues to be a popular program. It helps foster education and equip students for a technological future by exposing them to expert scientists, researchers and professionals from both inside IHMC and the community.

Continuing to expand the program in Ocala, Science Saturdays drew an average of 55 students from grades 3, 4 and 5

for four different events in fall 2013. The program also drew volunteers from three area high schools to help the younger students with the concepts and exercises. The volunteers hailed from Forest High, Vanguard High and Belleview High schools in the Ocala area.

The Ocala programs included: “Biology of Heart and Lung,” presented by Professor Bertha Freeman of the College of Central Florida; “Demystifying Data” (about Data Science) by Dr. Milenko Petrovic of IHMC; “Reaction Time” by Dr. Manal Fakoury, a clinical pharmacologist; and “Roller Coasters,” by Dr. Micah Clark of IHMC.

An average of 40 students attended four fall sessions in Pensacola, with an assist from volunteers



Dr. Pat Hayes of IHMC shares his excitement for science, learning and pendulums at Pensacola’s November Science Saturday. Here he is showing off one of his beautiful pendulum clocks and explaining how it works. Hands-on experimentation to understand the physics of pendulums followed.

## Science Saturdays

*Science Saturdays is a science enrichment program for kids in grades 3, 4 and 5 and takes place at 9 a.m. and 11 a.m.*

### PENSACOLA

**January 25** - Electric Motors  
Presented by Dr. Peter Neuhaus, IHMC

**February 22** - Secret Codes  
Presented by Dr. Sharon Heise, IHMC

**March 22** - Roller Coasters  
Presented by Dr. Matt Johnson, IHMC

**April 19** - Mathemagic  
Presented by Dr. Jerry Pratt, IHMC

### OCALA

**January 11** - Balloon Cars  
Presented by Mr. Adam Dalton, IHMC

**February 8** - Lemon Batteries & Solar Cells  
Presented by Dr. Ursula Schwuttke, IHMC

**March 8** - The Water Cycle  
Presented by Ms. Tracy Straub, Mr. Alan Garri, and Ms. Amber Gartner, Florida Engineering Society

**April 5** - Florida’s Fantastic Fossils  
Presented by Mr. Scott Mitchell, director of the Silver River Museum & Environmental Education Center

**May 3** - Gloop & Other Polymers  
Presented by Dr. Tom Eskridge, IHMC

from Pensacola High School and West Florida High School.

The Pensacola sessions included: “Flight,” presented by Dr. Ken Blackburn of Eglin Air Force Base; “Chemistry,” by Dr. Pam Vaughan of the University of West Florida; “Pendulums,” by Dr. Pat Hayes of IHMC; and “The Gravity of it All,” by Dr. Row Rogacki of IHMC. ✧

# Profiles of key new employees at IHMC

A research institute like IHMC sees a steady flux in employees, both in and out, for many reasons. New employees will join the institute when new grants are awarded and the research scientists in charge of the various grants ramp up staffing to handle the tasks. Employees can leave when projects are completed. Recently, the DARPA Robotics Challenge brought a wave of new employees to join the robotics team, some for short periods to work on specialized tasks, others for longer duration. IHMC also sees employees come and go as they move back and forth between the institute and universities, government agencies and corporations. Many employees work with their time split between IHMC and another entity. In the often close-knit worlds that are research, academia and government, this circulation helps create relationships among individuals and institutions that foster collaboration and innovation. The following profiles highlight a number of key employees who joined IHMC during 2013 in a variety of research positions.

## Peter Abeles



Peter Abeles joined IHMC as research assistant to assist with the DARPA Robotics Challenge (DRC). Abeles, hailing from the Washington, D.C., area, brings expertise in computer vision and localization (sensor processing), as well as robotics.

Abeles holds a bachelor's degree in physics—with a minor in art—from Carnegie Mellon University. Prior to joining IHMC he worked with Lockheed Martin and Intelligent Automation Inc. (AIA), a Maryland company. With AIA he worked on a DARPA project involving computer vision and motion planning.

Looking to accelerate his career, Abeles said he left AIA and went out on his own research track, releasing open source software that he developed that drew the attention of Dr. Jerry Pratt, a DRC team leader at IHMC.

"Jerry and his crew found me because of that," he said. "They had been using my linear algebra library, and also the computer vision library because they had the driving task for the VRC (DARPA Virtual Robotics Challenge), and needed someone with experience in computer vision. I had done some autonomous driving, so they brought me in to work on that task. It also validated

my theory that putting stuff out there would give me more visibility in terms of my career."

Abeles said he began programming in high school, but didn't get into robotics until college. "I started knocking on doors of professors until I found one with some work I could do. I started on some art-related SLAM (simultaneous location and mapping), so by the time I graduated I was doing more robotics research than physics."

Outside of work, he pursues whitewater kayaking and hiking. He started a Meet-up site for Pensacola to find others interested in driving to the Appalachian Mountains to find whitewater locations.

## Dr. Sylvain Bertrand



Dr. Sylvain Bertrand, a native of France, joined IHMC as a research associate to work with the DARPA Robotics Challenge team. He holds a Ph.D. in mechanical engineering from the

University of Versailles, and a Master's in mechanical engineering from the University of Poitiers.

Dr. Bertrand said that during his doctoral studies he extended his focus on robotic walking into biomechanics, investigating

human motion. That led to research on the mechanics of running.

At IHMC, his primary focus is robotic walking control.

He said he got into robotics with an assist from a helpful professor. "I didn't know what I wanted to do with my life," and the push set him on his life's path. "That's cool," he said.

He said that another early assist, this time from IHMC Senior Research Scientist Dr. Jerry Pratt, one of the team leaders for the DARPA Robotics Challenge, also helped put him on the path that led to IHMC.

He said that while they had never been introduced, he was aware of Dr. Pratt's reputation. "He is an important person in robotics," Dr. Bertrand said. That didn't stop him from reaching out for help.

"In the middle of my Ph.D. I got really stuck, and I didn't know where to go," Dr. Bertrand said. "I was just like, I'm going to contact somebody big in robotics. I sent Jerry an email, 'Hello, I'm helpless, please help me.' And he did. He sent me algorithms he had developed. I was amazed. It started like that."

He called the IHMC Robotics team "one of the best in the world."

When not working, Dr. Bertrand said his main hobby is juggling. In France he and a group of other jugglers formed a club to perform shows.

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### Dr. Tomas de Boer



Dr. Tomas de Boer, a native of the Netherlands, joined IHMC as a research associate for the DARPA Robotics Challenge. He holds a Ph.D from Delft University in mechanical design

and control of humanoid robots.

Dr. de Boer said he was working at Pal Robotics in Barcelona, Spain, on the design of a humanoid robot when he was introduced to Dr. Jerry Pratt, an IHMC team leader for the Robotics Challenge, by a former student, Twan Koolen, who was an IHMC intern. They teamed up on control research, and “Jerry suggested why don’t you come over here and help with the (DARPA) challenge.”

At IHMC Dr. de Boer has focused on walking control, “everything related to not falling, being robust, balance control,” he said.

As a boy, he said, “you could definitely call me a tech kid. I was always creating mechanical stuff, playing with Legos. I bought a Moped and restored it. I have always been interested in things that move, so I ended up in the field of mechanical engineering.”

He developed his interest in robotics at Phillips Research, an international company, where he built his first robotics device. “Robotics adds everything I find interesting from a mechanical design and control point of view. It is fantastic to create something and make it do human-like things,” he said.

Outside the office he enjoys outside sports, including training for triathlons, riding bicycles and swimming.

### Roberta Catizone



Roberta Catizone, a specialist in natural language processing and human-computer dialogue, joined IHMC as a research associate. She works on several projects, including the

human-computer Companions project for veterans with brain injuries, at IHMC Ocala. She holds a bachelor’s degree in fine art from Penn State University and a Master’s in computer science from New Mexico State. Her previous position was as a research associate at Sheffield University’s Natural Language Processing Group in the United Kingdom. She worked at the Computing Research Lab in New Mexico, the University of Pittsburgh Learning Research and Development Center and the Institute Dalle Molle in Geneva, Switzerland, researching natural language tutorial systems. She also works with Oxford University Press on electronic dictionaries.

She was Sheffield team leader of COMIC, a multimodal dialogue project, and the EU-funded Companions, a four-year project on intelligent personalized multimodal interfaces to the Internet

Catizone came late to computer science. She said that as a child she loved the design and sound quality of stereo systems. After getting her fine arts degree, “I was unemployed. My sister owned a software company, and they asked if I wanted to test some software, and I said sure, what’s software? I really liked it, so I learned to program, got a degree, and that was the start.”

As for IHMC, she said, “It’s great

place. I am completely impressed with it. And I really love the project.”

Outside of work she sings with two choirs, designs theater sets and swims for exercise. She and her husband, IHMC Senior Research Scientist Dr. Yorick Wilks, have two daughters: Octavia, 25 and Zoe, 19.

### Ron Van Hoof



Ron Van Hoof, born and raised in Holland, joined IHMC as a senior research associate. He holds a bachelor’s in computer science from the Hogeschool

West-Brabant in the Netherlands and a Master’s in knowledge engineering from the University of Middlesex, London.

After a career with Verizon (then NYNEX) and various contractors, he worked with IHMC Senior Research Scientist Dr. William J. Clancey for 15 years at NASA developing multi-agent systems, including an agent-based work flow automation system (Brahms). In 2013 he joined IHMC to work with Clancey’s team to research and develop a Model-Based Retinal Image Interpretation and Diagnosis System (IRIS-D). The objective is to enable healthcare providers to easily and affordably provide advanced screening services for patients, especially to diagnose problems related to diabetes.

At NASA Van Hoof also worked on programs involving the remote exploration of Mars, and on the Orbital Communications Adapter Management System (OCAMS), a multi-agent

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system for managing coordination and distribution of files between science teams and the International Space Station (ISS).

Van Hoof's career in computer science didn't begin with a childhood obsessed with computers or taking apart the family's electric appliances. It started in an economics class in high school.

"The teacher was talking about the good job opportunities that would come up in the future," he said. "He mentioned that a good career to get into was computer science because of the money they could make. He mentioned what was an enormous salary at the time. For some reason a little light bulb went off in my head and ever since then I have wanted to be in computer science. So that's what I pursued."

Fortunately, he said, it turned out that "I absolutely loved it."

Away from the office he plays video games (especially racing; he's an avid Formula 1 fan). He and his wife, Lisa, also visit Disney World often.

## Dr. Tingfan Wu



Taiwan native Dr. Tingfan Wu joined IHMC as a research associate with the DARPA Robotics Challenge team in Pensacola. It's "the dream job," he said. "I really want

to work on robotics, and there is a great team here.

"I talked with some previous employees of IHMC and they told me it was a great place. Of course one of the great attractions is that I wanted to participate in the DARPA Robotics Challenge, and IHMC was in first place in the initial

phase, so there was no better place to go."

Dr. Wu graduated from the University of California San Diego in August 2013 with a Ph.D. in computer science. His research field is developmental robotics, focusing on whether robots can be taught to learn. He studies how humans acquire, recognize and improve their skills to see if it can be applied in robots. That includes equipping robots with social interaction skills that help them gain human assistance in completing tasks.

"The specific field I am in is called developmental robotics," he said. "There are several things you have to figure out. The first is, what is a skill? How do you tell the robot the skill? These are very open-ended questions. In my research I typically look at how humans acquire, recognize and improve their skills. And try to see if I can implement a similar thing in robots."

He said the research focuses on human study, especially observing human infants, seeing how they acquire new skills, such as locomotion. And then the goal is to try to replicate similar things in robots.

At an early age, he said, "I knew I wanted to work on something that was going to improve human quality of life." He was exposed to computers in middle school, "and I decided this was definitely the way to go." But he wasn't satisfied with the way computers interact with people, and pursued development of more natural human-computer interfaces, a key research topic at IHMC.

"The field of human-computer interaction, and robotics, are the two natural extensions of a computer that can actually interact with the environment," he said. "This requires more natural human-computer interfaces."

Dr. Wu said that when time allows he pursues ocean swimming and badminton.

## Dr. John Yamokoski



Dr. John Yamokoski joined IHMC as a research scientist working with the robotics teams on joint NASA projects. He splits time between NASA and IHMC under an

Intergovernmental Personnel Act (IPA) agreement, with his office at Johnson Space Center in Houston, Texas.

Dr. Yamokoski has a Master's and a Ph.D in mechanical engineering from the University of Florida. Prior to joining IHMC he was with Oceaneering Space Systems, a subsidiary of Oceaneering, Inc., a company that specializes in remote undersea exploration vehicles, working at JSC on robotics projects.

At JSC, he was the software lead for NASA's entry into the DARPA Robotics Challenge, where IHMC has become one of the leading teams. He said other than for "a few jokes" now and then there has been no conflict between his roles at IHMC and at NASA. "It has been a pretty collaborative effort," he said. "Scientists are a very collaborative group, they know how to work together."

He said that as a young boy "I was something of a geek," and spent many days at the Museum of Science and Industry in Tampa, Fla., where he grew up. He and friends were into things like model rockets, computer programming and a (failed) attempt to create a video game. His interests in robotics developed during his college years.

Dr. Yamokoski is married (Christine) and has two children: Luke, 5, and Julia, 3. He enjoys outdoor fitness activities, as well as golf, beer brewing and gardening. 🇺🇸



## DR. WILLIAM DAVIS

Dr. William Davis goes against the grain, literally: Modern wheat—even whole grain—is not just not healthy, it is toxic, he tells audiences. Eliminating it from your diet has a wide range of dramatic, positive health impacts, he told a Pensacola audience in his talk, “Wheat: The UNhealthy Whole Grain.”

Dr. Davis, a cardiologist, said he understands that grains—especially whole grains—have been sold as a healthy alternative to meat and other fat-laden foods. Telling people that wheat is bad for them, he said, is “obnoxious” to most people. But “I was unhappy with the way things were going.” He said the idea that people should take cholesterol medicine and cut fat from their diet and everything would be fine wasn’t just wrong, it wasn’t working. In his cardiology practice, he said, he watched too many people do that—but still die of heart disease.

His bottom line? “Humans have no business eating grains.”



## DR. TOM JONES

While American robotic explorers remain unmatched in their ability to survey Mars and the solar system, U.S. astronauts must ride Russian rockets to reach the International Space Station (ISS). And while NASA plans to send astronauts into deep space beyond the Moon in the 2020s, those plans will require greater support from elected officials. A commitment to space exploration will be “a key to our nation’s successful and prosperous future,” said planetary scientist and veteran astronaut Dr. Tom Jones to an Ocala audience in his talk, “Beyond Earth: America’s Future in Space.”

Dr. Jones is a graduate of the Air Force Academy, scientist, author and pilot. He holds a Ph.D. in planetary sciences, and flew on four space shuttle missions to Earth orbit. He called the ISS “the biggest engineering achievement ever off the planet,” but said depending on Russia to send Americans to the station is “embarrassing.”



## DR. TODD CLEAR

America is a symbol of freedom, yet imprisons more people than any other nation. That includes China, with three times our population. It means one in every 99 U.S. adults is behind bars. More shockingly, one in every 31 adults in the U.S. is in a cell, on parole or under probation.

The question for any judicial system seeking to provide justice, and protect law-abiding citizens, is whether the costs—both financial and intangible—of such high levels of incarceration actually benefit the law-abiding majority. That’s the question Dr. Todd Clear explored for a Pensacola audience in his talk, “The Great American Incarceration Experiment: What Has it Cost Us?”

His answer: High levels of incarceration worsen the very problems they are intended to solve.

Dr. Clear is dean of the School of Criminal Justice at Rutgers, and was associate dean of the School of Criminology and Criminal Justice at Florida State University.



## DR. ALLEN JOSEPHS

Literary scholar Dr. Allen Josephs was featured as IHMC Pensacola hosted the first in a new Arts & Humanities lecture series organized by the University of West Florida. Josephs, renowned for research on Ernest Hemingway and Spanish culture, turned his attention to Pulitzer Prize-winning author Cormac McCarthy. He called McCarthy’s “The Road,” selected as UWF’s “common read” for 2013, “the single most compelling novel I have ever read.”

Dr. Josephs is a professor of English and World Languages at UWF and past president of the Ernest Hemingway Foundation and Society. He is the author of nine books and more than a hundred essays and reviews, including in The New York Times Book Review and Atlantic Monthly. His lecture was based on his essay, “The Quest for God in The Road,” in the “Cambridge Companion to Cormac McCarthy.”



## QUINT STUDER

Good healthcare it is a collaborative endeavor that demands we be good patients and consumers. That means demanding effective service—and being thankful when you get it. That’s what healthcare consultant Quint Studer told an Ocala audience in his talk, “Being an Informed Healthcare Customer: How to Know the Quality of Care You Will Receive.” He talked about what effective healthcare is, and where people can go to get educated about it. The bottom line? “Don’t be afraid to ask” the questions that prompt good service.

Studer is the founder of Studer Group, Inc. He has worked with numerous healthcare organizations nationwide which have won multiple performance awards. Studer Group, headquartered in Pensacola, was the recipient of the Malcolm Baldrige National Quality Award in 2010. He serves on the 21st Healthcare Leadership Curriculum Task Force at Harvard Business School.



## DR. MICHAEL ANASTASIO

Ensuring that our nuclear arsenal works isn't easy in an era in which weapons testing and development are prohibited. But that's just one of the many complex tasks assigned to America's national security labs—Los Alamos, Lawrence Livermore and Sandia.

Dr. Michael Anastasio, the only person to head up both Los Alamos and Lawrence Livermore, told a Pensacola audience that the labs are multi-purpose entities handling projects as disparate as creating a vaccine for HIV and helping to explore Mars. His talk: "The National Security Laboratories—from Nuclear Weapons to an HIV Vaccine; from Mars to Climate Change." The largest of the three labs, Los Alamos, employs 10,000 people. Its primary mission is to secure the safety and reliability of U.S. nuclear weapons.

Dr. Anastasio holds both a Master's and a Ph.D. in theoretical nuclear physics. He serves on the Defense Science Board as a special advisor to the commander of the U.S. Strategic Command.



## DR. JEFF VOLEK

Diets that severely restrict carbohydrates "remain a fringe concept" in nutrition, but new research is rapidly bringing the ketogenic diet into the mainstream. That's the message Dr. Jeff Volek brought to a Pensacola audience in his talk, "The Many Facets of Keto-Adaptation: Health, Performance and Beyond."

This research points to the low-carb routine as the answer to "a pandemic of obesity" threatening to overwhelm our healthcare system, he said. With one in three U.S. adults obese today, there's an epidemic of diabetes and other ills. By 2030 one in two adults could be obese. "We need a better solution" to obesity, he said.

Dr. Volek holds a Ph.D. in nutrition and is a professor in the Department of Kinesiology at the University of Connecticut. He has authored/co-authored four books, 60 peer-reviewed manuscripts and reviews, and delivered over 100 presentations on low carbohydrate diets around the world.



## DR. MICHAEL HOLICK

Dr. Michael Holick told his Ocala audience that dermatologists have so "demonized" exposure to sunlight that they have exacerbated an epidemic: Vitamin D deficiency. He focused on its benefits in his talk, "The D-Lightful Vitamin D for Good Health."

Humans evolved "under sunlight," Dr. Holick said, developing an evolutionary requirement for high levels of Vitamin D. But it is essentially impossible to get enough from our diet, and the "demonization" of sunlight has cut us off from the highest quality source of natural Vitamin D—that produced by our own bodies. A deficiency can be implicated in cancer, bone loss, diabetes, heart disease and more.

Dr. Holick is a medical doctor, author and professor of medicine, physiology and biophysics at Boston University Medical Center. His latest book is "The Vitamin D Solution: A 3-Step Strategy to Cure our Most Common Health Problems."



## DR. PAUL KAMINSKI

After the Soviet Union spent \$1 trillion building an air defense network, the United States was faced with the question of how to deal with it. The answer? Precision strike weapons, advanced radars and sensors—and stealth technology that made U.S. combat aircraft difficult to detect or shoot down. Dr. Paul Kaminski was on the ground floor of U.S. stealth efforts, directing programs that led to the development of groundbreaking aircraft such as the F-117 and the B-2. He talked about the origins of stealth to a Pensacola audience in his talk, "Stealth—An Insider's Perspective."

Hailed as a Pioneer of Stealth, among many other important positions Dr. Kaminski served as Director for Low Observables Technology with the Air Force. He also led the initial development of a National Reconnaissance Office space system and related sensor technology. Today he is chairman of the Defense Science Board. A graduate of the Air Force Academy, he holds a Ph.D. in aeronautics and astronautics from Stanford University.



## DR. ALESSIO FASANO

Gluten is an ingredient in food that causes problems for people sensitive to it, especially with celiac disease, an auto-immune disorder. Dr. Alessio Fasano, a world-renowned pediatric gastroenterologist, research scientist and entrepreneur, is a groundbreaking researcher on celiac disease. He founded the Center for Celiac Research to provide research, clinical expertise and teaching for the diagnosis, treatment and prevention of gluten-related disorders. He reviewed the growing research on gluten-related disorders for an Ocala audience in his talk, "Spectrum of Gluten-Related Disorders: People Shall Not Live on Bread Alone."

Gluten-related disorders affect approximately 1 in 133 people, a rate that has doubled in the U.S. every 15 years over the past 35 years. An estimate from the Center for Celiac Research puts gluten sensitivity at 6 percent of the U.S. population. Trained in Naples, Italy, as a pediatric gastroenterologist, Dr. Fasano was recruited to the University of Maryland School of Medicine in 1993 and founded its Division of Pediatric Gastroenterology and Nutrition.



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