



FLORIDA INSTITUTE FOR HUMAN & MACHINE COGNITION

ihmc

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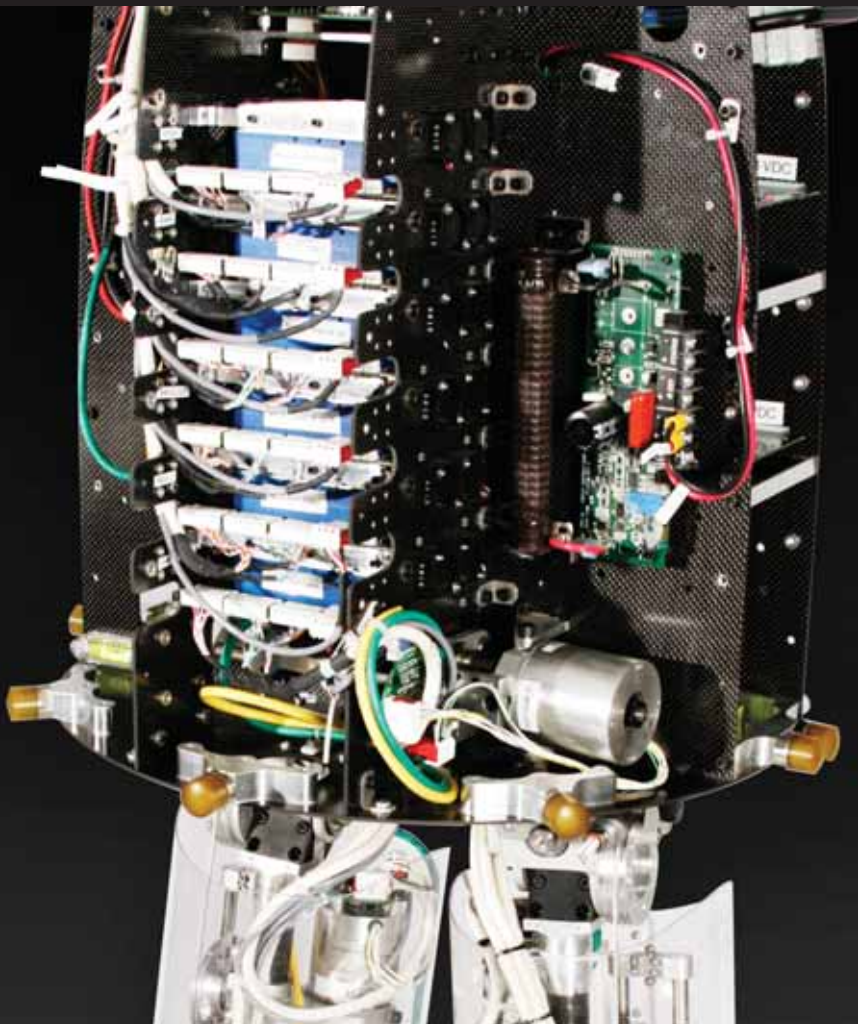
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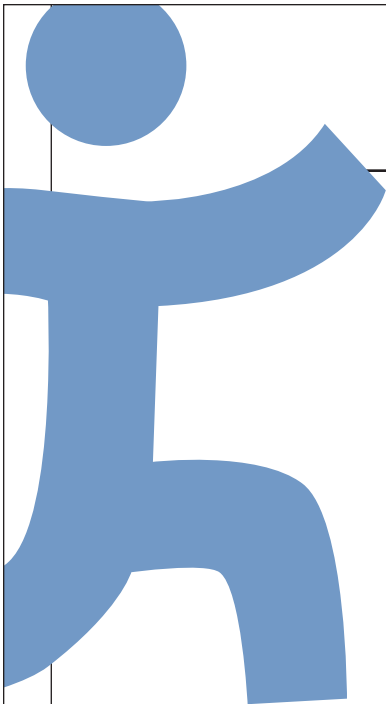
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Dear friends:

As this issue of the newsletter illuminates, robotics is a growing and increasingly important part of the research at IHMC. Led by Jerry Pratt and Peter Neuhaus in our Pensacola facility, IHMC scientists are doing exciting and important research into the ability of bipedal robots to stand and walk independently, even on uneven ground, if pushed by someone or something, or in a cluttered environment. While that might be easy for you and me, it is not for a two-legged robot. So research like ours will help make robots more useful and valuable.

This research is also leading to development of robotic exoskeletons that show great promise for helping people in wheelchairs to walk again, or for soldiers or workers to carry heavy loads or quickly walk and swim great distances.

It seems appropriate, as the Robotics Lab in Pensacola expands into new space and new research, to see in it a reflection of how a research institute like IHMC grows and evolves.

Peter and Jerry are not just scientists at the top of their field; they are also mentors doing important work in helping to bring along newer researchers and scientists now entering the burgeoning field of robotics.

IHMC's mission itself should focus on more than simply pushing the boundaries of research in a field such as robotics; it must support expanding the horizons of the men and women doing the pushing. That's how research builds upon itself in new and exciting ways.

We hope this newsletter will expand your horizons on the possibilities inherent in advanced research on robotics, and that you will visit our robotics lab during the next open house.

Best Wishes,

Kenneth M. Ford, Director

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Human & Machine
Cognition

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Biologically Inspired Robots

Most humans learn to use their legs—walk, run, jump, skip—at an early age. But even advanced humanoid robots remain slow, are not very good at recovering from disturbances, and have trouble getting over uneven ground or around obstacles. Unfortunately, there are also many people who have difficulty walking. Researchers at IHMC are investigating the fundamentals of walking and running on two legs, and developing new bipedal robots and exoskeletons. That will mean better robots—and improved mobility for impaired humans.

M2V2, a walking bipedal robot built by IHMC researchers, incorporates natural design elements to take advantage of the inherent dynamics of human legs. Researchers have

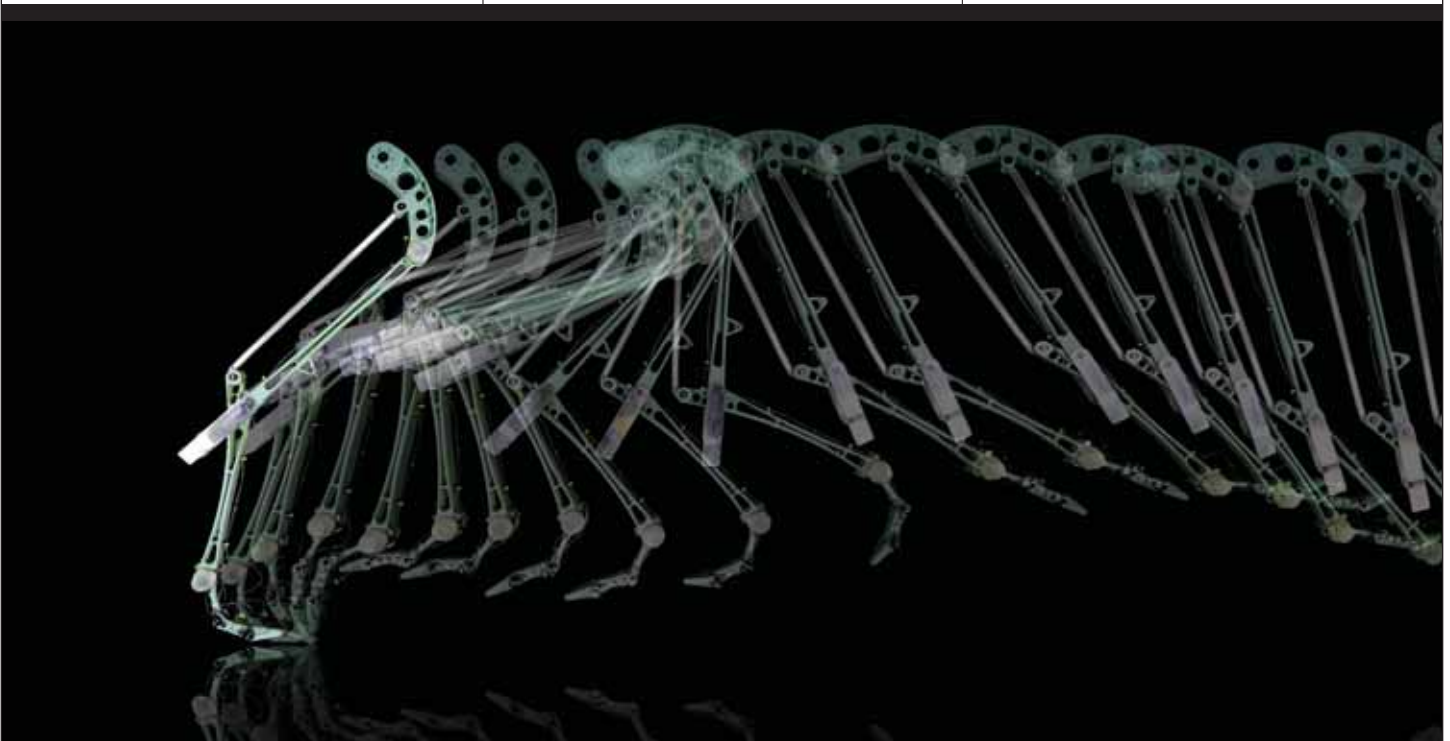
developed control algorithms to increase the stability of the robot in a challenging environment.

One of the innovations is the concept of capturability. IHMC researchers studied walking people to analyze how they recover from pushes and other disturbances. As the force of the push increases, the human steps farther away to regain balance. IHMC researchers termed the area that long step traverses “the capture region” and developed mathematical models to determine appropriate push-recovery responses. Using these new models in the robot algorithms has increased the ability of the robot to remain upright despite even large pushes.

Because walking and push recovery come so naturally to us, our built environment is designed for bipedal

walking. Unfortunately, people confined to a wheelchair or crutches repeatedly encounter daunting obstacles. To help them overcome these obstacles, IHMC researchers have used their knowledge of bipedal walking, mechanical design and control to build Mina, a robotic exoskeleton for paralyzed people.

Recently the researchers tested their first prototype on two paraplegics. After minimal training, the users were able to walk across the room using the Mina system, which includes two arm braces. Notably, both individuals were able to carry on a normal conversation while walking, indicating that using the exoskeleton does not require significant concentration. Additionally, they were able to catch and throw balls while upright, indicating that they can use



Fast Runner is a bipedal running robot that is being designed to run at more than 30 mph.

PROFILES Featured Researchers



Ionut Olaru

Hometown: Bucharest, Romania.
Education: BS in mechatronics and industrial robotics, M.S. in quality engineering and design, Ph.D. in humanoid robots, Politehnica University of Bucharest.
Joined IHMC: 2010.

Ionut has been attracted to science and engineering since he was a kid, always wondering how toys were made and considering how they can be improved.

A desire to help people with disabilities led him to mechanical engineering where he has been enthusiastic to design robotic prosthetic devices. At IHMC he has worked on both the M2V2 humanoid robot and the Mina exoskeleton project. He is leading the mechanical design effort on FastRunner.

As a Ph.D. student, he pursued research in the mechanical design of humanoid robots. For his postdoctoral research at the French National Center of Scientific Research, he extended his research to biologically inspired robotics, mostly bipedal, focusing on the mechanical design of the humanoid robot SHERPA.

He has enjoyed working at the IHMC robotics lab, where he has pursued research in the most challenging problems in robotics, which push him to discover more.



Sebastien Cotton

Hometown: Avignon, France.
Education: B.S. in mathematics and computer science, University of Avignon, France; M.S. in electrical engineering and Ph.D. in robotics, University of Montpellier, France.
Joined IHMC: 2010.

For his graduate work, Sebastien studied the balance of the humanoid structure for both humans and robotics. He believes there is a large synergy existing between robots and humans that has not been fully exploited. As such, IHMC is an ideal place for him to investigate human-machine interactions in detail. Sebastien is an example of IHMC's long reach in attracting robotics researchers.

He is the project manager for FastRunner, where he is focusing on modeling and control aspects, including developing a complete simulation demonstrating the robot's capacities. He is proud of the group's efforts to embed mechanical intelligence directly into the leg design to reduce the need for complex control algorithms. Sebastien's long-term plans include developing intuitive interfaces for robot teleoperation and creating transformer-like robots.

He is enjoying life in Pensacola, pursuing a variety of water sports, fishing and walking on the beautiful beaches.

their arms for other tasks while using the exoskeleton. Ultimately, the enthusiastic response by the users shows the success of the exoskeleton and the potential for this technology to enhance their lives.

IHMC researchers are continuing to develop new prototypes and expect to test an improved exoskeleton soon. Future applications could include rehabilitation for victims of stroke or spinal cord injuries, or augmenting our ability to carry heavy loads, quickly walk or swim long distances or function in complex environments.

■ ■ ■ *During pilot studies, the researchers have developed several prototype FastRunner legs and have demonstrated many of the benefits of the design. The knowledge gained from this effort will inform the creation of future robots that can travel at high speeds while remaining stable.* ■ ■ ■

While M2V2 and Mina are inspired by humans, the IHMC FastRunner robot is inspired by the ostrich, one of the fastest and most efficient two-legged animals. The two-legged FastRunner is being designed to run at 20-30 mph. The IHMC researchers, in collaboration with colleagues at MIT, are utilizing novel mechanical design concepts to achieve



The biologically inspired robots team: T. Koolen, M. Fortenberry, D. Duran, M. Johnson, J. Pratt, J. Carff, T. Craig, J. Godowski, J. Taylor, J. Coffield, S. Cotton, M. Bellman, D. Stephen, I. Oлару, P. Neuhaus Seated: J. Noorden, B. Layton

PROFILE



Chris Schmidt-Wetekam

Hometown: Milwaukee, Wisconsin.

Education: B.S., M.S., and Ph.D. in mechanical engineering, UC San Diego.

Joined IHMC: 2011.

Chris has always enjoyed building things, whether with Legos or unusual contraptions like a vehicle made of plywood and bicycle parts, powered by a garage door spring. He was inspired to go into robotics by the remarkably dynamic legged robots that were developed by IHMC's Jerry Pratt and others. For his graduate research he designed, simulated and programmed several robots which combined energy-efficient wheeled locomotion with agile legged locomotion.

At IHMC he is involved in the humanoid robot projects, including Atlas and Robonaut. He is particularly interested in how upper-body motions can compensate for leg forces and push recovery. He is enjoying living in Pensacola with its affordable housing in charming neighborhoods.

His hobbies include sailing, windsurfing and kite surfing, which make Pensacola's pristine, uncrowded beaches an asset.

these speeds, which are twice as fast as the fastest bipedal robot to date. For example, it will use natural dynamics to retract the legs as they swing forward, allowing the robot to traverse moderate terrain. During pilot studies, the researchers developed several prototype legs and demonstrated many benefits of the design. This knowledge will shape future robots that can travel at high speeds while remaining stable.

In many hazardous environments, using robots instead of, or in addition to, people makes sense. Such environments could include search and rescue, combat and space exploration. And for human controllers, operating a humanoid robot might be more natural than using other robots since it would function like a human. Towards those ends, IHMC is working with NASA Johnson Space Center to develop walking algorithms for

■■■ *Someday Robonaut might explore other planets alongside human astronauts.* ■■■

the NASA Robonaut. Someday Robonaut might explore other planets alongside human astronauts.

While two-legged creatures are not as common as those with four or more legs, and even nature itself is challenged to master the art of bipedal walking, especially balance, there are distinct advantages to walking on two legs. By mastering the challenges, IHMC researchers are helping develop robots that can not just operate robustly in the human environment themselves, but can also better assist humans in navigating this world—and other worlds awaiting discovery. ✧

PEOPLE IN THE NEWS

NEWS OF IHMC



Ford named to U.S. Defense Science Board

IHMC Director/CEO Ken Ford has been named to the prestigious Defense Science Board by the U.S. Department of Defense. The board reports directly to the Secretary of Defense.

The 32-member board is comprised of nationally recognized leaders and experts selected for their preeminence


in the fields of science, technology and its application to military operations, research, engineering, manufacturing and the acquisition process.

The Defense Science Board was established in 1956 as a standing committee to advise top Pentagon officials on the “needs and opportunities presented by new scientific knowledge for radically new weapons systems.” Over time, the board has expanded its purview to also develop and strengthen the DoD’s research and development strategies for the 21st century.

■ ■ ■ *The Defense Science Board was established in 1956 as a standing committee that advises top Pentagon officials on the “needs and opportunities presented by new scientific knowledge for radically new weapons systems.”* ■ ■ ■

Retired Air Force Gen. Lester L. Lyles, vice chair of the Defense Science Board, said that “leadership in defense requires a constant infusion of new ideas and access to state of the art knowledge on scientific and technical matters.”

He said “Ken Ford brings those desired qualities to this board.”

Dr. Ford has served on a number of top national boards and commissions, including the National Science Board, Air Force Science Advisory Board, and NASA Advisory Council, which he most recently served as chair. In 2010, he was awarded NASA’s Distinguished Public Service Medal—the agency’s highest honor. Dr. Ford is a Fellow of the Association for the Advancement of Artificial Intelligence (AAAI), a member of the Association for Computing Machinery (ACM), and a member of the IEEE Computer Society. 

HAPPENINGS

NEWS OF IHMC



left to right: State Rep. Dennis Baxley; Lawrence “Brad” Strombock, director of Sustainable Initiatives Florida DEP; Ken Ford, IHMC CEO; Ocala Mayor Randy Ewers; and Randy Berridge, president of the Florida High Tech Council.

IHMC Ocala celebrates LEED gold certification

IHMC Ocala hosted an event honoring recognition of the new Ocala facility as a LEED Gold project. This designation recognizes the efforts of IHMC and its architects to create an environmentally friendly facility. “This LEED Gold certification recognizes our efforts to create a healthy, productive, state-of-the-art workplace for our people, one that is less costly to operate and maintain, and has a reduced environmental footprint,” said IHMC Director and CEO Ken Ford.

The event included remarks from Ocala Mayor Randy Ewers; Brad Strombock, director of Sustainable Initiatives for the Florida Department of Environmental Protection; and state Rep. Dennis Baxley, R-Ocala. Florida High Tech Corridor sponsored the event, which drew over 100 attendees.

Human-Machine Trust Workshop focuses on autonomous systems

IHMC recently welcomed over 40 invitees from federal agencies such as the Office of Naval Research, the Air Force Research Laboratory, the Army Research Laboratory and the Federal Aviation Administration, as well as from numerous top-tier universities, to its Ocala research facility for a workshop on identifying, discussing and prioritizing basic research issues regarding trust in the human-machine partnership for next generation autonomous systems.

Under sponsorship of the Air Force Office of Scientific Research, IHMC’s David Atkinson organized the workshop as an interdisciplinary event bringing together experts in diverse fields ranging from computer science to cognitive science to psychology.

Presentations and discussions focused on the premise that intelligent, autonomous systems would be invaluable in problem domains that are not amenable to conventional automation, or which humans find difficult, dangerous or too complex. Such application domains involve critical operations in defense, health care and other industries where the consequences of mistakes, errors or failure to perform can be dire. In these situations trust in intelligent machines, and autonomy in general, is absolutely required, and attendees focused on how to better understand issues of trust and measures of trustworthiness.

The workshop consensus was that new interdisciplinary research in trust and autonomy would contribute substantially to the actual adoption of intelligent machines capable of autonomous behavior in tomorrow’s human-machine environments.



David Atkinson

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NEW ARRIVALS



Micah Clark

Dr. Micah Clark joins IHMC as a new research scientist. His research interests include adversary modeling, autonomy and human-machine cooperation, among other things. He previously was with the Jet Propulsion Laboratory where he worked on intelligent systems R&D, fulfilling the complementary roles of AI technologist and software systems engineer. He was a member of multiple NASA missions operations teams, including EPOXI and Deep Impact, as well as serving as a software systems engineer for the Constellation Project. He received his Ph.D. in Cognitive Science and his B.S. in Computer Science and Philosophy, both from Rensselaer Polytechnic Institute.



Chua Wei "Kenny" Liang

Kenny is a visiting research scientist working with IHMC researchers on a variety of human-machine interface technologies. He is a researcher with DSO National Laboratories of Singapore and has worked on several projects in the domains of multi-modality crew console and human-machine interface design for HRI.



Ursula Schwuttke

Dr. Ursula Schwuttke is the program development director for educational outreach in Ocala. Before IHMC, she was vice president of business development for Highest Wind, LLC, a start-up wind energy company focused on developing renewable energy technology. At Highest Wind, Dr. Schwuttke was responsible for pursuing venture capital and government grants, for developing research partnerships, and for establishing strategic relationships. She also founded and launched Partners in Algebra, dedicated to the success of socio-economically disadvantaged community college students who struggle with basic math and writing.



Ann Spang

Ms. Ann Spang is IHMC's new assistant director for community relations and will be based in the Ocala office. She will be responsible for facilities issues, public relations, tracking and coordinating sponsors, and running events, such as conferences, lectures and science outreach.

She was formerly the vice president for corporate relations at Ocala/Marion County Economic Development Corporation.

IHMC hosts Research Days with UF & USF

In an effort to increase collaboration with our university colleagues, IHMC hosted Research Days with the University of Florida and the University of South Florida. A diverse array of researchers, including electrical engineers, marine biologists, systems engineers, mechanical engineers, computer scientists, neuroscientists and chemical engineers, participated in breakout groups on robotics, human-machine collaboration and coordination, networks and communications, multi-sensory interfaces and cybersecurity.

In addition to the ability for scientists and researchers at the respective institutions to meet and interact with colleagues in their fields, both days resulted in the identification of a number of areas of common research interests and the identification of potential funding opportunities. Next steps for participants include writing joint proposals for upcoming research solicitations and continuing dialogue on novel ideas in their respective fields.

Collaboration across fields and institutions is a hallmark of IHMC's research efforts and provides a multidisciplinary approach to many research challenges. Working with peers in other institutions allows IHMC scientists and engineers to leverage their strengths to support research across a wide spectrum.

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STEMflorida cites IHMC lecture series as “Best Practice”

STEMflorida has cited IHMC’s adult evening lecture series as a 2011 Best Practice. The best practices were selected from around Florida, exemplifying programs that encourage participation in science, technology, engineering and mathematics. Winners, representing diverse programs operated by organizations across the state, were honored at a think tank hosted by STEMflorida. IHMC’s award was for the Best STEM-enabled Lecture Series throughout the year. STEMflorida is a not-for-profit aimed at ensuring leadership for science, technology, engineering and mathematics by connecting relevant education and talent development programs, philanthropic stewardship and economic and community development.



IHMC CEO Ken Ford and Rick Baker, USF vice president of public policy and innovation partnerships, sign USF-IHMC affiliation agreement.

IHMC Ocala corrals “Broken Beauty”

IHMC Ocala’s front lawn was the home of “Broken Beauty,” a horse statue by artist Stephanie Giera. The statue is part of Horse Fever II, an effort by the Marion Cultural Alliance to provide public art as well as raise funds. The horse, in front of IHMC, was sponsored by Renstar Medical Research. Giera decorated the statue with broken pieces of jewelry donated by members of the Marion county community, symbolizing beauty from brokenness. The statue was auctioned in a fundraiser for the Marion Cultural Alliance.

USF-IHMC sign formal affiliation agreement to cooperate on research

IHMC is continuing to leverage its talents by partnering with universities across Florida, throughout the United States, and around the world. To strengthen their relationship, IHMC and the University of South Florida signed an affiliation agreement to cooperate on research initiatives of common interest. USF and IHMC personnel will work jointly in many fields, including cybersecurity, human-machine collaboration and coordination, multisensory interfaces and natural language processing.



Broken Beauty outside IHMC Ocala.

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March Science Saturday in Ocala

Science Saturdays begins in Ocala, and continues in Pensacola

Science Saturdays, IHMC's flagship science education program, began its first year at IHMC Ocala. Science Saturdays is a hands-on science program for kids in grades three through five. Activities, led by IHMC researchers, focus each month on a different scientific concept. A generous gift by Ron and Phyllis Ewers provided the funding to kick off the program in Ocala. The first sessions were

filled, and the enthusiasm level was high.

While the programs in each location will share many resources, each activity is led by researchers who put their own personal stamp on it. In April, Yorick Wilks, who specializes in natural language processing, led an activity on Talking Computers. Other activities have included topics on flight, electronics, balloon rockets, pendulums and gravity.

Science Saturdays in Pensacola continues to be well attended into its ninth year. This past year we had the perennial favorite—chemistry day—led by the local section of the American Chemical Society. In addition, students explored flight using wind tubes, and roller coasters using a marble wall. Word continues to spread, and the new lottery system has broadened participation. Each month over 100 students apply for one of the 50 available slots.

IHMC holds robotics open house

Researchers at IHMC Pensacola shared ongoing robotics research with the public during the second annual robotics open house. Visitors saw demonstrations of quadcopters, with some getting a chance to wear a hat that enabled the copter to



Robotics Open House

track their movements. Researchers also presented videos and allowed visitors up-close looks at other robots and prototypes, including a biped, exoskeleton and FastRunner.

Over 200 visitors, including almost 100 children, attended the event, getting a chance to meet the researchers and get a first-hand look at scientific research. The event was held in conjunction with National Robotics Week, a nationwide celebration of robotics to educate the public about research and inspire learners of all ages to pursue careers in science, math and engineering, science, math, and engineering.



Robotics Open House

HAPPENINGS

NEWS OF IHMC

Knowledge Systems Conference goes international

IHMC recently hosted the seventh international Knowledge Systems for Coalition Operations conference. It brought together practitioners and key decision-makers in coalition operations to discuss research in areas of knowledge-based systems, planning and multi-agent systems. Participants included one French and two U.S. generals, as well as attendees from England and Canada.

Coalition operations are a burgeoning area, as the military and cross-organization alliances increase their participation in cooperative endeavors and join forces together for a common cause. An example of a coalition effort this conference considered is developing tools to help agribusiness development in Afghanistan, and particularly ways to achieve collaborations between military, nongovernmental organizations, state and local governments.

The conference was sponsored by IHMC and the California State University, San Bernardino, Integrated Information Technology Policy Analysis project. Papers from this conference will be published as a special issue of IEEE Intelligent Systems.

Ford speaks to Leadership Florida

IHMC CEO Ken Ford spoke on "People, Places, and Innovation" at the Leadership Florida annual meeting on June 11, 2011. Leadership Florida, a program of the Florida Chamber

of Commerce, provides participants from across the state insight into the conditions and challenges facing Florida. The annual meeting is open to all who have participated in the eight-month Leadership Florida program.

IHMC is Marion County "Innovator of the Year"

In early March, the Appleton Museum of Art provided the perfect backdrop for the Ocala/Marion County Chamber of Commerce's 124th Annual Meeting and "Stars Over Ocala" Business Recognition Awards Ceremony, where IHMC was recognized as recipient of the "Innovator of the Year" award.

With over 200 business and community leaders in attendance, the chamber's top brass presented highlights of their 2011 accomplishments. The highly anticipated awards ceremony took center stage later in the evening as 17 individuals and businesses were recognized for their contributions to the Ocala/Marion County community. The categories included Business of the Year, Business Person of the Year, Innovator of the Year and many more.


The Innovator of the Year award is presented to an organization that has successfully brought a unique product or service to Marion County that made important contributions to the community and economic development. IHMC was among three nominees in this prestigious category. Dr. John "Row" Rogacki, associate director, and Ann Spang, assistant director for Community Relations, proudly accepted for IHMC.



IHMC gets 2012 Overall Industry Partner Career Academy Award

IHMC Pensacola has been recognized once again for its contributions in the area of robotics. The EscaRosa Next Generation Learning Community Career Academy presented IHMC with its "Overall Industry Partner" award at the 3rd Annual Career Academy Awards Luncheon on April 11, 2012. The Career Academy Awards Ceremony recognizes outstanding business partners who support the career academies within the Escambia and Santa Rosa county school districts. Teachers and students from the two districts who excel within their career academy also participated in the ceremony.

IHMC was highlighted for its work with West Florida High School Advanced Career Experience (ACE) program, which allows high school students to work in their chosen technical industry to gain real-world, hands-on experience.

The awards ceremony included remarks by Escambia County School Superintendent Malcolm Thomas and Santa Rosa County Superintendent Tim Wyrosdick, as well as Scott Luth, senior vice president for economic development at the Greater Pensacola Chamber. 

RECENT LECTURES

■■■ IHMC'S EVENING LECTURE SERIES

www.ihmc.us/evening_lecture.php



Charlie Kennel

NASA is reaching a crossroads with the end of the space shuttle era. Charles Kennel examined the goals and technical requirements of human exploration beyond low earth orbit after 2020 during his lecture, "NASA at mid-life: The future of human space exploration." The principal question is whether human space exploration can be sustained over the long periods of time required, and if so, what will it take. The possible answers have technological, social, economic and political dimensions. Kennel is a distinguished professor emeritus of atmospheric sciences at Scripps, senior strategist for the UCSD Sustainability Solutions Institute, and co-leads the University of Cambridge/UCSD Global Water Initiative. He is also a member of the U.S. National Academy of Sciences, the American Academy of Arts and Sciences, the American Philosophical Society and the International Academy of Astronautics.



Lars Perkins

The ever-growing complexity and pervasiveness of computers sometimes presents challenges for people to perform even routine tasks, especially when the device interface is not intuitive. Lars Perkins described how new devices should be designed to avoid such challenges during his lecture, "Honey Can You Help Me Turn on the TV? Why today's products make us feel stupid." Designers must respect their customers' time and perspective. In addition, they should consider creating a holistic user experience which includes the device, customer support, and ultimately the brand and identity of the manufacturer itself. Perkins is a consultant in the computer software industry. He previously worked as director of project management for Google, where he directed Picasa. He is a member of the NASA Advisory Council and serves as chair of the Education and Public Outreach Committee.



Margaret Leinen

The oceans have changed dramatically since Earth was formed four billion years ago. It has been hot enough to sustain crocodiles in the Arctic, and cold enough to be covered in ice. During her lecture, "Our Changing Oceans," Margaret Leinen explained the changes being documented today and why they worry scientists. In particular, sustaining the variety of life that we see today relies on oceans and climate remaining similar to what we have now. Additionally, changes are happening much more rapidly than in the past, leaving less time for adaptation. Leinen is the associate provost for marine and environmental initiatives at Florida Atlantic University and executive director of the Harbor Branch Oceanographic Institute. She is a Fellow of the American Association for the Advancement of Science and the Geological Society of America.



Kenneth N. Raymond

Iron is essential for many critical functions in the human body, including oxygen transport. During his lecture, "The Human/Bacterial Arms Race for Iron," Kenneth Raymond presented a general discussion of iron metabolism in humans and some diseases that result from disruption of iron transport. Raymond is a UC Berkeley chancellor's professor, director of the Glenn T. Seaborg Center at Lawrence Berkeley National Laboratory and the president and chairman of Lumipore. His research focuses on metals in biology and physical inorganic chemistry. This lecture was part of the William D. Smart Seminar Series in Chemistry sponsored by the University of West Florida.

RECENT LECTURES

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Wes Huntress

Are we alone in the universe? That fundamental question has haunted man from the beginning. Searching for life elsewhere has been a driver for NASA's exploration of the solar system. Dr. Wes Huntress examined some of the missions and what they have found during his lecture, "Roving the Solar System: Looking for Signs of Life." Huntress is chair of NASA's Science Advisory Committee and director emeritus at the Geophysical Laboratory of the Carnegie Institution of Washington, a privately endowed scientific research institution. Prior to this work he led NASA efforts to explore the solar system. He remains a spokesman and strategist for the scientific exploration of space.



Mayor Rick Baker

Rick Baker, former mayor of St. Petersburg, Florida, described his experience as mayor in his lecture, "Building Seamless Cities." He explained how the job of mayor has three main elements: dealing with the day-to-day business of the city, addressing crises, and advancing a vision for the city. His strategic plan—Making St. Petersburg Best—led the city through an historic renaissance period. Baker was first elected mayor in 2001 to lead Florida's fourth-largest city and re-elected in November 2005 with over 70% of the vote. He was term-limited out of office in 2009. In 2008, Mayor Baker was named as the 2008 United States Mayor/Public Official of the year by *Governing Magazine*, and in 2011 *Newsweek Magazine/The Daily Beast* labeled him "America's greatest mayor of the decade."



Dan Britt

Climate change has become a major political issue. But few people really understand how climate has changed in the past, or the forces that drive those changes. Dr. Dan Britt detailed the history of climate change and how that knowledge can help us as we consider the ongoing challenges during his lecture, "Orbits and Ice Ages: The History of Climate." Britt is a professor of astronomy and planetary sciences at the Department of Physics, University of Central Florida. His research centers on the physical properties and mineralogy of asteroids, comets, the Moon and Mars, under several NASA grants. His eclectic career includes service as an Air Force ICBM launch officer and as an economist for Boeing.



RECENT LECTURES

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Ted McPherson

Understanding the traits that make leaders successful can provide insights to assist everyone in reaching their potential. Ted McPherson, an entrepreneur and management consultant, explained the role of character and its foundational role in producing breakthrough results during his lecture, "Character and Results: The Value of Soul and Unreasonableness." McPherson serves as a leader and strategic advisor to Fortune 100 companies, Forbes 400 entrepreneurs and major investors. He is CEO of InterSolve Group and has served on the NASA Advisory Council. His varied professional career includes service with the Navy, the Defense Intelligence Agency and presidential appointments as an undersecretary with the U.S. Department of Education and CFO of the Department of Agriculture.



Kip Hodges

Future exploration of the moon and planets will likely involve both human and robotic explorers. During his lecture, "A New Era of Human and Robotic Planetary Field Geology," Kip Hodges discussed his ongoing studies of how explorers might best work with robotic assistance, and how wearable computers and other advances might permit greater autonomy and situational awareness. Dr. Hodges, with a solid grounding in the geological evolution of Earth's mountain ranges, is turning his terrestrial gaze skyward as the founding director of the School of Earth and Space Exploration at Arizona State University. He is assisting NASA in the development and implementation of a new field-geology training program for its astronauts, and developing new ways to determine the age of meteorite impacts on the Earth and Moon.



Braden R. Allenby

Technology, whether in the form of railroads, electricity or other game changers of the past, has frequently and dramatically changed human, natural and built systems at a regional and global scale. Today, however, we are experiencing rapid evolution in five foundational technologies: nanotechnology, biotechnology, information and communication technology, robotics, and applied cognitive science. Braden Allenby said these changes will result in a future that is unpredictable and dependent on the new technologies during his lecture, "You Want the Future? You Can't Handle the Future!" Dr. Allenby, with degrees from Yale, the University of Virginia and Rutgers, is the Lincoln Professor of Engineering and Ethics, professor of civil and environmental engineering, and of law, at Arizona State University.



Tom Murphy

Faced with the collapse of its steel industry, Pittsburgh was forced to rebuild as a city to meet the new economic realities, and other cities can learn from the experience. Successful cities of the future must adapt to modern forces such as climate change, technological innovation, and demographic shifts. During his lecture, "Building on Innovation," Tom Murphy described the transformation of Pittsburgh under his leadership as mayor in meeting these challenges. Murphy is a senior resident fellow of the Urban Land Institute (ULI) and the Klingbeil Family Chair for urban development. He specializes in public policy, urban entertainment, transportation, housing, real estate finance and environmental issues.

RECENT LECTURES

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Jon Mills

Whether we know it or not, multiple times a day we give up our privacy, whether by posting on Facebook, driving through a tollbooth or using a store discount card. This growing ability to electronically “track” us, however, increases the likelihood of abuse: the invasion of privacy. Jon Mills discussed the need to clarify the rules, such as setting limits on warrantless wiretapping or creating guidelines for the disclosure of autopsy photos, during his lecture, “Living in Glass Houses—The Loss of Individual Privacy in Today’s World.” Mills is dean emeritus and professor of Law at the University of Florida Fredric G. Levin College of Law and Counsel to Boies, Schiller and Flexner L.L.P. He is a former speaker of the Florida House of Representatives.



Tom Jones

As detection technologies and search efforts improve, the world is learning about more asteroids and comets whose orbits approach or cross Earth’s. Tom Jones highlighted the dangers of these objects and challenges to responding to the danger, both technologically and politically, during his lecture, “Getting to Know the Asteroid in Your Future: Risks and Opportunities from Near-Earth Objects.” While deflection technologies are improving, political agreements to enable international response are lagging behind. Jones is a veteran NASA astronaut, speaker, author and consultant. He holds a doctorate in planetary sciences and flew on four space shuttle missions. Dr. Jones, a graduate of the U.S. Air Force Academy, is a senior research scientist at IHMC.

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