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FLORIDA INSTITUTE FOR HUMAN & MACHINE COGNITION

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FLORIDA INSTITUTE FOR HUMAN & MACHINE COGNITION

Dear Friends of IHMC,

As many have noted, a healthy research enterprise is a key driver of our nation's economic and military success. From a broader perspective, research is helping us better understand the universe and our place in it.

Important research of exactly this nature is taking place in Antarctica as part of the United States Antarctic Program operated by the National Science Foundation. Such research is aimed at answering important questions in astrophysics, geology, glaciology, biology, oceanography, and climate systems.

Over the last three years I have had the singular honor of serving on the National Science Board and in that capacity I recently had the privilege of visiting Antarctica. My brief visit certainly helped me gain a much better appreciation of the challenges associated with conducting research on the coldest, highest, windiest, driest, and most pristine continent on the planet. Antarctica is a place of haunting beauty that one does not easily forget.

Best Wishes,

Ken Ford

Kenneth M. Ford, Director

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FIHMC BOARD OF DIRECTORS

Sensory Augmentation

"Awake your senses, that you may the better judge."

—William Shakespeare

People are endowed with a remarkable range of senses. When walking down the street, for instance, we can look at a map, talk on a cell phone, listen for traffic, and step off a curb without looking down. If anything is out of the ordinary, we can quickly divert our attention. When we limit our sensory input, however, our ability to multitask diminishes greatly.

The technology revolution has largely ignored how humans regularly interact with the world around us, bypassing our ability to sense information in various ways. Many of the interfaces we use to interact with man-made systems, such as computers, cars, industrial process control rooms, and airplanes, are little changed from older, mechanical systems with many limitations.

When using a word processor, we type on an electronic version of a typewriter, using a keyboard layout that, limited by manufacturing capabilities in the late 1800s, was designed to keep the old mechanical typebars from clashing. The text appears on a white rectangle on the monitor to represent sheets of paper fed into a mechanical typewriter. The "page" rests on top of our "desktop."

Other more complicated systems are also restricted by legacy interfaces. Modern airplane cockpits, for example, still use graphical dials and gauges to represent important flight data that historically was measured and displayed with mechanical devices but which are now measured and displayed electronically.

As machines have become more powerful and complicated, designers have simply added more information to the displays human operators use to understand and control these machines. These complex displays often overload the already taxed visual system of pilots, drivers, and almost anyone else interfacing with a machine.

Systems designed by IHMC's Anil Raj and colleagues reduce the workload on the visual system by sending information through additional channels, such as the tactile and auditory sensory systems. By awakening additional senses, his team aims to make users better equipped to make accurate and timely decisions in their environments.

The somatosensory and vestibular systems constitute our primary orienting and spatial relations sense (proprioception). They are so critical that we can't really turn them off, unlike our eyes or ears, which we can close or cover. Whereas many of us

SCIENTIST PROFILE

Anil Raj

Hometown: Farmington Hills, MI
Education: B.A. Biomedical Sciences, University of Michigan; M.D., University of Michigan
Joined IHMC: 1996

Anil enjoys doing things that haven't been done before. While in surgical training, he realized that he would be doing much of the same thing over and over again. Now, though, he is proud of the progress on the multisensory human centered interfaces and is excited by the potential new applications.

While in medical school Anil took a year off to work at the Massachusetts Eye and Ear Infirmary on the vestibular system, particularly with respect to flight. Though the work piqued his interest, he chose to first try his hand, literally, in medicine, with a surgery internship at the University of Hawaii.

Toward the end of his internship, he applied for a National Research Council fellowship program with NASA. He realized that if he stayed in general surgery, he would burn out in just a few short years, so he decided to jump to spaceflight human factors research, his other passion.

During his NASA fellowship at Johnson Space Center, Anil investigated effects of microgravity and other acceleration forces on the vestibular system. Two of his colleagues during those projects were Angus Rupert and Fred Guedry, with the Naval Aerospace Medical Research Lab. Rupert gave a presentation on his then-new tactile situation awareness system project, and Anil jumped at the chance to move to Pensacola to work on it.

Anil's move to IHMC was facilitated by collaborations between NAMRL and IHMC. At IHMC he really enjoys the opportunity to lead his own research efforts. With such a nontraditional path to research, he is sure he would not have had this opportunity anywhere else. He likes the diversity of research at IHMC and the caliber of his colleagues. He knows that if he has a challenge in his work, he'll be able to find someone down the hall who knows the state of the art.

One of the best things about Pensacola, according to Anil, is that he met his wife Johanna here. He also enjoys the size of the community. Though the weather can't compare to Hawaii, it has much less traffic than Houston. He enjoys woodworking and metalworking, but most of his free time now is spent with his young sons, Ravi and Sanjay.

have known someone who is blind or deaf, there are only a handful of people in the world known to have no somatosensory input but an otherwise normal nervous system. Most people rely on proprioception, including the senses of touch, joint-position, and balance, to know their orientation in space. Those without these senses must rely primarily on their vision for orientation. To sip their coffee, they must constantly keep their eyes on their hand and the cup; if they look away, they will likely spill it. To stand, they must monitor the position of their feet and any tilt of vertical cues visually, else they will fall.

The closest most of us could come to approximating such tactile and vestibular deprivation is to strap into an airplane cockpit. One of the first things pilots learn is to only trust their avionics displays. The information pilots receive from their vision, vestibular system, and tactile sense in many cases can be irrelevant to the task of flying, disorienting, or illusory. However, maintaining proper orientation is probably the most important task for a pilot. Currently, situation awareness is obtained visually by concentrating on the instrument panel, so when a pilot is distracted by another visual task, such as an engine warning light, she is at risk for an accident.

By providing orientation information through the somatosensory system's tactile sense, Raj and colleagues at the Naval Aerospace Medical Research Laboratory (NAMRL) demonstrated that both the visual system and the cognitive workload of the pilot could be reduced, improving situation awareness while maintaining performance.

By adding an array of tactors, Raj turned typical flight gear worn under a flight suit into tactile garment prototypes for the Navy/NASA tactile situation awareness system (TSAS). Initially the tactors were simply buzzers like those in cell phones. However, the range of information they could convey was limited. Recent versions include tactors driven by pneumatic or electric signals that provide both frequency and intensity information, leading to richer sensory input.

Tests with the TSAS torso tactile interface were very successful. In the first test, in 1995, a Navy pilot flew a series of maneuvers, including straight and level flight, standard rate turns, recoveries from unusual positions, and some acrobatic maneuvers like inside loops and aileron rolls. All these were performed while blindfolded

in a cockpit with no instruments. Subsequent tests with helicopters, unmaned aerial vehicles, simulated astronaut spacewalks showed similar success with TSAS.

Although torso tactile interfaces are limited by the low density of tactile nerve distribution on the torso, they are suitable for providing low resolution, dimensional situation awareness cues. Now Raj, Dr. Paul Bach-y-Rita of University of Wisconsin-Madison, and coworkers at Wicab, Inc. are exploring ways of providing high resolution cues through a highly innervated location: the tongue. Bach-y-Rita initially created the BrainPort™ tongue display system for aiding the blind and those with balance disorders. Blindfolded people, congenitally blind people, and people who had lost their vestibular system showed remarkable improvements during tests with the initial system.

The high density of touch-sensitive nerves in the tongue provides an avenue to convey detailed input nonvisually and reduce visual workload of high resolution information. Of particular interest to the researchers is the extension of normal senses without interfering with existing sensory information. For example, rather than require a soldier to obstruct his eyes with night vision goggles or force a diver to focus on a handheld sonar display, the BrainPort™ could provide sonar or infrared imaging information through the tongue display. Other situation awareness cues could then be presented on the torso, leaving the visual system free to perform other tasks.

Critical to the success of these systems is ensuring that they, too, don't overload the user. Therefore, much effort has gone into creating the underlying system that not only controls the tactile interfaces, but also the electronic audio and visual interfaces. The tactors are not going to be surgically implanted in the wearer but instead will be either attached to a garment that moves as the user moves or applied to the tongue. Additionally, different wearers will have different perceptions of stimuli from specific physical locations on their body. Therefore, Raj developed an intelligent software system to dynamically adjust to each wearer throughout use. The same mechanism allows the computer to manage the information flow through multisensory displays. This technical system management prevents new information from interrupting a user's attention (unless necessary) and minimizes the possibility that the user will miss important information. In order to best employ these dynamic capabilities, Raj's team has developed the Adaptive Multi-agent Integration architecture to implement their vision for augmenting the cognition of users and the systems with which they interact.

As computers have increased in power, they can now act more like team members and less like tools. An important element of teamwork is the awareness of the cognitive and physical state of the teammates. For the "technical" part of the team to augment situation awareness, it must understand the context under which the human team members are operating. Typically, our inputs to a technical system are limited to keystrokes, mouse movements, joystick motions, button presses, and other simple mechanical devices. By providing the technical system with multisensory capabilites to monitor changes in human team members, better decisions about managing information flow and assisting an overtaxed individual with adjustable automation can be made. For example, a pilot may be looking at one display when a critical problem not relating to that display arises. Currently, flashing lights, bells, or other distracters try to get the pilot's attention. In Raj's adaptive system, the display the user is looking at would change to show just the most critical information. The other information would be remapped to tactile or audio displays or logged for later review. If an event required critical thinking and evaluation, the system would then take over other mundane tasks using adjustable automation, freeing up the user to concentrate on the complex tasks. Similiar tecniques could be employed as aids by those with cognitive or sensory impairments.

The human brain is well designed to take in information of many types, including, at some level, the state of other people, through a variety of channels. Our interactions with our computers, however, are severely limited, relying on outmoded input and output systems. Most information passes through our visual system, avoiding our many other highly specialized senses. Through their work at IHMC, Raj and his colleagues aim to awaken more of our senses, making us better judges of our worlds and to make the systems we interact with better understand us.

HAPPENINGS

HONORS AND EVENTS AT IHMC

IHMC hosts NSF site visit on Science of Learning Center

IHMC is a finalist for a 5-year, $20 million grant from the National Science Foundation to create a Science of Learning Center. The IHMC center would build on a previous NSF catalyst grant that funded the start of the National Alliance for Expertise Studies (NAES), expanding and enhancing the program.

The NAES was conceived as a multidisciplinary, multiuniversity center that unites the world leaders in the study of expertise in the creation of training methods and intelligent technologies that will advance our nation's ability to develop the expert workforce of the future. The NAES will advance the science of learning through integrated research on expertise and the achievement of proficiency.

In all complex sociotechnical workplaces, including those in government and industry, knowledge and skill have become widely recognized as important assets. As more of our experts retire, we need to have efficient ways to transfer their knowledge to new workers.

Dr. Guy Boy, Dr. Ken Ford, and Dr. Bernard Claverie

IHMC's Robert Hoffman, a leader in the field of expertise studies, and Steve Fiore of the University of Central Florida will be the codirectors. The multidisciplinary center will draw on the strengths of researchers from academia and industry across the country, including Florida State University, University of Florida, Florida International University, Carnegie Mellon University, Kansas State University, and Klein Associates, as well as staff from the Escambia County School System. In addition, the researchers will partner with organizations such as Boeing, SAIC, and NASA.

NAES meeting

IHMC researchers in a variety of disciplines will be involved. Expertise researchers Paul Feltovich and Robert Hoffman will contribute to many of the focus areas of the project. In addition, Bill Clancey will contribute his knowledge of workplace and teamwork simulation, and Clark Glymour will lead studies in causal reasoning.

This site visit is the final step in the competitive grant process for this award, and it is a positive reflection of the strength of IHMC's research staff. Final notification is expected in early 2006.

IHMC begins partnership with European Institute

IHMC signed a memorandum of understanding with EURISCO (European Institute for Cognitive Sciences & Engineering) this summer. EURISCO is a private, not-for-profit research institute headquartered in Toulouse, France. EURISCO researchers perform leading research in Cognitive Engineering ranging from human-centered development including organizational aspects, to work practices and technology in use. The memorandum of understanding will facilitate collaboration between the two institutions.

Relations between IHMC and EURISCO have a long history. IHMC's Jeff Bradshaw has collaborated extensively with EURISCO's Guy Boy on software agent systems. This year, Bradshaw is on sabbatical in France and is collaborating extensively with EURISCO. Boy, the founder and president of EURISCO, is now a visiting scientist at IHMC and frequently travels to Pensacola to interact with the Institute's research scientists.

PEOPLE IN THE NEWS

HONORS AND EVENTS AT IHMC

Ford appointed to Air Force Science Advisory Board

IHMC Director Ken Ford was sworn in as a member of the Air Force Science Advisory Board (SAB) in October. The SAB was established in 1947 as a vital link between the Air Force and the nation's civilian, scientific, and engineering communities to promote the exchange of the latest scientific and technical information that may enhance the accomplishment of the Air Force mission. The Board reports to both the Chief of Staff and the Secretary of the Air Force and serves as a major force in determining U.S. Air Force research and development policy.

"The appointment of Dr. Ford is an outstanding step for the Air Force Scientific Advisory Board," said General Charles Horner, USAF (ret.). "He has the unique ability to see and define technology leaps that escape the more conventional thinker."

Members of the SAB include distinguished scientists, engineers, and academicians primarily from the nation's universities, national laboratories, industry, and retired military general officers. The Secretary of the Air Force selects members on the basis of their eminence in scientific fields of interest to the U.S. Air Force. The White House Liaison Office approves all board appointments.

"My service on this board will provide an opportunity to make a significant contribution to the future as many of its recommendations have been implemented by the Air Force," said Ford, who also serves on the National Science Board. "Service on the SAB is both an honor and an important obligation of time and effort."

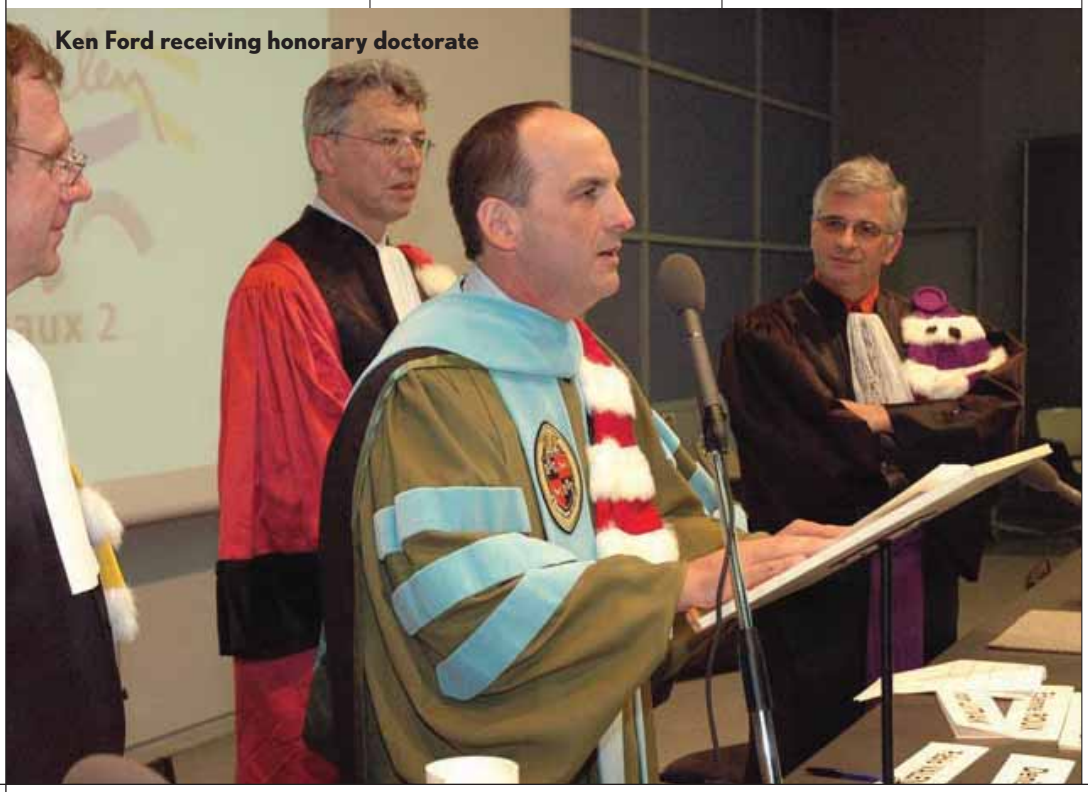
https://www.sab.hq.af.mil/

Ford awarded honorary doctorate

IHMC Director Ken Ford received an honorary doctorate from Université Victor Segalen Bordeaux, France. Ford was honored for his contributions to the fields of information technology and artificial intelligence, along with his service as a member of the National Science Board.

"It's a great personal accolade to receive this honorary doctorate, but to a large extent, I consider it shared with my wonderful colleagues at IHMC." Ford said. "From a practical standpoint, it strengthens important relationships with our colleagues overseas and helps us establish new ones as well."

The Victor Segalen University is home to l'Institut de Cognitique (Cognition Institute), whose director, Dr. Bernard Claverie, hosted Dr. Ford's visit to Bordeaux. The Cognition Institute is a new university research center with a focus similar to that of IHMC: using technology to enhance human capabilities.



Ken Ford receiving honorary doctorate

Tulane scientists visit IHMC

We at IHMC are pleased to welcome two colleagues from Tulane University for extended visits. Both are faculty in the Department of Electrical Engineering and Computer Science at Tulane University. Work at Tulane has been disrupted due to damage by Hurricane Katrina. IHMC has a strong relationship with Tulane, with IHMC Director Ken Ford serving on the Board of Advisors for the school of engineering. Both researchers will return to Tulane in the spring semester when classes resume.

Dr. Sergey Drakunov is an associate professor specializing in system analysis and control theory. He has a long relationship with IHMC, particularly in collaboration with Dr. Anil Raj. Dr. Drakunov owns a home on Pensacola Beach, where he is now residing.

Dr. Brij Singh is an assistant professor with a research focus on power electronics. His broader interests include renewable energy systems, computational intelligence, and materials and sensors. Initially he evacuated to Memphis, expecting to be gone only a few days. When he learned from Dr. Drakunov that IHMC could arrange office space for him, he quickly accepted the offer and relocated his wife and three children to Pensacola. He is happy to be resuming his research and to be in close proximity to New Orleans.

RECENT LECTURES

IHMC's Evening Lecture Series

Visit http://www.ihmc.us/movies/ to view lectures online

Jordan describes cancer experience

Facing death changes your views toward life. Hamilton Jordan, former White House Chief of Staff, has battled cancer four times. He shared insight into life during his presentation "No Such Thing as a Bad Day" on August 25th.

After leaving Washington, where he was Chief of Staff for President Jimmy Carter, Jordan and his wife, a pediatric oncologist, started Camp Sunshine, a camp for kids with cancer. The children's strength in the face of their illness inspired him to think that he could be cured of his cancer.

His first cancer was found several years after starting the camp during an annual checkup with his doctor. Based on his experiences with Camp Sunshine, he knew the questions to ask. The prognosis was not good, and he felt like giving up. A physician friend flew to see him immediately and counseled him to get involved in his treatment as the patient has the greatest stake in his treatment regime.

Hamilton poured his whole self into figuring out how to beat this cancer. Everyday, while battling the cancer, he would get up and try to work, try to jog. He was "absolutely determined that I was not going to have this cancer totally define and dominate my life."

After an annual physical 10 years after his first diagnosis, he was told he had slightly elevated, but not dangerous, values of PSA, an indicator for prostate cancer. After some internet research, he decided to push for testing, and, sure enough, he had another cancer to fight. Again he took charge of his treatment and managed to beat it.

His number one lesson from these experiences: get your annual checkups. Each of his four cancers was found during annual checkups. He also now is a strong advocate for medical research.

Personally, cancer has taught him what is most important. "My life has never seemed more worth living than when I was fighting for it," he said. A fellow cancer fighter inspired the title of his book, and this talk. He told Jordan shortly after being told that there was nothing they could do medically for his cancer that "There is no such thing as a bad day." Every day is a gift to be enjoyed because you never know what might happen tomorrow.


Hamilton Jordan

Hastings discusses engineering education

Engineering advancements play a critical role in our lives today, from cars and computers to water supply and new materials. Continued advances depend on training engineers. On July 27th, Dr. Dan Hastings detailed a vision for the future of engineering education in his lecture "What is the Future of Engineering Education in the U.S.?"

The globalization of creative engineering and current demographic trends in the U.S. will fundamentally change engineering. Percieved barriers to immigration may have reduced the number of foreigners studying engineering in the U.S., and, not enough U.S. citizens are being attracted to engineering to meet our national needs. In particular, our national security has traditionally been closly tied to our technological superiority.

Engineering evolves and so must engineering education. Over the last century we have moved from the invention labs run by individuals, like Edison, to complex

RECENT LECTURES

IHMC's Evening Lecture Series

In order to meet the future needs of engineering, we need to increase the number of students choosing engineering.


Dr. Dan Hastings

institutions studying complex problems with a focus on the societal problems and impacts of new engineering advances. Education, too, has changed as the needs have changed, removing classes in metallurgy, for example, and adding courses in biomedical engineering. As we shift from production of goods to a service economy, we are seeing a shift from engineering goods to engineering services. For example, IBM is now less about selling computers and more about providing computer services.

In order to meet future national needs, we need to increase the number of students studying engineering. Particularly, we must tap those population groups currently underrepresented in engineering. Current ideas include improving the public's perception of engineering, changing the focus of engineering to include the societal impacts, increasing scholarships for those studying engineering, reducing barriers to immigration for engineering graduates, and improving pre–college engineering education.

Hastings is currently Professor of Aeronautics and Astronautics & Engineering Systems at MIT, and Director of the MIT Engineering Systems Division. He served as Chief Scientist of the Air Force from 1997 to 1999, and led several influential studies on where the Air Force should invest in space, global energy projection, and options for a science and technology workforce for the 21st century. Hastings is a Fellow of the AIAA and a member of the International Academy of Astron autics and the NASA Advisory Council. Hastings serves on the Air Force Scientific Advisory Board and is a member of the National Science Board.

Edge links food and Southern culture

The debut of Ernest Matthew Mickler's *White Trash Cooking* in 1986 put traditional Southern cooking on the national stage. Mr. John Edge, Director of the Southern Foodways Alliance, examined the role of that cookbook in documenting Southern culture in his lecture "Let Us Now Praise Famous Men: Rethinking the White Trash Cookbook" on November 17.

White Trash Cooking is a spiral-bound book filled with recipes for Southern basics like fried okra, fried chicken, and roast possum. The center section is a collection of photographs that harken back to James Agee and Walker Evans' "Let Us Now Praise Famous Men," a stark portrait of Southern sharecroppers during the Depression. Edge highlighted the respect evident in both portrayals of the Southern poor. Although many similar endeavors have come across as mockeries or instilled a sense of pity, both works show life as it was.

White Trash Cooking was a surprise bestseller, called "the best American cookbook of the century" by *Metropolitan Home*. Success bred resentment, though; several people and organizations sued Mickler over the book. Unfortunately, in many cases, according to Edge, the suits should not have been directed at Mickler, who viewed his subjects with respect, but against society at large, which enjoyed poking fun at that which it did not fully understand. The success also led to many spin-offs, few of which are anything more than parodies of Southern food and life.

Edge has made a career out of studying Southern food, using it as a tool to study Southern culture. Food is a central part of Southern culture, with church picnics to Sunday dinners. On his recent visit to Pensacola, Edge visited many long-time eateries popular with locals, sampling a range of down-home food, particularly mullet. He complimented Pensacolians on valuing these traditional restaurants, noting the ways in which those menus reflect the culture of the community.


John Edge

GRANTS

From September to December 2005, IHMC was awarded over $2.5 million for research

NEW FUNDING AWARDED TO IHMC FROM SEPT. 2005 TO DEC. 2005

Extended CmapTools / Cmap Ontology Environment

PI: Alberto Cañas & Pat Hayes
Amount Awarded: $895,869
Granting Agency: DoD

IHMC's CmapTools have show broad utility in representing knowledge. This grant will support the extension of the tools to incorporate formal logical languages such as OWL and RDF to promote modeling analytic thinking and approaches. In addition, the researchers will enhance the tools to integrate with commercially available data mining/ pattern recognition engines.

Effective Learning Through State and Action Transformations Based on the Fundamentals of Quadrupedal Locomotion

PI: Jerry Pratt
Amount: $697,893
Granting Agency: DARPA

Quadrupedal robots show promise in assisting humans by carrying loads or acting as scouts in a variety of terrains. However, their utility is currently limited by their slow walking speed and limitations on terrain type. IHMC scientists with expertise in walking robots and learning algorithms will use this funding to develop learning algorithms that will allow a quadrupedal robot test platform to walk over diverse terrains. These algorithms will incorporate human expertise and domain knowledge to rapidly improve the performance of the robot.

Enduring Personal Cognitive Assistant

PI: James Allen
Amount Awarded: $649,999
Granting Agency: DARPA

Unprecedented advances in computer science over the last several decades, combined with the unexpectedly affordable prices of advanced technology, often leave the human side of the human-computer system overwhelmed by the power and capability of the machines on their desks or in their pockets. IHMC researchers are partnering with a team lead by SRI International to develop an Enduring Personal Cognitive Assistant (EPCA). EPCA will help users interact naturally with computers, PDAs, and other high-technology devices. IHMC researchers will develop multiple ways of communicating with the EPCA, including spoken language, gestures, sketches, and handwriting. A clear understanding of the user's intent is a key to establishing and maintaining the user's trust of his EPCA.

Agile Computing for the Army Future Combat Systems

PI: Niranjan Suri & Marco Carvalho
Amount Awarded: $150,000
Granting Agency: ARL

The Army Future Combat Systems (FCS) environment will likely consist of a sensor rich, networked environment supporting the operational needs of the soldiers in the field. A diverse set of sensors may be utilized, ranging from simple Unattended Ground Sensors (UGS) to land-based vehicles, aerial vehicles, and space-based sensors. This grant will support IHMC researchers in developing an agile computing system for exploiting the sensor rich environment. Particularly, they will focus on developing the FlexFeed framework, a middleware realization of Agile Computing that is specifically targeted toward distributed sensor networks. In addition, they will develop an underlying communications framework that is capable of providing ad-hoc networking capabilities and reliable transmission of data while supporting device and network mobility.

Knowledge Elicitation

PI: Robert Hoffman
Amount Awarded: $65,688
Granting Agency: Boeing

As senior staff at many companies retire, much of the company's knowledge leaves, too. Most companies have staff train their replacements, but many are not skilled teachers, nor do they fully realize the extent of their knowledge, including their "intuition." Under this grant, IHMC scientists will work on site at Boeing with Boeing domain experts to elicit information necessary to produce knowledge maps of two Boeing engineering domains. They will also provide training for at least two Boeing engineers in techniques of knowledge elicitation. By formalizing the engineers' knowledge, it won't leave the company with them.

C2WE Advanced Visualization Techniques

PI: Tim Wright
Amount Awarded: $50,000
Granting Agency: Northrop Grumman

The C2 Warrior Environment (C2WE) serves as a test bed for new technologies in advanced visualization, converting large amounts of information into an intuitive visual representation so users can make better decisions faster. These technologies are focused on reducing operator fatigue while improving situational awareness. IHMC researchers will illustrate how our technologies can contribute to C2WE under this contract.

LOCAL NEWS

Security Configuration Auditing for Network Defense

PI: Niranjan Suri
Amount Awarded: $49,999
Granting Agency: Army

The National Missile Defense system will rely on networked computers with strong security. IHMC researchers will bring their skills in network security, particularly focused on agents, to assist Sentar, Inc. in developing a security system for the missile defense system. They will identify requirements, design, and develop a resident auditing agent to access a security configuration repository, perform a security configuration audit, and implement security configuration changes to the local computer. The system will run on different platforms and allow a user to specify which security configuration features to include and exclude from the auditing process.

BEAR Robot Concept

PI: Jerry Pratt
Amount Awarded: $15,000
Granting Agency: Vecna

One of the first steps in designing a robot is realistic simulation. Vecna has contracted with IHMC researchers to perform this simulation on their BEAR robot concept. The simulations include realistic physical models of all of the joints and components, including their weights and limitations. These simulations will guide the construction of the actual robot and be a template for graphical representations of the robot in action. They also can serve as a test bed for control algorithms for the robot.

SCIENCE SATURDAYS

Another successful season of Science Saturdays ended in November. Each month, approximetely 50 kids participate, filling the enrollment for the two sessions. Many new faces attended this year, with lots of veterans, too. Students come from a range of Escambia and Santa Rosa public and private schools and home schools; most bring a friend or two to share the experience.

IHMC's Science Saturdays is a free, hands-on monthly science program for kids in grades 3 through 5, led by IHMC researchers. This fall's activities covered quite a range. During the Science Magic day, kids made slime and learned about Newtonian and non-Newtonian liquids. During Roller Coasters, IHMC's Matt Johnson explained the principles of potential and kinetic energy, complete with equations. For the October activity, kids built telegraphs and buzzers, learning basic circuitry and getting a tangible understanding of electromagnetism.

Feedback from kids and parents continues to be very positive. Many kids comment that they don't like science in school, with lots of worksheets, but they love the hands-on activities at Science Saturdays. They frequently pester the volunteers for information on how to do the activities and related ones at home. Parents enjoy that the volunteers present very advanced concepts, concepts most kids won't see until high school or beyond, respecting the intelligence and curiosity of their children. The experience sticks with the kids, sometimes literally. One parent reported that her daughter was still playing with the slime two months later!

Students making slime

Science Saturdays will resume in January with a spring semester schedule. The enthusiasm of the kids and volunteers is sure to make the future ones as successful as those this fall.

IHMC's Peter Neuhaus helping students check lemon currents

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