



WELCOME TO THE MAY / JUNE 2012 EDITION of the MSIAC M&S Newsletter.

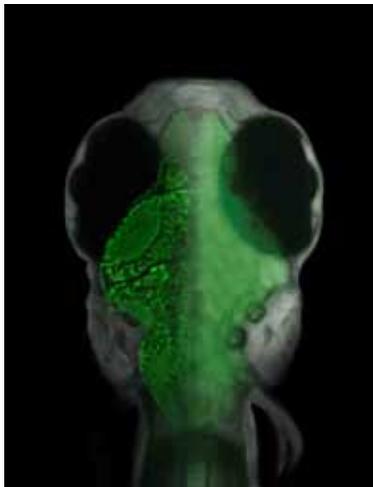
The Newsletter presents a variety of M&S articles and events from communities enabled by M&S within the Department of Defense and beyond.

This issue's focus is on medical M&S. We present articles ranging from measuring brain activity to simulation expertise for medical training.

Please note that although the wording in the excerpts may not always correspond to official DoD usage, the full articles available through the links provide valuable insights into significant ways that modeling and simulation helps foster innovation. We hope you enjoy this issue and welcome your comments.

FOCUS ON MEDICAL M&S

Virtual Reality Allows Researchers to Measure Brain Activity During Behaviour at Unprecedented Resolution



RESEARCHERS HAVE DEVELOPED A NEW TECHNIQUE that allows them to measure brain activity in large populations of nerve cells at the resolution of individual cells. The technique, reported today in the journal 'Nature', has been developed in zebrafish to represent a simplified model of how brain regions work together to flexibly control behaviour.

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FOCUS ON MEDICAL M&S



Virtual Reality Allows Researchers to Measure Brain Activity During Behaviour at Unprecedented Resolution

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Our thoughts and actions are the product of large populations of nerve cells, called neurons, working in harmony, often millions at a time. Measuring brain activity during behaviour at detailed resolution in these groups of cells has proved extremely challenging.

Currently, scientists are restricted to measuring their activity in individual brain areas of — for example — moving rats, typically in fewer than a few hundred neurons. Dr. Misha Ahrens, a Sir Henry Wellcome Postdoctoral Fellow based at Harvard University and the University of Cambridge, worked with colleagues to develop a technique that allows neuroscientists to study as many as 2000 neurons simultaneously, anywhere in the brain of a transparent zebrafish. Their work was funded by the Wellcome Trust and the National Institutes of Health.

Dr. Ahrens and colleagues created a virtual environment for zebrafish, which allowed them to measure activity in the neurons as the fish ‘moved’. In reality, the zebrafish was paralysed to allow the researchers to image its brain; the fish perceived ‘moving’ through the virtual environment by activating their motor neuron axons, the cells responsible for generating movement.

Zebrafish are often used as a simple organism to study genetics and characteristics of the nervous system that are conserved in humans. They can be genetically modified, and Dr. Ahrens and colleagues created a fish in which all neurons contained a protein that increases its fluorescence when the cells are active.

The fish are transparent, so the team was able to use a laser-scanning microscope to see activity in any neuron in the brain of the fish and in up to 2000 neurons simultaneously.

Dr. Ahrens explains: “Our behaviour is determined by thousands, possibly millions, of nerve cells working in harmony. The zebrafish performs complex behaviours, with a brain of

about 100,000 neurons, almost all of which are accessible to optical recording of neural activity. Our new technique will help us examine how large networks mediate behaviour, while telling us what each individual cell is doing.”

Using the technique, Dr. Ahrens and colleagues asked whether zebrafish adapt their behaviour in response to changes in their environment. To do this, they manipulated the virtual environment to simulate the fish suddenly becoming more ‘muscular’. This served as a simplified version of what happens when the brain needs to adapt the way it drives behaviour (e.g. when water temperature changes the efficacy of the muscles or when the fish gets injured).

This article originally appeared on the Wellcome Trust website. For the complete article, [click here](#).



NAWCTSD Applies Simulation Expertise for Future Medical Training

EXCITING AND INNOVATIVE MEDICAL TRAINING RESEARCH is happening at the Naval Air Warfare Center Training Systems Division (NAWCTSD) and is likely to grow in the future. Mr. Matthew Lineberry, Research Psychologist, NAWCTSD leads a number of the command’s medical thrusts that are instrumental in leading the Navy into blue waters.

One completed project worth noting, in support of the Combat Casualty Training Consortium (CCTC), sponsored by USAMRMC and TATRC, was named runner-up for Best Research Abstract at the International Meeting for Simulation in Health care 2012. “We supported knowledge elicitation and trainee performance assessment development in support of CCTC,” stated Lineberry. “With the help of instructors of two of the most critical combat trauma procedures - emergency airway and controlling hemorrhage — we

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FOCUS ON MEDICAL M&S

Simulation Expertise for Medical Training

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refined the trainee performance assessments and identified which simulator cues were critical for learning and teaching each procedure. In this way, we're better able to optimize training for these procedures moving forward." NAWCTSD understands the importance of collaboration.

They work in close contact with the other Services, academic partners at UCF, M&S industry partners, and medical institutions. "In the medical domain, collaboration and coordination is facilitated by the fact that medicine is relevant across the services and outside of the DoD," stated Mr. Lineberry. "The 'tent' for collaboration in medical training technology is very large, and that benefits everyone."

Two current NAWCTSD efforts sponsored by the Naval Aviation Enterprise Chief Technology Office promise to enhance medical training of the future: Technology and Research for Application of the Spacing Effect (TRASE) and Promoting Expert Reasoning in Science Education Using Simulation (PERSEUS).

TRASE involves development and evaluation of adaptive algorithms for prediction and mitigation of knowledge decay using computer- or mobile device-based memorization applications. This has applicability for medicine, where memorization of treatment protocols, contraindications, and other facts are critical for quality and safety of care.

This article originally appeared on the Team Orlando website. For the complete article, [click here](#).



Video Baby Monitor Increases Simulation Realism Without Big Price Tag

WITH TIGHT BUDGETS IN MIND, the Boise VA Medical Center (BVAMC) was looking for a way to enhance in-situ simulation. The mannequin used during mock codes in the hospital units included a wireless transmitter for voice, but it lacked

an acceptable way to hear or see what was happening in the room without physically being at the bedside. Some facilities have tried using a standard baby monitor during simulation, to enable the mannequin operator to hear what was happening and to respond appropriately. The simulation education team here decided to use a color video and audio baby monitor instead. With the ability to see, as well as hear what was happening real-time during the simulation, the benefits were observed immediately.

Using an IV pole mount, the team made a bracket that allowed the camera/microphone unit to be placed at the foot of the bed. During the first mock code on the BVAMC medical/surgical unit, the mannequin operator was able to see the learner's physical touch on the "patient" when inquiring about pain location, and in turn, could cause the "patient" to respond appropriately to the actions of the learner. Because both the mannequin and the baby monitor were wireless, the operator was able to control the simulation and respond to the learner's actions from two rooms away. Being able to remotely run in-situ scenarios without immediate physical presence at the bedside opens up many options and increases the realism of training.

Additional benefits to this particular baby monitor are the ability to see in the dark using infrared light (which would allow for continuous monitoring during "power outage" scenarios); battery or AC adapter operation; and the ability to record and capture images and sound from the monitor onto an attached computer. Using a USBto-RCA converter, both still images and video footage were captured during simulations. While the video quality is not as sharp as standard video cameras, the ability to see and respond appropriately and to use the videos during debriefing, if desired, made this purchase well worth the money.

This article originally appeared on the U.S. Department of Veteran Affairs website. For the complete article, [click here](#).





FOCUS ON MEDICAL



Researchers Use Game to Change How Scientists Study Disease Outbreaks

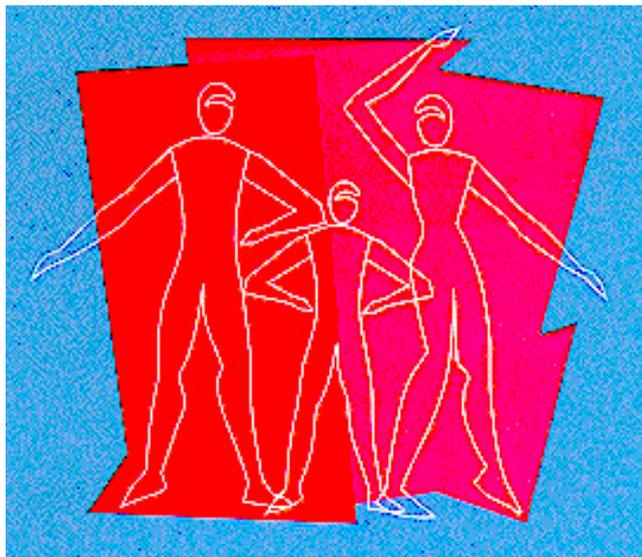
IT MAY SEEM LIKE A GAME OF TAG, but it's an innovative tool for teaching the fundamentals of epidemiology, the science of how infectious diseases move through a population.

An international team of scientists—including researchers who teach an annual clinic at the African Institute for Mathematical Sciences (AIMS) in Muizenberg, South Africa—is helping epidemiologists improve the mathematical models they use to study outbreaks of diseases like cholera, AIDS and malaria.

In 2011, attendees at the clinic were treated to a game of “Muizenberg Mathematical Fever,” where players simulate a real life epidemic by passing around pieces of paper that say: “You have been infected.” The paper pieces are followed by instructions for propagating the disease. The exercise proved so effective in demonstrating concepts in epidemiology that a discussion of the game is published in today’s issue of the journal *PLoS Biology*.

“Infectious disease modeling is an established field of study in bio-mathematics,” said Juliet Pulliam, a biologist at the University of Florida’s Emerging Pathogens Institute and co-author of the paper. “But there has been a tendency for mathematicians to operate separately from practitioners on the ground who track diseases.”

The game was intended to convince all players in the epidemiology field that teamwork is the better approach. “Reducing disease risk requires sophisticated mathematical models



to inform public health officials and other policy-makers,” said Sam Scheiner, Ecology and Evolution of Infectious Diseases (EEID) program director at the National Science Foundation (NSF), which funded the research. EEID is a joint NSF-National Institutes of Health program. At NSF, it is co-funded

by the Directorates for Biological Sciences and Geosciences. “This collaborative effort is training researchers in these techniques,” said Scheiner, “as well as strengthening ties between U.S. and African students and scientists.”

“Not knowing how data about an outbreak were collected can lead to misinterpretations,” Pulliam said.

For example, if procedures change for how infected individuals are counted, it could create a spike in data that falsely portrays how a disease is being spread.

This article originally appeared on the National Science Foundation website. For the complete article, [click here](#).

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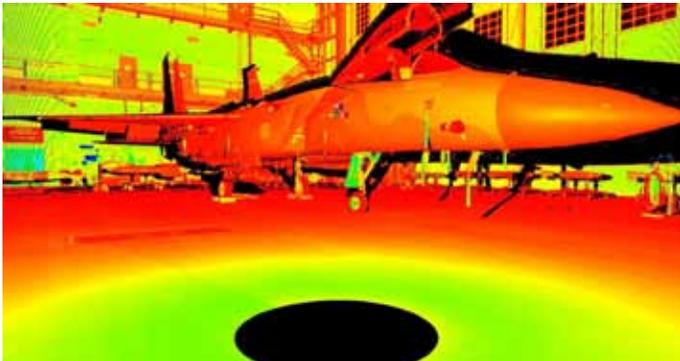
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■ ■ ■ New 3-D Scanner Makes Impact at Eglin



WHEN THE 46TH TEST WING'S AIR FORCE SEEK EAGLE OFFICE purchased a 3-D laser scanner system six months ago, they had no idea how much of an impact this system would make.

“This is state of the art,” said Mark Hillman, lead engineer at the SEEK EAGLE. “We are breaking ground for the military.”

The approximately \$150,000 Leica HDS 7000 3-D laser scanner and Rapidform reverse engineering software program was purchased to quickly build accurate digital models of Air Force aircraft and weapons for use in aircraft-weapon compatibility analyses.

“Before, we had to implement the real tests to determine how capable a system would be,” said Paul Collins, lead contract engineer for SEEK EAGLE. “Now we build models for use in simulated test environments for a good indication of the outcome, before we go into actual testing, which can save hundreds of thousands of dollars.”

After one month of trial scans, they were able to use it to quickly scan an entire aircraft.

“Four years ago, it took six people two weeks to manually collect 3-D data for the A-10 aircraft,” said Collins. “With the laser scanner, two people can collect the same amount of data in two days, a 93 percent reduction.”

Additionally, the accuracy of the laser is +/- 0.01. Using the manual method, the accuracy was at best +/- 0.03, according to Collins.

The data collection process involves positioning the scanner at various positions around the airplane. The scanner automatically sweeps a laser beam across the aircraft to generate a 3-D point cloud.

“Any areas where good data is not collected, such as shadows, are depicted as black holes in the scanner software requiring the scanner to be re-positioned for optimal results”, said Collins.

After scanning an aircraft, SEEK EAGLE engineers use Rapidform reverse engineering software and the 3-D point clouds to construct solid digital models.

This article originally appeared on the U.S. Air Force website. For the complete article, [click here](#).

■ ■ ■ Army Wants Quick Virtual Terrain

WITH SO MUCH HARD LABOR NEEDED TO CREATE VIRTUAL TERRAIN for simulations, the U.S. Army is hoping that someone can come up with a quickie terrain generator for its land-attack missile simulations.

Though simulations are often billed as a fast and low-cost method of training and mission planning, generating the underlying terrain models is a process built upon brute-force computing and copious amounts of human sweat, which eats up time and dollars.

The Small Business Innovation Research project, titled “Rapid Scene Creation for Multispectral Terrain Signature Models and Simulations,” calls for an automated technique or system that can quickly create earthen background terrain databases for integration into missile flight simulations.

Quick, high-fidelity terrain generation could also help with mission planning, unmanned aircraft approach routing, and civilian applications such as natural resource monitoring and border control. Scene sizes range from 0.5-by-0.5 kilometers to 10-by-10 kilometers, with terrain characterized by topography, features such as trees and roads, and EO/IR characteristics.

This article originally appeared on the Training and Simulation Journal (TSJ) website. For the complete article, [click here](#).



UCF's Virtual Classroom Software Receives Grant for Innovative Teacher Preparation Program

A \$1.5 MILLION GRANT FROM THE BILL & MELINDA GATES FOUNDATION will triple the reach of an innovative teacher preparation program developed at the University of Central Florida that uses avatars in virtual classrooms to train future educators.



College of Education Professors Lisa Dieker and Michael Hynes along with College of Engineering & Computer Science Professor Charles Hughes developed TLE TeachLive™ with

TLE TeachLive™ improves teacher practice and student learning by giving aspiring educators the opportunity to instruct a virtual classroom full of avatar students. The grant is to develop the lab's current model at universities across the country, with a focus in the areas of sustainability, technology and research.

TLE TeachLive™ started as a pilot project at UCF in 2005. It has grown into a network of universities that use labs across the country to give education majors the opportunity to practice in a computer-generated classroom.

A trained “interactive actor” at UCF controls the avatar students, whose personalities reflect those of typical or atypical pre-teens, depending on the objectives of the experience. The actor watches the participating teachers in action. If a teacher fails to use best practices in content or instruction, the avatars act up, creating a scenario that could happen in the average classroom environment.

The experience allows teachers-in-training to perfect their skills without working with any real students. For veteran teachers, practice in a virtual classroom allows them to hone and refine their expertise or try out new techniques.

an interdisciplinary team that included members of the Synthetic Reality Lab at UCF's Institute for Simulation & Training.

This article originally appeared on the UCF's Institute for Simulation & Training website. For the complete article, [click here](#).



Modeling and Simulation Staff Officer Course (MSSOC) Open for Registration

MSIAC M&S UNIVERSITY IS PRESENTING the Modeling and Simulation Staff Officer Course (MSSOC) July 17-19, 2012 in Alexandria, VA.

MSSOC is a three-day course that provides a broad overview of modeling and simulation (M&S) policy and activities of the Department of Defense (DoD), with discussion of how DoD employs M&S in support of training, analysis, acquisition of new products and systems, test and evaluation (T&E) and experimentation. The course focuses on M&S terms, concepts, applications, and information resources, preparing attendees for positions that require conversancy in these topics. Students will gain familiarity with major M&S concepts, policies, organizations, programs, activities, and issues within the Department of Defense. Continuous Learning Units (CEUs) are available for this course. For more information, [click here](#).



EUCOM Exercises Adapt to Operational, Fiscal Environment



BUDGET TIGHTENING WON'T MEAN AN END to U.S. European Command's robust exercise program, but it could bring big changes to the program that keeps U.S. and allied forces at the top of their game, EUCOM officials here said.

In fact, as operations wind down in Afghanistan, Navy Vice Adm. Charles Martoglio, EUCOM's deputy commander, told American Forces Press Service he expects an increase in U.S. exercises with NATO allies and other partners.

U.S. participation dropped measurably over the past decade because forces were tied up in real-world events in the Middle East, he said. But as those forces return, he said, the exercise program will become key to maintaining their combat edge and the interoperability developed working on the ground, in the air and at sea.

"We do not want to lose this muscle that we have built with our partners," agreed Navy Rear Adm. Mark Montgomery, EUCOM's deputy director of plans, policy and strategy.

Building on those hard-earned skills will be critical to sustaining NATO into the future, Martoglio said. "So we have to look toward ensuring interoperability of those forces and routinely training together so that if we have to conduct high-end operations, we have the ability to work together from a technical perspective, and the skills to work together from a training perspective," he said.

Throughout its history, Eucom has aligned its exercise program to changing geopolitical conditions and challenges, said Marine Corps Col. Edward Bligh, chief of the command's joint training, readiness and exercise division. During the Cold War, exercises focused on a land battle in the Fulda Gap. After the Berlin Wall fell, they shifted toward

building partnerships with new Eastern European democracies. Then, after the 9/11 terror attacks, exercise planners moved into high gear to prepare U.S. and coalition forces for deployments to Afghanistan and Iraq.

"The people who fight with us downrange are coming from our [combatant command area of responsibility]," Bligh said. "So to ensure they are capable and ready to go, our exercise program has been highly focused on International Security Assistance Force preparation."

This article originally appeared on the U.S. Department of Defense website. For the complete article, [click here](#).

UAS in the NAS Distributed, Integrated Test & Evaluation

ON MAY 8, 2012, THE SIMULATION LABORATORIES (SIMLABS) at NASA Dryden Flight Research Center achieved a "NASA first" by integrating aircraft telemetry data from Dryden's Ikhana Unmanned Aircraft System (UAS) into a live, virtual and constructive (LVC) flight test environment.

As a key capability for NASA's UAS Integration in the National Airspace System (NAS) Project, the Integrated Test and Evaluation (IT&E) team is the first to install and fly an Automatic Dependent Surveillance-Broadcast (ADS-B) system on a large unmanned aircraft and downlink its output, including both ownship information and surrounding live air traffic, to a ground control station.

The IT&E sub-project is building a combined live and virtual (simulated) real-time human-in-the-loop distributed test environment in order to facilitate the evaluation of candidate technologies that will enable more routine UAS operations in the NAS. During the test, a composite view of the mixed live and virtual air traffic was presented to operators in the Ground Control Station at Dryden and at the Air Traffic Control workstation at Ames.

This capability will be used in future tests to reduce technical barriers related to the safety and operational challenges associated with enabling routine UAS access to the NAS. The Project will continue to expand its LVC test capability by extending its interface to facilities at NASA Langley and Glenn Research Centers and possibly the FAA's William J.

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NASA's UAS Integration

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Hughes Technical Center. When completed, the LVC test capability would be usable by any organization needing to integrate either a live manned or a live unmanned aircraft into a simulated environment.

This article originally appeared on the NASA Aviation Systems website. For the original article, [click here](#).

Open-Source, Cross-Platform Visual Tool for Authoring Learning in Games (VITAL)

A VISUAL TOOL FOR AUTHORING LEARNING (VITAL) is an open-source tool for creating the instructional logic within a serious game for training. VITAL provides the capability for instructional system designers and developers to collaborate via high-level graphical user interfaces, explicitly specify instructional elements such as learning objectives and instructional methods, and generate functional instructional logic without the need for low-level programming. It has been designed to be platform-independent and has been integrated with multiple game engines, including Delta3D, VBS2™, Unity3D™ and Microsoft Silverlight™.

VITAL was developed with the intention of blending instructional constructs and concepts typically used by an instructional system designer with the constructs and concepts used by game developers, providing a collaborative authoring environment for both. VITAL introduces a novel level of rigor into the development of instructional content in games by embodying best practices. It also makes instructional content a “first-class citizen” in the software, including natural support for embedded assessment and performance tracking. Lastly, it reduces the level of effort needed to create effective instructional content in games and directly supports the re-use and straightforward revision of instructional content.

VITAL has been released as open-source code on sourceforge at <http://sourceforge.net/projects/vital/> and continues to be under active development. It was used to develop the award-winning VESSEL Damage Control Trainer, currently deployed at the U.S. Navy Recruit Training Command, and is currently in use in the development of new training games.

This article was contributed by Talib S. Hussain, John Ostwald, Kerry Moffitt, Raytheon BBN Technologies.

Naval Station GTMO Prepares for Hurricane Exercise

■■■

IN PREPARATION FOR THE UPCOMING HURRICANE SEASON,

Naval Station Guantanamo Bay conducted an exercise April 13-18 to test its responsiveness to weather threats and disasters.

The exercise called “HURREX/Citadel Gale 2012” involved two simulated storm systems that developed and intensified to hurricane strength, threatening the Caribbean Islands, East Coast and Gulf Coast Regions.

Commander, U.S. Fleet Forces’ (USFF) and Commander, Navy Installations Command (CNIC) conducted the exercise April 16-27 to test afloat and shore-based commands emergency preparedness.

Naval Station Guantanamo Bay began the exercise three days earlier before other naval installations because of its location in the Caribbean.

“The purpose of the Citadel Gale exercise for Guantanamo Bay is to exercise or test the Naval Station and tenant commands ability to react to a hurricane,” said Mark Kennedy, NAVSTA GTMO’s emergency manager. “This exercise will test our capability to change course of readiness as a hurricane track moves towards GTMO.”

Some of the keys areas tested included personnel accountability, notification processes to the population, shelter setup and damage assessment after a storm, according to Kennedy.

“Base residents should expect to hear the base siren and they may see emergency vehicles responding to various incident scenarios,” Kennedy said.

Although the exercise does not include resident participation, Kennedy said that it is important they know what to do.

“It is important for base residents to check channel 4, the radio, or GTMO’s Facebook pages for information after the siren is heard,” he said. “They should start preparing their emergency kits in preparation for hurricane season starting 1 June.”

This article originally appeared on the U.S. Navy website. For the complete article, [click here](#).





M&S WHAT & WHEN

MODELING & SIMULATION CALENDAR OF EVENTS

For a complete list of upcoming events, please visit the MSIAC website at

www.dod-msiac.org/calendar.html

The 23rd IASTED International Conference on M&S

July 3 – 5, 2012
Banff, Canada

Summer Simulation Multi-Conference (SummerSim) 2012

July 8 – 11, 2012
Genoa, Italy

MSV'12 – 2012 International Conference on Modeling, Simulation and Visualization Methods

July 16 – 19, 2012
Las Vegas, NV

Modeling and Simulation Staff Officer Course (MSSOC)

July 17 – 19, 2012
Alexandria, VA

12th Annual MOVES Research and Education Summit

July 31 – August 2, 2012
Monterey, CA

Advanced Distributed Learning Co-Laboratory iFest 2012

July 31 – August 2, 2012
Orlando, FL

2012 Military Health System Research Symposium

August 13 – 16, 2012
Ft. Lauderdale, FL

Promote an Event:

If you would like to promote an M&S event on the MSIAC Calendar, please email the event information to

MsiacHelpDesk@dod-msiac.org



THE MSIAC M&S NEWSLETTER

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