# TATRC TIMES

# TATRC's 1st Ever Spring Technology Open House Draws Over 200 Distinguished Guests and Sparks Innovative Discussions

## IN THIS ISSUE:

*TATRC's Spring Technology Open House drew over 200 visitors.*

TATRC held the organization's first ever "Technology on the Horizon" Spring Open House on Friday, 8 May to highlight and feature our new mission as well as current research and managed programs. Guests and attendees were able to see and experience TATRC's cutting edge technologies first hand, while engaging in an interactive, open dialogue with our research leads. The goal of this event was to provide a broad awareness of TATRC's core competency areas and current research
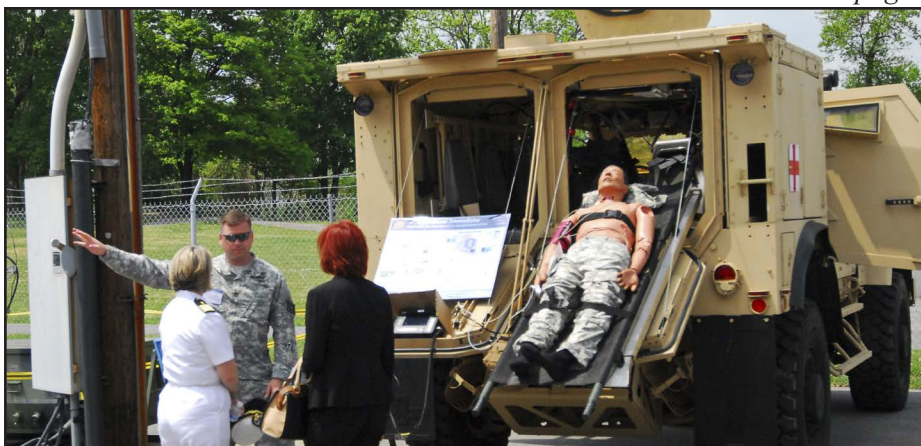
*SFC Bryan Miles explains the operational telemedicine system for patient monitoring, documentation, telementoring and transmission.*

A QUARTERLY NEWSLETTER OF THE TELEMEDICINE & ADVANCED TECHNOLOGY RESEARCH CENTER

# TATRC *TIMES*

## *Open House*

portfolios, as well as to highlight what TATRC is TODAY, so that all of our attendees could see our capabilities first hand.

Each of TATRC's five key labs and other programs were actively involved in the Open House. Our AMEDD Advanced Medical Technology Initiative (AAMTI), Biotechnology High Performance Computing Software Applications Institute (BHSAI), Health Technology Innovation Center (HTIC), Medical Modeling & Simulation Innovation Center (MMSIC), Mobile Health Innovation Center (mHIC), and Operational Telemedicine Lab all had exhibits and technologies that allowed guests and visitors to see what specific research each of our labs and programs are involved in. Exhibits focused on cross domain solutions, wireless capabilities in the field, virtual health care, as well as numerous other technologies that TATRC is researching to continue to push our technological capabilities both operationally, and at home so that we can continue to benefit military medicine.

The event brought more than 200 people to TATRC's PitLab and Innovation Center where visitors viewed more than 40 projects and technologies on display. We were honored that among the 200 attendees, there were many distinguished guests who were able to make it as well. MG Brian Lein, Commanding General of USAMRMC, RADM Bruce Doll, Deputy Commander of USAMRMC, COL Rick Starrs, former Chief of Staff at USAM-RMC, COL Alejandro Lopez-Duke, Chief of Staff at USAMRMC, as well as, key staff from DHA, OTSG and Health Affairs, and countless small businesses were in attendance and interacting with TATRC staff during the Open House Event.

The turnout for this event was incredible and the response was tremendous. Guests and attendees left feeling impressed with what TATRC does and how vast our capabilities truly extend. We were excited at the opportunity to showcase all the great work that our labs do and demonstrate the possibilities of what TATRC as a whole can provide the military health community now, and
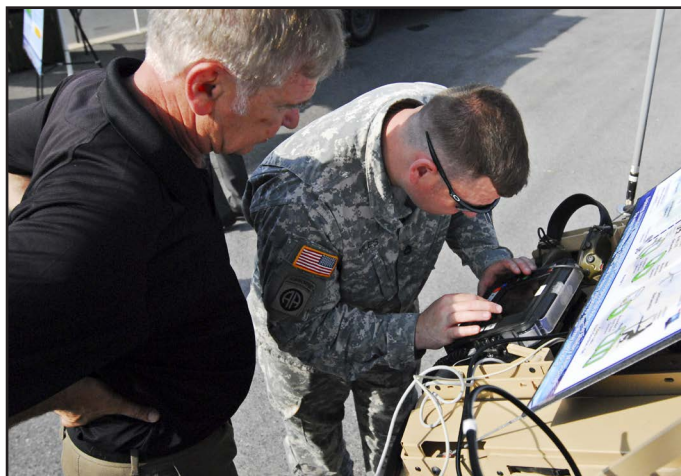


*Dr. Gary Gilbert and SFC Bryan Miles testing wireless communications devices.*

in the future.

COL (R) Dr. Francis McVeigh, Chief Scientist at TATRC, stated, "TATRC's Open House was an opportunity to let our colleagues and collaborators both within and outside of DoD, learn about our new mission focus. This was equally exciting for our staff and visitors. Well established partnerships were rekindled and continued and countless new opportunities were identified. Upon reflection of the conversations and interactions it was obvious that TATRC's future is bright and that there are a lot of individuals wanting to go forward with us. There is an old Chinese Proverb that sums this up, 'If you want to go fast – go alone, if you want to go far – go with others,' and that is what TATRC plans to do."
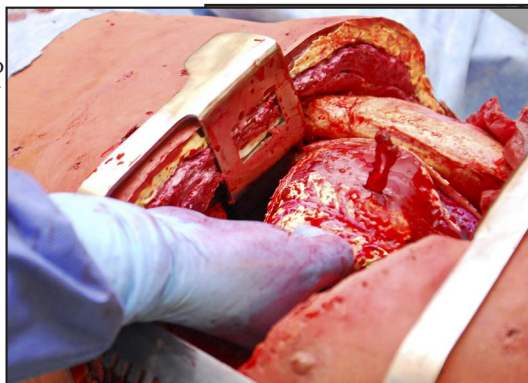




*MG Lein sees first hand, the advanced, lifelike capabilities of the newest medical simulation manikins as demonstrated by Dr. Robert Buckman, one of TATRC's longstanding PI's.*

# TATRC Participates in the Pentagon DoD Lab Days

The Department of Defense (DoD) held their first ever DoD Lab Day exhibition on Thursday, 14 May in the Pentagon's Center Courtyard. The DoD Lab Day featured technologies and projects from all branches of service, spanning over four main tent areas. The theme of this event was "DoD Lab Day: Where Today's Possibilities are Tomorrow's Realities..." and it focused on advancing the capabilities of the Force of the Future. The goal of the DoD Lab Day was to increase awareness of the programs and projects (past, present, and future) being conducted in the DoD laboratories and to educate senior leaders, program sponsors and program managers, Congressional staff, media, and the general public. US-AMRMC was prominently featured in the medical tent where TATRC had an interactive Medical Modeling & Simulation display in conjunction with Joint Program Committee – 1 (JPC-1).

Many prominent and distinguished top officials from the DoD were present for the event including, Deputy Defense Secretary, Mr. Bob Work, who made the opening remarks for the day. Mr. Work began the DoD Lab Day by stating, "I firmly believe, as does Secretary Carter, that we must continue to innovate to protect our country." Mr. Frank Kendall, Undersecretary of Defense for Acquisition, Technology and Logistics, who served as the DoD Lab Days host, followed by saying, "What we see today is innovation in the foreground. We wanted to show the groundbreaking work going on at our DoD labs, recognize the best of the best, and showcase the specific projects and demonstrations that we're working on in the world of science and technology."

The key take away from this event was to demonstrate how DoD labs are critical components of the DoD Research and Engineering Enterprise. The labs provide science, tech-



**Dr. Jan Harris, Director of the Joint Program Committee - 1, and Mr. Harvey Magee, Lab Manager for TATRC's MMSIC, explain the medical modeling & simulation training manikin at the first ever DoD Lab Days.**

nology, and engineering to the DoD that gives our Service men and women the warfighting edge while keeping them safe and allows the DoD to achieve dominant warfighting capabilities through technological innovations.

From TATRC, Mr. Harvey Magee of the Medical Modeling & Simulation Innovation Center (MMSIC) was onsite to demonstrate and discuss the BioGears$^R$ project along with the Virtual Standardized Patient (VSP) technologies. BioGears$^R$ is an open source, general purpose human physiology engine that allows for simulation of the entire human body. The engine demonstrates various system models including cardiovascular,



**Ms. Mary Miller, Deputy Undersecretary of the Army for Research and Technology, discusses medical modeling and simulation research with Dr. Jan Harris and Mr. Harvey Magee.**



**MG Brian C. Lein, Commanding General, USAMRMC and Ft. Detrick, along with RADM Bruce A. Doll, Director of Research, Development, and Acquisition for the Defense Health Agency discuss with Senior Pentagon officials the advancements in medical research and technology.**

## DoD Lab Days

respiratory, substances, renal, endocrine, and energy balance systems. The engine allows for medical training content to be both created and disseminated to the medical community and provides knowledge to those in the industry through education in simulated physiology. The VSP is a collaborative project funded by JPC-1 at the University of Southern California's (USC) Institute for Creative Technologies (ICT) that is consistent with the vision of TATRC's MMSIC to develop an open-source foundation to support inter-operability among simulation based medical training systems. This project explores applications with virtual human patients. The goal of VSP is to enable simulation patient interactions that simulate the fidelity of a real patient encounter with objective performance measurement and guidance to improve performance.

Mr. Magee stated: "This DoD Lab event was significant for TATRC as well as JPC-1, because of the level of interest shown from DoD officials. Numerous discussions confirmed that simulation based training for medicine is a technology whose time has come. After sixteen years of identifying enabling technologies, maturing them into components, we are seeing a "game changer" in how we train healthcare personnel, from the foxhole to the operating room. The most promising technologies are being considered for integration into systems of simulation based training, with potential for formal acquisition and transition into the Military Healthcare System." \\\

# Unmanned Systems Demonstrate Collaborative Casualty Evacuation

TATRC's Operational Telemedicine Lab is currently managing two ongoing Small Business Innovation Research (SBIR) projects for developing the Human-Computer Interface (HCI) and Command and Control (C2) capabilities for unmanned casualty evacuation (CASEVAC) and emergency medical resupply missions. The overall goal of these projects is to develop an application on a handheld device (e.g. Nett Warrior) that would provide the capability to a ground medic with little or no training in Vertical Take-Off & Landing (VTOL) systems operation, to interact with unmanned assets at the task/goal level in order to plan and execute unmanned CASEVAC and resupply missions.

Earlier this spring, a team consisting of Neya Systems, Lockheed Martin, and Kaman Aerospace, successfully demonstrated a collaborative CASEVAC mission. The mission utilized both an unmanned K-MAX helicopter and an unmanned ground vehicle, using a mission management system and command and control interface prototyped by Neya Systems, under a TATRC managed-SBIR project. During the demonstration, an operator representing a ground medic, utilized Neya's VTOL Evacuation and Resupply Tactical Interface (VERTI) running on an Android tablet. Using VERTI, the operator was able to dispatch an unmanned ground vehicle to inspect a casualty at a remote location, initiate a CASEVAC request using the closest VTOL asset, observe a video feed from the unmanned K-MAX during its autonomous flight, and coordinate takeoff and landing using high-level commands. This demonstration was funded by OSD ATL and the Naval Air (NAVAIR) PEO for Unmanned Systems for the purpose of demonstrating that the VERTI capability could be integrated with the OSD-ATL supported Unmanned Aircraft Control System.

Moving forward, TATRC plans to integrate flight control, tele-monitoring, and medical information exchange into the mission management system via a common reference architecture. With the growing planned use of unmanned systems on



*Lockheed's unmanned K-MAX helicopter and Neya's unmanned ground vehicle performing a collaborative casualty evacuation mission.*



*Neya's VERTI Human-Computer Interface for collaborative landing.*

the battlefield, the need to develop CASEVAC and medical resupply capabilities for unmanned assets is becoming increasingly important. The research and development of a solid C2 infrastructure, and end-user application for a combat medic to plan and execute a CASEVAC or medical resupply mission using high-level tasking, is required to realize this capability. \\\

# USAMRMC's Commanding General Visits TATRC

On 13 April 2015, TATRC welcomed USAMRMC's CG, MG Brian C. Lein for his first tour and formal brief of TATRC's many initiatives and core capabilities. The brief was led by TATRC's Director, COL Daniel Kral and covered each of the five key lab areas to include: BHSAI, HTIC, mHIC, MMSIC, and Operational Telemedicine, as well as TATRC's special programs, AAMTI and Tele-behavioral Health. Each of the labs and special programs were briefed further by the Lab Managers and subject matter experts in those particular areas.

MG Lein noted that we live in an era of exponential growth in the field of advanced medical technologies. Lein said "We have for 150 years used the Halstead method of Training. We are now moving toward an era of personal-ized care in which we may even see the replication of the human being via virtual reality technologies. In an era of declining resources, it is more critical than ever to communicate TATRC's uniqueness and proven capabilities to create synergy."

After the formal briefing concluded, MG Lein toured TATRC's offices and lab facilities to meet the staff and view some of the work that is being done on the current projects.



*MG Brian C. Lein and TATRC's Director, COL Dan Kral, discuss TATRC's future direction and new mission.*



*Dr. Gary Gilbert demonstrates the S800 multi-rotor Unmanned Aerial System (UAS) to MG Lein.*

# On the Horizon...

## Upcoming Events:

**13-17 July:** C4ISR Event-15 Live Demonstration; Ft. Dix, NJ

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**17-20 August:** Military Health System Research Symposium (MHSRS); Ft. Lauderdale, FL

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**18-20 August:** 2015 Defense Health Information Technology Symposium; Orlando, FL

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**17 September:** ATA Mid-Year: Washington, DC

\* \* \* \* \*

**13-15 October:** BioGears User Conference; Research Triangle Park, NC

## TATRC's mHIC Team Leverages Wi-Fi and Mobile Health with the 14th CSH at JRTC

Life in a Combat Support Hospital (CSH) can be challenging!!

Austere conditions, separation from family, and a demanding work environment, all contribute to the challenges of completing your daily tasks. When your task is to deliver definitive health care, these conditions can strain and tax even the most dedicated soldier.

Another difficulty facing soldiers within a CSH is the lack of a means of locating your staff to address emergent medical scenarios. Pagers, Cell phones, and overhead hospital public address systems are not available within a deployed CSH and do not work when you do not have the network infrastructure to support these technologies.

It was because of these reasons that TATRC's Mobile Health Innovation Center (mHIC) collaborated with the Commander of the 14th CSH, Colonel Paula Lodi, to demonstrate the use of a wireless recall device during their deployment to participate in training at the Joint Readiness Training Center (JRTC) at Fort Polk, LA.

The goal of this demonstration was to prove that the insertion of a commercially available technology can solve a problem and bridge a gap in the ability to recall specialized clinical providers within an austere environment. The expected end result of the demonstration was to show an improvement of patient outcomes by optimizing the response time to address emergent clinical issues with the appropriate personnel.

The technologies demonstrated were the Vocera B3000n badge and the Xirrus Secure Wi-Fi system. The badge provides hands free communication throughout the CSH to the clinicians, command staff, and all of the operational areas within the hospital. The Secure Wi-Fi system was the enabling technology that allowed the badges to operate within the Combat Support Hospital. In addition, the wi-fi system provided a wireless network for the electronic health record which enabled the hospital to have their MC4 network operational in a fraction of the time normally required to run cable throughout the CSH.

Our partners for this demonstration were the Cyber Center of Excellence, Experimental Division, The 14th CSH and Vocera Communications, Inc., who provided their newest technology for this demonstration. The newly improved badges which operate on the 5 GHz Wi-Fi frequency, provided for a much improved user experience and greatly simplified the establishment of the network.

By partnering with premier units such as the 14th CSH to demonstrate emerging technologies, we will discover how these technologies can benefit soldiers in the environment in which they conduct their daily missions.



*PFC Morris, a Patient Administration Specialist, annotating information regarding patients being received during a mass casualty event. He is using the hands free communication device to communicate with the soldiers unloading the ambulances.*



*14th CSH after torrential rains.*



*Area outlined in Red is possible location for CSH personnel.*

# TATRC Team Participates in SMRC Training at LRMC

"Breaking News Story!" We hear these words continuously from the major network news sources. Unfortunately, the lead story is often a report associated with a disaster scenario. Manmade and natural disasters occur daily across the globe and the only real difference between these stories are the scope of the disaster, measured by the number of lives affected. This is not meant to minimize the impact that these disasters have on individuals, but rather to discuss the ability of the local response organizations to effectively intervene and to minimize the ongoing suffering.

When the scope of such an event is such that the local response capability is overwhelmed, our country is always one of the first to volunteer and provide aid. When the State Department authorizes support to be provided, they contact the Department of Defense, who in turns notifies the Combatant Command (COCOM) responsible for the affected areas. If the COCOM does not have the organic capabilities needed such as, medical personnel experienced in burn injuries, public health expertise, pastoral care, behavioral health, or command, control, communication and telemedicine, then the COCOM reaches out to the Medical Command for support. Because of this, the U.S. Army Medical Command has established the Spe-

cial MEDCOM Response Capability (SMRC) teams, which is managed by TATRC.

These agile teams are designed to react quickly, at the direction of our national Command authority, to augment civilian and non-governmental organizations and to minimize suffering across the globe. In order to remain proficient, and keep both the equipment and other SMRC team members up to date, the TATRC team provides training to other SMRC team members and continually assesses new technologies which enhance communications. To date, the TATRC team has met with over eight of the other SMRC Teams and participated in exercises such as, RIMPAC in the Pacific Region.

This June, members of TATRC's SMRC team provided on-site training to the SMRC team at Landstuhl's Regional Medical Center (LRMC). Dr. Francis McVeigh, TATRC's Chief Scientist, Mr. Larry Markins, lead technology integrator, and Mr. Edward Kensinger, a senior project manager, all participated in the training event hosted by MAJ Logan Blank, the Program Manager for the Public Health SMRC team at LRMC. For this training event, TATRC staff updated the equipment sets, which are maintained at LRMC, as well as ensured that all of the personnel were familiarized and trained on

the equipment sets. Furthermore, the ground work was established to jointly participate in future field exercises.

TATRC is responsible for equipping and manning the Telemedicine SMRC team. This team is prepared to provide communications and telemedicine capabilities to all of the other SMRC teams. In the event of a disaster response, the TATRC SMRC team could provide communication capabilities from almost anywhere on the planet and could be on location within the first few days following the disaster. This quick response component would allow our team to be on location during the initial response period when the need is the greatest. In a quote from Mr. Kensinger, he stated, "The TATRC Telemedicine SMRC is following the guidance of the Army and are lighter, faster and more agile than traditional disaster response organizations." \\\

*The SMART/SMRC-MC3T provides policy, guidance and Military Support to Civil Authorities (MSCA) during disaster, civil-military cooperative action, humanitarian, and emergency response to CBRNE incidents in the Continental United States, and U.S. territories or possessions Outside Continental United States.*

# TATRC *TIMES*

## TATRC's Operational Telemedicine Team Prepares for the Ground Activities E-15 Telemedicine Exercises in Ft. Dix, NJ

TATRC's Operational Telemedicine Laboratory has been actively preparing for the U. S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC) Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) Ground Activity (CGA) Event 2015 (E-15) exercise over several weeks this Summer at Ft. Dix, NJ. The Operational Telemedicine Lab's objective is to conduct concept demonstrations and operational user evaluations on medical systems. This is done in a simulated field environment using current and future capability sets and tactical networks that have the ability to provide front line and medical evacuation medics a capability to conduct point of care telemedicine and transmission of medical data to receiving treatment facilities.

CGA provides the Army with a significant venue to assess and validate next-generation network technologies and facilitates C4ISR technological maturation. CGA provides reliable data about technical performance, which enables senior Army leaders to make informed decisions to shape the Army's future force and network.

The E-15 exercise will span over three weeks and will involve integrating medical systems onto the CGA tactical radio and 4G LTE network, training medics on the medical systems to be evaluated and mission concept demonstration evaluation scenarios.

During the exercise and evaluation, TATRC will be hosting its 2nd Annual Visitor's Day on Wednesday, 15 July. The Visitor's Day will be an opportunity for invited guests to observe technical and operational assessments of Roles I & II Telemedicine technologies and research prototypes being used by combat medics during small unit elements of an Infantry Brigade Combat Team exercise. In between exercises, technology SME's and research partners will be on-hand to provide insight and feedback regarding ongoing theater operational telemedicine projects. Guests will be able to observe as ground and flight medics, as well as Physician's Assistants, use and provide feedback on several prototype capabilities developed as part of both Army and Defense Health Agency (DHA) Small Business Innovation Research (SBIR) and DHA Joint Program Committee – 1 & 6 funded TATRC Telemedicine projects. This event allows guests to view a full field scenario and medical encounter.

This one-day event will be a full day of demonstrations in a tactical field environment. The morning session will consist of a tour of the Battalion Aid Station (BAS) and Brigade Medical Company. The afternoon session will consist of attendees departing out to the field to view a tactical exercise that will include viewing operational forces arriving at their objective, the forces taking on casualties, medics treating and packaging casualties, moving casualties to the landing zone, loading casualties onto the MEDEVAC helicopter, and watching the helicopter depart for the Brigade Medical Company. During the time of the exercise, ground and air medics will be transmitting TC3 cards and Tempus Pro telemetry data over the tactical radios and 4G LTE networks to the BAS. Attendees will then head back to Range 1, and on the way, see a UAV demonstration. Once back at Range 1, guests will see the medical record transfer of data from Ft. Dix off to the Combat Support Hospital at Ft. Gordon, GA.

TATRC's Operational Telemedicine team is eager for this year's evaluation and exercise as it provides an opportunity for key research projects to be demonstrated in a live field setting so that further advancements can be made for our Warfighters. \\\



*U.S. Army Medic SGT Daniel Vita from U.S. Army Medical Research Institute of Infectious Diseases demonstrates the voice-to-text application on the Nett Warrior end user device to Dr. Jan Harris, Director, JPC-1, and MG Joseph Caravalho, former Commanding General, USAMRMC, who attended last year's Telemedicine exercise, with Dr. Gary Gilbert, Operational Telemedicine Lab Manager in the background.*

# Employee Spotlight

## Employee of the Quarter: Mr. Joseph D. Barrick

It is with great pleasure that The Telemedicine and Advanced Technology Research Center (TATRC) announces that Mr. Joe Barrick is TATRC's Employee of the Quarter, for the 3rd quarter in FY2015!

Mr. Joe Barrick, the Senior Logistics Engineer at TATRC, was selected from a list of outstanding individuals and his contributions to the organization are extraordinary.

Mr. Barrick is recognized for going above and beyond his regular duties, and for doing whatever it takes to get the job done. He spent numerous hours setting up the tents within TATRC's PITLab area in preparation for TATRC's Spring Open House. He also took the initiative at our Open House by shuttling guests and visitor's attending the Open House, who were parked at a distance from the event, and transported them to the Open Houses' Main Welcome Tent. These unselfish actions are a reflection of his dedication and willingness to go the extra mile to ensure TATRC's successes.

Mr. Barrick constantly looks for ways to improve and enhance our facilities, by focusing on the smallest of details. He continually seeks ways to economize and save money for the government. His care and concern for others is evident as he made himself available and assisted our staff with moving to new office locations, which included helping them pack and transport their office goods. Mr. Barrick constantly remains ahead of schedule on his inventories thus preventing unnecessary loss of property by maintaining timely accountability.

Mr. Barrick always puts TATRC's mission first, in everything he does and for that the organization is grateful. He has proven time and time again to be one of TATRC's most valued staff in his actions, both professionally and personally. He makes TATRC a better place to work, and is a huge part of our successes. Thanks for all you do and congratulations on receiving the honor of Employee of the Quarter. \\\

## This Quarter's TATRC TRIVIA...

**?**

**TATRC was originally established in 1991, but not under the name TATRC. What was the first name for the organization that became better known as the DoD "Telemedicine Test Bed"?**
*Stay tuned for the answer in our next issue!*

## Answer to Last Issue's TATRC TRIVIA...

**!**

**Q: Under the new construct and reorganization of TATRC, how many labs and key programs does TATRC have?**

**A: There are 5 Labs in the new TATRC: Biotechnology HPC Software Applications Institute (BHSAI), Health Technology Innovation Center (HTIC), Mobile Health Innovation Center (mHIC), Medical Modeling & Simulation Innovation Center (MMSIC), and Operational Telemedicine!**

## BioGears®: The Open Source Virtual Physiological Human Platform

So, what if a computer program was available that could simulate the behavior and responses of human physiology in response to various traumatic intrusions? What if it could respond to medical interventions? Would that be of benefit to both research and training of healthcare professionals? What if medical curriculum developers, instructional designers and medical school professors could create more interactive and engaging learning experiences so learners could see the results of their clinical decisions? "What a concept: human physiology represented by bits & bytes in a computer. Now, medical educators can focus on delivering their message, knowing they don't have to develop a physiology simulator... AND they can use it for free, since it's being developed with public funds," said Mr. Harvey Magee, the Lab Manager for the Medical Modeling & Simulation Innovation Center (MMSIC), and government manager for the BioGears® project.

BioGears® is a $7M, five-year research program funded through the Defense Medical Research and Development Program. It is the most comprehensive open source mathematical model of human physiology available. The strategy behind BioGears® is to remove the burden of developing a physiology engine from developers of medical modeling and simulation training tools so they can focus on developing their training content.

Under this research award*, Applied Research Associates Inc. is creating an open source, extensible human physiology engine that is available now via an Apache 2.0 open source software license. BioGears® enables accurate and consistent physiology simulation across the needs of the medical community. The engine can either be used as a standalone application or integrated with simulators, sensor interfaces, and models of all fidelities. BioGears® is intended to support medical education, research, and training technologies. To complete this work, medical doctors (Archetype Technolo-

| Systems | Features | Substances |
|---|---|---|
| Cardiovascular system computes hemodynamics | •Library of Drugs<br>•Drug administration through multiple routes | **Drugs**<br>•PK Model<br>•PD Model |
| Respiratory system computes pulmonary functions | | **Blood**<br>•Hemoglobin |
| Energy balance system computes temperature, exercise readiness, and nutrient usage | •Electrocardiogram<br>•Anesthesia Machine | •Gases<br>•Ions |
| Substances system computes diffusion, gas exchange, and drug effects | | **Hormones**<br>•Epinephrine |
| Environment modifies ambient values and thermal properties | •CPR<br>•Pulmonary Function Test<br>•Complete Blood Count<br>•Urine Panel | •Norepinephrine<br>•Insulin<br>•Glucagon |
| Renal circuit computes filtration | | **Nutrients**<br>•Fat |
| Endocrine and nervous systems maintain homeostasis through feedback mechanisms | •Chronic Conditions<br>•Insults & Interventions | •Sugars<br>•Proteins |

*The current project scope of BioGears® includes a variety of system models such as cardiovascular, respiratory, substances, renal, endocrine, and energy balance systems.*

*Continued from page 10*

gies) as well as physiology and pharmacology subject matter experts (University of North Carolina at Chapel Hill) are part of the research team. The software is available now for free download as an Alpha version.

BioGears® was designed with four specific user groups in mind, and these are the groups being targeted for input and testing:

1. Engine Integrators (those who could use the engine as is),

2. Contributors (users who can add or replace various systems to improve the engine's functionality),

3. External Model/Engine Developers (those who run the BioGears® engine along with other engines of the same nature), and

4. Researchers/Educators (those who create input to Bio-Gears® for instruction and/or studying).

BioGears® simulates resting physiology and real-time changes in physiology due to injuries and medical interventions. BioGears® provides a virtual physiological patient platform that can be extended and customized for a variety of scenarios and use cases. Why? This enables safe and effective medical training and education. Medical training content can now be created and disseminated, and it engages the research community to develop physiology models. It is an incredible engine that will provide valuable knowledge to those in the healthcare industry by educating them in simulated physiology. The diagram below summarizes the systems, features, and substances that BioGears® features to date.

TATRC has always focused on working closely with its customers; that is, the user communities who are ultimately affected by new technologies. So, one of the requirements in the research award is that the developers host a public

conference to encourage input from, and involvement of, the Medical Modeling & Simulation (MM&S) Community of Interest. The Beta version will be released in October 2015 and will coincide with the free BioGears® Conference, 13-14 October 2015. This conference will provide the community of MM&S professionals an opportunity to exchange information and to discuss how to advance the current state-of-the-art in physiological modeling. Conference admission will be free to all who register (biogearsconference2015.sched.org). The conference is designed to stimulate discussions on how to develop and extend BioGears® physiology models for new users and use cases, and it will expand the body of knowledge regarding the use of simulated physiology for medical education.

Abstract submission is open now, and the BioGears® team has selected a wide range of topic areas to encourage attendance and active participation from a diverse group of researchers across the MM&S community. Those interested in attending do not need to be using BioGears® to either attend or submit an abstract. To learn more about the conference and the abstract submission process, please visit the BioGears® website, www.BioGearsEngine.com

For further information please visit the BioGears® website: www. BioGearsEngine.com

# June: Men's Health Month

Did you know that women are 100 percent more likely to visit the doctor for annual examinations and preventative services than men?

June is a great time to remind men that it's important to take time to take care of themselves. Prevention is a priority.

Anchored by a congressional health education program, Men's Health Month is celebrated across the country with screenings, health fairs and other education and outreach activities. The purpose of Men's Health Month is to heighten the awareness of preventable health problems and encourage early de-

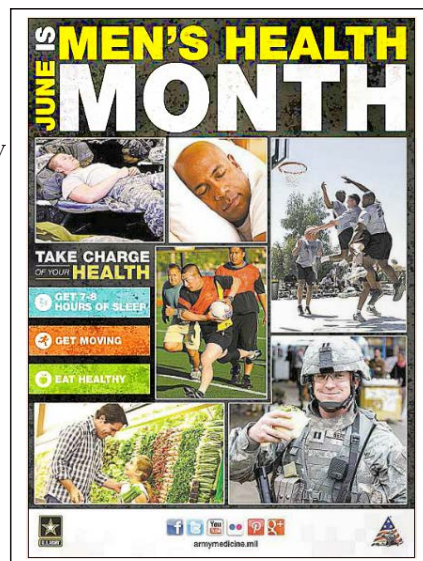tection and treatment of disease among men and boys.

**Men's Health Tips:**
• Visit a health care provider regularly and get regular health screenings
• Get at least 7-8 hours of sleep per night
• Limit your intake of alcohol and caffeine
   Resources:
   http://www.menshealthnetwork.org/
   http://www.menshealthnetwork.org/library/pdfs/GetItChecked.pdf
   http://www.prostatehealthguide.com/ \\\

## TATRC's Operational Telemedicine Staff Attend the DARPA Robotics Challenge Finals 2015

Two members of TATRC's Operational Telemedicine Robotics team, Mr. Nate Fisher, Project Manager, and Ms. Rebecca Lee, Project Officer, attended and participated in the DARPA Robotics Challenge from 5 – 6 June at the Fairplex in Pomona, CA. The DARPA Robotics Challenge began in the wake of the Fukushima nuclear disaster in 2011 with the idea that robots could one day perform tasks too dangerous for humans. The finalists were challenged to complete eight disaster related tasks in under an hour. Teams from around the globe including Japan, Germany, Italy, the Republic of Korea, and Hong Kong competed in the Finals at the fairground in Pomona, CA.

The challenge consisted of robots completing eight tasks related to humanitarian search and rescue scenarios. In contrast to the last challenge event in 2013, the robots were untethered and had an hour to complete all tasks. The tasks involved driving down a dirt track, egressing from the vehicle, opening and walking through a door, turning a valve, cutting a hole through drywall, a surprise task, navigating through rubble, and walking up stairs. There was a mix of bipedal and quadruped robots and most of the teams used existing hardware bases such as Boston Dynamics' ATLAS, Korea Advanced Institute of Science and Technology (KAIST)'s HUBO, and UCLA and University of Pennsylvania's THOR. Other teams, such as Carnegie Mellon University, NASA's Jet Propulsion Labs, and Virginia Tech built their own hardware in addition to custom software. From early on it was evident that robots with multiple modalities had an advantage over the bipedal teams which had difficulty moving from station to station. Many of the bipedal robots fell while walking which left them disabled without assistance. The only robot able to get back up after falling was CMU's CHIMP, which used the tracks on its four limbs to maintain mobility on all fours. The teams also experienced degraded communication capabilities after completing the door opening task. The unreliable communication between the robot and the operators who were in another building, proved to be difficult and it took many of the teams over the allotted hour to complete only a few of the tasks.

One of the most interesting aspects of the trip was the
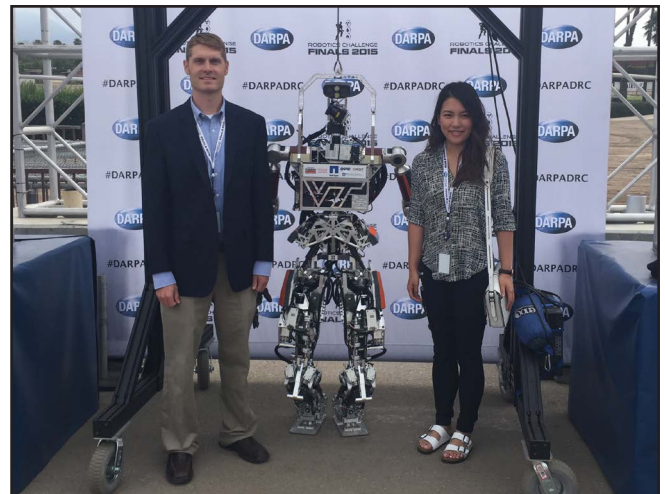


**Mr. Nate Fisher and Ms. Rebecca Lee strike a pose with Virginia Tech's custom built robot.**

tour of the garage, from where all the teams operated their robots. Here we were told that some teams assigned separate specialized operators for separate tasks.

In addition to the main challenge, the event also hosted an exposition with booths from various universities, independent labs, and government agencies. The variety of demonstrations ranged from companion robots to high school competition robots to marsupial robots and drones for urban search and rescue. Several of TATRC's Small Business Innovation Research (SBIR) partners were in attendance and exhibiting including those of Vecna and ReSquared, Dr. Howie Choset of CMU; and Dr. Reed Young of The Johns Hopkins University Applied Physics Laboratory who is opening a new lab in February 2016. Between runs, Boston Dynamics and MIT demonstrated their impressive quadruped robots "Spot" and "Cheetah."

The winner of the Challenge was Korea's KAIST team. Their robot could configure itself into multiple modalities which allowed it to complete more tasks with greater ease. It would lower its body onto its wheeled toes and knees while also effectively lowering its center of gravity. When it went up the stairs, its torso rotated 180 degrees so that it could walk with its knees pointed backwards and out of the way. It completed all eight tasks six minutes faster than the second place Florida Institute for Human and Machine Cognition team. Other robots that were configurable and had lower centers of gravity seemed to perform better than their more humanoid counterparts. Despite concerns that robots are taking over human jobs, it was very obvious that robots have a long way to go before they could replace humans in any large capacity. The competing robots had a small degree of autonomy, mainly for balance and walking, but relied on

**Re², one of TATRC's SBIR partners, demonstrates at the DARPA Robotics Challenge**

## Robotics *Continued from page 11*

human operators for completing all of the tasks. Unreliable communication and sensor feedback also played a large role in slowing down the robots. It was very eye opening when they showed the audience what the operators were able to see with degraded communication capabilities.

There were also several notable attendees such as Larry Page, Co-founder and CEO of Google, Elon Musk, Founder of PayPal, Tesla Motors, and conceived the Space X space travel concept for civilians, and Travis Kalanick, Co-founder of Uber and Red Swoosh. Their presence made it clear that industry leaders are very invested in the future of autonomous robots.

The Distinguished Visitors briefing held by the Director of DARPA, Arati Prabhakar, and the Director of the Tactical Technology Office, Dr. Bradford Tousley, discussed possible future Challenges including one for swarming robots which would expand endurance, speed, range, payload, and survivability capabilities. Having light and mobile units would augment capabilities for multiple military domains including medical casualty evacuations. Although the finals would be the last event for the DARPA Robotics Challenge, it would be interesting to see future groups focus on the specific task of swarming robots. ⋙

# T2 Team Partners with TATRC mHIC Team on Enhancing Mobile Health Apps

Technical Senior staff from the National Center for Telehealth and Technology (T2) recently visited the TATRC mHIC office at Fort Gordon, Georgia. Dr. Nigel Bush, Research Psychologist and Program Manager, and Dr. Julie Kinn, Deputy Director of the Mobile Health Program, were onsite in early April as part of a direct exchange in support of an active collaboration between TATRC and T2. Members of the T2 and mHIC teams will be working together to migrate the Mood Tracker mobile application from a stand-alone, native app to a tool that will allow for patients to be in direct contact and communications with their behavioral health team. This will be accomplished by incorporating the existing Mood Tracker app software features into the MHCE bi-directional system. The end result is that the Mood Tracker features will be embedded into the mCare application and will allow patients to have a wider range of services available to them through the mCare interface.

Furthermore, a second research project was just funded by JPC-1 that will allow an expanded partnership between T2 and TATRC, involving the Behavioral Health Coach application, mCare and the Early Stage Platform. ⋙



**Holly Pavliscsak (mHIC mHealth Research Manager), Dr. Julie Kinn, Mr. Nathanael Montgomery (mHIC Developer), Mr. Zaheir Razak (mHIC Developer) and Dr. Nigel Bush enjoyed some picture perfect Augusta spring weather during a working lunch session at Fort Gordon.**

# TATRC Participates at the Global City Team Challenge (GCTC) in Washington, DC

On June 1, 2015, TATRC participated in the National Institute of Science and Technology (NIST)/US-Ignite sponsored Global City Team Challenge (GCTC), "... an initiative designed to advance the deployment of Internet of Things (IoT) technologies within a smart city / smart community environment." (www.us-ignite.org) The GCTC festival was held at the National Building Museum in Washington DC. Over 65 demonstrations were shown from around the world and focused on how technology can be applied to improve city/community life including health, education, transportation, energy and utilities, public safety, and more. The event brought out more than 1,500 attendees nationwide.

TATRC partnered with the Defense Health Agency, Massachusetts General Hospital (MGH), Drager, Respiratory Motion, ViTelNet and others to demonstrate how technology can be used for "Remotely Caring for Vulnerable Populations during a Pandemic". Our demonstration showed the transformational power of open, integrated, medical device and Health Information Technology platforms to automate detection, triage, and treatment of individuals affected by a pandemic, as applied to an Ebola Virus Disease (EVD) use case.

Our exhibit built off of the successful prototype created by MGH and their multiple partners to demonstrate methods to improve Ebola care, inter-vendor data sharing, device integration, and remote and closed-loop control using open standards. These capabilities go beyond those available today to improve patient care and protect healthcare workers, including integrating sensors and data acquisition to improve the Ebola screening, monitoring, and diagnosis processes.

The team demonstrated technologies for detecting, triaging, monitoring and treating patients with Ebola. The Smart Colorimetric Assay Reader (CAR), created by the U.S. Army Edgewood Chemical and Biological Center under partnership with TATRC, detects the presence of the Ebola virus, or other chemical and biological contagions and transmits the results to the Nett Warrior secure smartphone to coordinate military medical care in the field (or civilian care). The Smart CAR also performs and analyzes test results from remote locations and sends those results to the Nett Warrior phone and onto MC-4 App for incorporation into the patient's medical record. Also demonstrated in our booth was how once a patient is identified as having Ebola, they can be quarantined in a secure environment using remote control of ventilators, infusion pumps, and monitors to reduce the risk of exposure by healthcare workers by limiting the number of times they enter the patient environment to change device settings.

Ms. Betty Levine, TATRC's Health Technology Innovation Center's Lab Manager, who was in attendance and assisting with the TATRC team's demonstrations stated,



*Dave Williams explains and demonstrates the SMART Colorimetric Assay Reader (CAR) which is used in detecting the presence of the Ebola virus at the Global City Team Challenge.*

"Being able to see all 60+ exhibits related to Disaster/Emergency Response, Education, Health and Transportation, Energy and Public Utilities, Public Safety, and General Smart City Initiatives in one place, was compelling and encouraging. The teams, which included partners from government, academia, industry and the military, created environments that promise to improve how we live through the "IoT" and was a true glimpse into our future. After attending this event, and seeing the capabilities of these promising technologies first hand, further underscores the need for continued collaboration so that when faced with an emergency or disaster, we are prepared and ready to respond." \\\

# The Mission of Operational Tele-Behavioral Health (OTBH) Continues to Make a Difference

LTC Rafael G. Semidei, Sr., M.D., DABFM, Psychiatrist, 883rd Med Det. (CSC) TF Prospect, Iraq.



SGT Marie Swieta, 547th ASMC, CSC, NCOIC.

You have completed your Battle-Space Circulations each month until now – this time the trip keeps being delayed by weather. You have patients at three separate locations. Some are critically short of medications; others need follow-up care, still others need a professional consultation, sooner rather than later. What can you do right now? Answer: Go "virtual" - make your clinical rounds via telemedicine"!

Tele-Behavioral Health (TBH) is a treatment delivery modality that has been used in the CENTCOM AOR since 2010, when TATRC was directed by the Army Surgeon General to develop and support an in- theater Operational Tele-Behavioral Health (OTBH) system. TATRC was once again selected for a unique mission because of its proven ability to create and implement just-in-time solutions to complex organizational challenges. OTBH's primary uses were to deliver comprehensive Behavioral Health (BH) services to areas lacking BH assets. Remote locations with minimal staffing and sites where travel was difficult and/or dangerous were selected. Medical Signalers configured assured military communications to support each remote site, adding a tele-component to their already challenging mission set. Their actions facilitated this long-term tele-clinical success story.

By the end of 2011, the Tele-BH system was seeing 20% of all theater mental health encounters. During the next three years, TBH accounted for over 2,000 visits each year, through a network of 87 sites in all four regional commands. The CENTCOM Mental Health Consultant provided clinical over-watch of all in-country patient encounter, face-to-face and tele-BH, with no significant difference in patient outcomes.

The USA Public Health Command patient survey reported a key factoid, … "that nearly 72% of theater tele-behavior health patients reported they would not have sought BH care if the tele-care had not been available."

Today, the current distribution of BH assets in the CENTCOM - AOR is the ideal environment for the use of TBH by facilitating the access to subspecialty skills for psychotherapy, psychopharmacology and administrative evaluations. Communication with Service Members, professional colleagues and commanders can be achieved without the risks and disruption of travel.

It has been a really productive afternoon, nine patients in three locations – each seen and seen by "virtual face-to-face". Each patient received personalized care, medication and lab work. Each episode was electronically documented in their long term medical record and each patient experienced the difference telemedicine could make as a force multiplier for their medical well-being. ⟩⟩⟩

## Let's Get Social!



**For more information on TATRC and its many initiatives, visit: www.tatrc.org or call 301.619.7927**



TATRC-MCMR-TT
Bldg. 1054 Patchel Street,
Ft. Detrick MD 21702
tatrc.org
301.619.7927

# Dr. Oran Rigby, Director of Trauma for Sydney and NSW State, Australia Visits TATRC

On 23 April, Dr. Oran Rigby, Director of Trauma for Sydney and New South Wales (NSW) State at the NSW Institute of Trauma and Injury Management, visited with members from TATRC's Operational Telemedicine team. Dr. Rigby is an intensivist and surgeon who also works in the pre-hospital field with Sydney Helicopter Emergency Medical Service (HEMS) and as state coordinator for the NSWs Counter disaster and aeromedical emergency response. Dr. Rigby was awarded

a Churchill Fellowship to travel to the U.S. in order to research the opportunities and developments in the field of robotics and telemedicine as they apply to the management of trauma in Australian military and civilian populations and to leverage trauma expertise to rural and civilian personnel. Due to TATRC's Operational Telemedicine Lab's involvement in all phases of deployed medical technology, including telemedicine and Unmanned Systems for medical missions, Dr. Rigby chose

TATRC as one of the groups he wanted to meet with to receive an overview of our initiatives. Dr. Rigby was able to meet with Dr. Gary Gilbert, Lab Manager for the Operational Telemedicine Lab, along with other key technical staff and program managers for an in-depth tour and hands-on demonstration of numerous operational and robotic technologies that TATRC is working on and how we use these telemedicine technologies in an operational setting. \\\



**Dr. Oran Rigby, pictured in the front row, second from the left, visits TATRC's Operational Telemedicine Lab for hands-on demonstrations.**

# FY16 Pre-Proposals Now Closed

The FY16 iteration of the AMEDD Advanced Medical Technology Initiative (AAMTI) closed for pre-proposal submission on 3 June 2015. Fifty-eight pre-proposals were submitted and are now in the process of being evaluated. Full Proposals will be invited in late July. The FY16 submissions covered a wide-range of technologies and clinical applications

and were submitted by MEDCOM innovators representing a broad spectrum of military, clinical, and technical expertise and experience. For more information on the AAMTI program, please visit the website at http://www.tatrc.org/www/labs-and-programs/aamti/. \\\

# TATRC Staff Recognized for Federal Service Career Awards

The U.S. Army Medical Research & Materiel Command (USAMRMC) recognized over 75 federal employees in an awards ceremony on 27 May, for their career achievements and combined years of federal service to the U.S. government. Among the list of recipients were four TATRC staff members. All of these distinguished candidates dutifully served their country, and continue that tradition of excellence as civil servants. Mr. Harvey Magee who served 20 years in the Air Force and retired as a Major, has been working as a civilian for one year and is TATRC's Lab Manager for the Medical Modeling & Simulation Innovation Center (MMSIC). Dr. Francis McVeigh served for 29 years in the Army as an Optometrist and retired as a Colonel, and has served an additional three years as a civilian. He is currently our Chief Scientist. Ms. Cheryl Merritt, who served 22 years in the Army, and retired as a Lieutenant Colonel has been with TATRC as a civilian for four years, and currently serves as the Chief of Business Operations. Mr. Greg Dempsey served for 27 years as an Army Comptroller, and retired

as a Lieutenant Colonel and is now in his third year as a civilian and is TATRC's Chief Financial Officer.

We thank you for your loyal service and continued contributions to our mission and our Warfighters! ⑊



**TATRC congratulates its Federal Career Service Award winners. From left: Mr. Greg Dempsey, Mr. Harvey Magee, Ms. Cheryl Merritt, and Dr. Francis McVeigh.**

# TATRC Holds its 20th Annual Organization Day

TATRC held its 20th Annual Organization day on Friday, 26 June on base at Ft. Detrick. Each year, the Organization Day is an opportunity to gather alumni and current TATRC staff together in order to see where the Organization currently is, and review how far we have progressed and improved over the past year. Our Director, COL Dan Kral, addressed the group on the vision for TATRC's future and encouraged the continued collaboration amongst our various

partners. This year's organization day provided great food, exciting competition in Corn Hole and Ladder Golf tournaments, and a water balloon fight with the Senior Leadership. The 20th Annual Organization Day was quite the success, and we look forward to continuing the tradition and seeing how far TATRC has come at next year's 21st Annual Organization Day! ⑊



**COL Dan Kral dishes out the fun at TATRC's Organization Day and Picnic.**

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