

2016 IEEE International Conference on Biomedical and Health Informatics
Feb 24th-27th, 2016, Las Vegas, NV, USA

SPECIAL SESSION

"Challenges in Health Monitoring and Analytics in Extreme Environments"

Biomedical and health informatics is interdisciplinary in nature, and the synergy in the multi-disciplines has helped advance precision and preventive medicine. Monitoring the health of individuals have provided new opportunities not only in treating and evaluating patients who suffer from chronic conditions, but also in managing and maintaining the well-being of healthy individuals. The latter is particularly important for those performing mission critical tasks in space, on the battlefield, or in regions with climate extremes (e.g. the Arctic and Antarctic regions). These environments are often unstructured and the impact the environment can create can be unknown.

In this panel, we look at the challenges and opportunities that are often found in these extreme environments, and the integrative technology and engineering that enable health monitoring and analytics to operate in these adverse conditions. Discussion may include equipment resilience, measurement, networking, management, analytics and visualization of the health data within a framework of sensors, body area networks, algorithms, data mining, and applications.

LOCATION AND TIME

Thursday, February 25, 2016

16:45-18:15

Room-Mesquite 2

SESSION CHAIR



Professor **Carolyn McGregor AM** is the Canada Research Chair in Health Informatics based at the University of Ontario Institute of Technology. Dr. McGregor has led pioneering research in Big Data analytics, real-time event stream processing, temporal data stream data mining, business process modelling and cloud computing. She now progresses this research within the context of critical care medicine, mental health, astronaut health and military and civilian tactical training.

Professor McGregor has a track record of leadership in Health Informatics across, research, teaching, university governance and service to the profession. She is an international leading researcher in the area of critical care health informatics and in particular neonatal health informatics for which she has been researching for over 15 years. She has been awarded over \$10 million in research, consultancy and infrastructure funding and has led multiple large research programs including a multi-million dollar First of A Kind (FOAK) research program with IBM. She has over 140 refereed publications, has been awarded 1 patent and filed 2 others in multiple jurisdictions and has established two startup companies resulting

from her research. She has extensive research collaborations in Canada, China, USA, Russia, Australia, Ireland and India.

In 2013 her Artemis project was awarded the Information Technology Association of Canada (ITAC) Ingenious Award in the Not for Profit Category. In 2014 she was awarded membership in the Order of Australia for her significant service to science and innovation through health care information systems. In 2015 she was awarded the Advance Global Australian award for Technology Innovation, an award for Australian diaspora. In 2016 she serves as Chair of the IEEE Life Sciences Technical Community.

She received her bachelor of applied science in computer science honours (1st class) degree, and her PhD degree in computer science from the University of Technology, Sydney.

PANELISTS and PRESENTATIONS

Through this panel we hope to use this topic area, health monitoring and analytics, as a means to demonstrate how it takes interdisciplinary research to address challenges in operating under extreme conditions.

Andrew Hess, President of the Prognostics and Health Management Society which has a long history with equipment monitoring for equipment health, will bring new research directions in applying that research to the aerospace program for astronaut monitoring as well as other related areas such as signal synchronization.

Dr. Karl Friedl, who retired from thirty years of active duty service in the Army as a Colonel in 2013, will speak to his practical research in the area of monitoring within the military context and including Parkinson's Disease as a relevant model for monitoring in health and chronic disease. Dr. Friedl is also a keynote speaker at BHI-2016.

Dr. Emil Jovanov, Director of Real-Time Physiological Monitoring Laboratory at the University of Alabama in Huntsville, will address recent advances in sensing and integration technologies. He will discuss the use of disparate sensor devices such as smart bottles, integration of those devices with body area networks, and implications under extreme environment context.



Andrew Hess, President of the Prognostics and Health Management Society, is a 1969 graduate of the University of Virginia (BS Aerospace Engineering) and the U. S. Navy Test Pilot School. Andy attended George Washington University working towards a Masters in Technology Management and has completed many Navy and DOD sponsored professional and acquisition management courses. Andy is world renowned for his work in fixed and rotary wing health monitoring and is recognized as the father of Naval Aviation propulsion diagnostics.

Working for the Naval Air System Command and beginning with the A-7E Engine Monitoring System program of the early 70's, Andy has been the leading advocate for health monitoring in the Naval

Aviation. He has been actively involved in every NAVAIR aircraft program since the F-8, leading to the evolution and development of not just engine monitoring; but also aircraft structural life usage, comprehensive health monitoring and management capabilities for most all other aircraft subsystems and advance maintenance concepts like Condition Based Maintenance (CBM+). For the last 10 years of his government career, Andy worked leading and managing the vision, the development, and integration of the Prognostic and Health Management (PHM) system the AL support concept for the Joint Strike Fighter program. Andy's consulting interests are now leading him and his clients to exploring the application of PHM capabilities and CBM+ related support concepts to many new industry sectors such as: industrial gas and steam turbines, ships and fast patrol boats, unmanned vehicles, wind energy, nuclear energy, ground vehicles, mining, and gas and oil. Serving on the Board of Directors, Andy helped establish and grow the new and very successful PHM Society professional organization and has just been named president of the society. Recently, Andy was named an Asset Management Fellow with the International Society of Engineering Asset Management and is a member of the new SAE HM-1 committee on Integrated Vehicle Health Management Systems.



Karl Friedl, Ph.D., COL (US Army, ret.) is a Fellow in the ORISE Knowledge Preservation Program and also an adjunct Professor in the Department of Neurology, University of California, San Francisco. He retired from thirty years of active duty service in the Army as a Colonel in 2013, where he had last served as Director of the Telemedicine and Advanced Technology Research Center (TATRC) at the US Army Medical Research and Materiel Command. Dr Friedl received his Ph.D. degree in biology (integrative physiology) through the Institute of Environmental Stress in the University of California, Santa Barbara, in 1984. His research interest is focused on physiological modeling and monitoring technologies especially as applied to the limits of human performance. Dr. Friedl serves as Associate Editor of the *IEEE Journal of Biomedical and Health Informatics*. He is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE).



Emil Jovanov, Ph.D. is an Associate Professor in the Electrical and Computer Engineering Department at the University of Alabama in Huntsville. He is also the Director of Real-Time Physiological Monitoring Laboratory and the Co-director of mHealth Laboratory (Laboratory for mobile health and wellness monitoring). He received his Dipl. Ing. (1984), M.Sc. (1989), and Ph.D. (1993) from the University of Belgrade. Dr. Jovanov is recognized as the originator of the concept of wireless body area networks for health monitoring and he is one of the leaders in the field of wearable health monitoring. Dr. Jovanov is a Senior Member of IEEE, and serves as Associate Editor of the *IEEE Journal of Biomedical and Health Informatics* and *IEEE Transactions on Biomedical Circuits and Systems*, and as a member of Editorial Board of *Applied Psychophysiology and Biofeedback*. He is a member of the IEEE Engineering in Medicine and Biology Society (IEEE-EMBS) *Technical Committee on Wearable Biomedical Sensors and Systems*. Dr. Jovanov has spent over 30 years in the development and

implementation of application specific hardware, software, and systems. His current research interests include ubiquitous and mobile computing, biomedical signal processing, and health monitoring.