

News from NAMS

NASA Academic Mission Services Program

Administered by:



NAMS Highlights - February 2019

The Latest News from the NASA Academic Mission Services Program



Dr. David Bell Named Director of NASA Academic Mission Services (NAMS) Contract

Dr. David Bell has been appointed as the new Director of NASA Academic Mission Services (NAMS) Program, effective February 20, 2019.

In this role, Dr. Bell will serve as Site Manager for NAMS activities at NASA's Ames Research Center, Moffett Field, California. He joined USRA in 2002, and serves currently as both Director, Research Institute for Advanced Computer Science (RIACS) and NAMS Chief Technologist. In his latter role, David's focus is enabling R&D collaborations between universities, industry, and NASA in a range of domains, including quantum computing, machine learning, autonomous systems, nanotechnology, and biotechnology. Among his many contributions as RIACS Director is the Quantum Artificial Intelligence Laboratory, a collaboration among USRA, Google, and NASA.

Prior to working with USRA, Dr. Bell worked for ten years as a member of the research staff at the Xerox Palo Alto Research Center, in the Scientific & Engineering Reasoning Area of the Systems and Practices Lab. At Xerox, he conducted multi-disciplinary research with computer scientists developing novel artificial intelligence software and social scientists who studied work practices of organizations. David also held an appointment at MIT where he led a research program in the Center for Innovation in Product Development. In this capacity, David led a research program involving faculty and students at the MIT Sloan School of Management, the MIT School of Engineering, and the Stanford Management Science & Engineering and Design Research programs. Partner organizations included the U.S. Navy, ITT Industries, IBM, General Motors, Ford, and others. David received his Ph.D. from Cornell University with a dissertation on the dynamics of product development processes, is co-inventor on

Technical Highlights and University and Industry Engagement through R&D Collaborations

USRA Joins Forces with Princeton University



USRA and Princeton University join forces to apply quantum computation to the world of wireless networks thanks to the new NSF-sponsored grant award "Advancing the Wireless Spectral Frontier with Quantum-Enabled Computational Techniques (QENeTs)". The research will last three years and is led by Dr. Davide Venturelli from USRA's Research Institute for Advanced Computer Science (RIACS) and NASA Academic Mission Services (NAMS) Program, and by Prof. Kyle Jamieson, director of the Princeton Advanced Wireless Systems group (PAWS). This new project involves collaboration with NASA's Quantum Artificial Intelligence Lab Team in the Intelligent Systems Division (Code TI) that is led by Dr. Eleanor Rieffel and supported by USRA through the NAMS contract.



**Mount
Sinai**



**University Of
British Columbia**

Environmental Analytics – New Awards

USRA joins forces with the University of British Columbia (UBC) and the Icahn School of Medicine at Mount Sinai in the area of Environmental Analytics, thanks to two new grants led by USRA's Dr. Meytar Sorek-Hamer who is USRA's Principal Investigator for both projects. Dr. Sorek-Hamer leads the air quality and noise investigation research in the UBC "Pathways to Healthy Cities" project, and is coordinating this research with a new NASA Ames Research Innovation Award (ARIA) on "Virtual Sensors for Air Quality (AQ) Measurements in Urban Environments" that was awarded by the NASA Ames Office of the Chief Scientist to Dr. Nikunj Oza (NASA PI), Dr. Das (USRA Co-I), and Dr. Sorek-Hamer (USRA Co-I). The Mount Sinai project is studying correlations between air pollution and children's health, as part of the National Institute of Health (NIH) funded project "ECHO Consortium on Perinatal Programming of Neurodevelopment". These externally funded awards are part of a strategic collaboration with the NASA Ames Earth Science Division led by Dr. Ryan Spackman, which is supported by USRA through the NAMS Contract.

Aeroflightdynamics Group Collaborate with California State Polytechnic University, Pomona

A USRA-funded collaboration under the NAMS R&D Collaboration task created a new semester-long graduate-level flight control design course at Cal Poly Pomona, using materials from the recently published AIAA textbook and the CONDUIT® software which were developed by the US Army and the USRA team. The 15-week long course was offered during the Fall 2018 semester and was enrolled by 10 master students who were also working engineers at local aerospace companies and agencies (e.g., Northrop Grumman and Edwards Air Force Base). As part of the collaboration effort, a second new course on system identification is planned to be offered in Summer 2019 that will utilize the system identification AIAA textbook (authored by Dr. Mark Tischler) and the CIFER® software that was also developed by the US Army and the USRA team. The successful completion of the flight control design course will serve as the framework for future collaborations on curriculum development with other USRA university partners. This project involved collaboration with the Aviation Development Directorate - Ames (Code Y) led by Dr. Mark Tischler, the UAV Lab in the Aerospace Department at Cal Poly Pomona led by Prof. Subodh Bhandari, the USRA NAMS Aeroflightdynamics Lead Kenny Cheung, and NAMS Collaboration Leads – Saba Hussain and Dr. David Bell.



Pictured from left to right (front row): Kenny Cheung, Prof. Subodh Bhandari, and Dr. Mark Tischler with Cal Poly Pomona Flight Control Design course students



The Amazon rainforest covers most of the Amazon river basin in South America, encompassing more than 2 million square miles. It stretches through nine nations, with the majority contained in Brazil, Peru, and Colombia. It is one of the most biodiverse tracts of tropical rainforest in the world. There are around 40,000 plant species, 1,300 bird species, 3,000 types of fish, 430 mammals and a whopping 2.5 million different insects.
Credits: NASA

Machine Learning Research on Amazon Rainforests Featured in Science Node Magazine

Dr. Kamalika Das, Senior Research Scientist at USRA and NAMS Data Sciences Task Lead, was featured on the Science Node Magazine this month, for her research on modeling climate vegetation interactions in the Amazon rainforest. Most of Dr. Das' research effort is directed towards developing large scale machine learning algorithms to solve problems in Earth and Environmental Sciences, one of them being the modeling effects of climate (change) in rainforests of the world. The Amazon is the world's largest tropical rainforest covering over 5.5 million square kilometers and has an incredibly rich ecosystem consisting of half of the world's animal species. Unfortunately, the Amazon rainforest's abundance is under threat due to climate change. Although various studies have investigated how rising temperatures may be altering the Amazon ecosystem, specifically plant growth, Dr. Das has found that many of the existing results contradict each other and investigated this problem from a larger perspective. Instead of compartmentalizing the issues as other studies had done, Das conducted a large-scale regression study. Using the Pleiades supercomputer at Ames' NASA Advanced Supercomputing Facility and NASA Earth Exchange data pools, she developed optimization-based models that analyze the relationships between various independent and dependent variables like temperature, precipitation, land elevation, and



The University of Vermont



vegetation growth. “It’s not temperature alone that affects vegetation; everything works together,” Dr. Das says. “Studying the correlation itself is not enough to understand the dynamics that are actually in play in this region. It’s not the final answer.” This was the first time she had ever combined techniques from machine learning and genetic programming, an optimization technique inspired by biological evolution and the results look promising. They give a first glimpse of the vital relationships between climactic factors and vegetation growth in the Amazon. They also set the foundation for future studies by informing researchers about which variables are the most important, paving the way for causal analysis and forecasting.

Dr. Das has been at the forefront of bringing together machine learning and Earth Science research and this work definitely helps to take that to the next step. This method can now be used to look at problems outside of the rainforest, such as air quality monitoring. Many factors impact a place’s air quality, such as building density, amount of green space, and number of vehicles. All of these variables can be analyzed using a similar regression study to make predictions about air quality and carbon levels in the atmosphere. In her own words, “I get a lot of satisfaction in trying to answer questions related to the environment and the general health of the Earth. I just love to get all these answers, which I feel are very important for us to know so we can act accordingly—or at least know what’s coming ahead of us.”

The system that Dr. Das has developed is impactful because it can be used to look at problems outside of the rainforest and can continue to help us learn about climate change on earth and come up with solutions. This research was done in collaboration with Prof. Josh Bongard of the University of Vermont and the USRA Data Science Lead working in the Intelligent Systems Division (Code TI) and NASA Earth Exchange (NEX) project in the Earth Sciences Division of NASA’s Ames Research Center (Code SG). The research team included Marcin Szubert (University of Vermont), Josh Bongard (University of Vermont), Kamalika Das (USRA), Anuradha Kodali (USRA), Sangram Ganguly (NEX) from NASA’s Ames Research Center.

Welcome New Hires and Student Interns!

New Hires

Jeffrey Marshall, Ph.D. - Quantum Artificial Intelligence Lab QUAIL
Yohei Shinozuka, Ph.D. - Environmental Science
Miguel Saragoca Martinho - Data Science (Machine Learning)
Adwait Sahasrabhojane - Data Science (Machine Learning)

New Interns

Sabrina Berger - Data Science (Machine Learning)
Tessa Morris-Paterson, Ph.D. Candidate - GeneLab (Bio Sciences)