

National Heart, Lung, and Blood Institute Workshop
The Promise of NHLBI Data Science
July 20 -21 2021

INTRODUCTION

The National Heart, Lung, and Blood Institute (NHLBI), a part of the National Institutes of Health (NIH), is offering a Data Science Workshop for researchers interested in collaborative research to incorporate innovative data science and data-focused methods in biomedical heart, lung, blood, and sleep (HLBS) domains. The purpose of this workshop is to provide an opportunity for (a) biomedical researchers to learn the state-of-the-art data science methods, such as data architecture and machine learning/artificial intelligence procedures; (b) data scientists to understand the important questions in HLBS related research, and (c) collaborative data science methods and HLBS discoveries through applications.

Opportunities in Data Science at NHLBI: The NHLBI Strategic Vision has identified data science as a key priority area for the NHLBI. The rise of data science at NHLBI is driven by the concept of precision medicine. Precision medicine requires large amounts of data relevant to individual patients. Advances in science and technology, from omics to high-throughput screening, are generating vast amount of complex, diverse and rich context data. Developing innovative approaches to the integration, analysis, and interpretation of Big Data from multiple sources has the potential to provide new insights into the preemption and precise treatment of HLBS disorders, and to understand biological, social, and behavioral determinants associated with HLBS health and disease and to improve patient outcomes.

Presentation Overview: The goal of this workshop is to explore the application of data science in biomedical research and to encourage collaboration among physician-scientist, clinical and basic researchers, and data scientists to carry out research on HLBS related issues. The presentations will provide an overview of the “Big Data” that have been generated from NHLBI observational cohort studies, registries and repositories (e.g., BioLINCC, GenTAC), as well as basic science studies at NHLBI. Novel data science methods and HLBS applications presented in the workshop will be discussed by the participants. A selected set of the presentations will be further developed into manuscripts for publication.

Case Studies within DIR: Realizing the importance of data science in HLBS research, several NHLBI Division of Intramural Research (DIR) groups are currently hosting a number of informal, small-scale activities in data science training and collaboration. The experience gained from these DIR activities may be tremendously beneficial to expand the scope of existing activities to the wider scientific community involving HLBS research.

At the close of the workshop, participants will identify (1) Knowledge gaps in understanding and utilizing NHLBI datasets of various data types (e.g., BioData Catalyst), (2) Value of collaborations between domain experts and computer scientists, engineers and statisticians and (3) Needs assessment to ensure diverse participation in HLBS data science.

ACKNOWLEDGEMENTS

The workshop organizers would like to thank the speakers, the steering committee, and our partners for their work and contributions to the meeting program.

WORKSHOP STEERING COMMITTEE

Erin Iturriaga, DNP, M.S.N., RN | Division of Cardiovascular Sciences (DCVS), NHLBI, NIH

Jonathan Kaltman, M.D. | DCVS, NHLBI, NIH

Asif Rizwan, Ph.D. | Division of Blood Diseases and Resources (DBDR), NHLBI, NIH

Colin Wu, Ph.D. | Division of Intramural Research (DIR), NHLBI, NIH

PRESENTER INFORMATION

Seung Hoan Choi, Ph.D., BioData Catalyst Fellows, Statistical Geneticist, Broad Institute



Seung Hoan Choi, Ph.D., is a statistical geneticist in the laboratory of Drs. Patrick Ellinor and Steven Lubitz in the Cardiovascular Disease Initiative at the Broad Institute of MIT and Harvard. He received a Ph.D. degree from the Department of Biostatistics at Boston University with his focused research in statistical genetics. His research interests are developing and applying novel statistical methods to elucidate the genetic basis of complex diseases. To achieve this goal, he has been developing his analytic capabilities in genetics, statistics, and large-scale data processing. He is currently a member of the BioData Catalyst fellowship program. During his fellowship, he has used this foundation to elucidate the genetic basis of a common and complex human disease, atrial fibrillation. When he is not in the lab, he enjoys spending time with his family and two young children.

Michelle Daya, Ph.D., BioData Catalyst Fellows, Co-founder of Contextualize, LLC.



Michelle Daya, Ph.D. is a software engineer, data scientist and biomedical researcher. She started her career as a software engineer, and after working in this field for ~10 years, she pursued and obtained a PhD in human genetics at Stellenbosch University, South Africa. Through her PhD and recent work as Assistant Professor at the University of Colorado Anschutz Medical campus, Dr. Daya has hands-on experience wrangling large heterogeneous biomedical data sets on various computing platforms, developing bioinformatic pipelines and performing statistical modelling. In 2020, Dr. Daya was awarded a Biodata Catalyst fellowship. Her fellowship project entailed performing a large genome-wide and HLA association study of total serum IgE using NHLBI TOPMed and external data sets on the Seven Bridges platform. Currently she is a co-founder of Contextualize, LLC, building software solutions that capture domain knowledge, transforming data into insights.

Gary H. Gibbons, M.D., Director, National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health (NIH)



Gary H. Gibbons, M.D., is director of the National Heart, Lung, and Blood Institute (NHLBI) at the National Institutes of Health (NIH), where he oversees the third largest institute at the NIH, with an annual budget of more than \$3 billion and a staff of 917 federal employees. The NHLBI provides global leadership for research, training and education programs to promote the prevention and treatment of heart, lung and blood diseases and enhance the health of all individuals so that they can live longer and more fulfilling lives. Prior to being named director of the NHLBI, Gibbons served as a member of the National Heart, Lung, and Blood Advisory Council (NHLBAC) from 2009-2012. He was also a member of the NHLBI Board of Extramural Experts (BEE), a working group of the NHLBAC. Before joining the NHLBI, Dr. Gibbons served as the founding director of the Cardiovascular Research Institute, chairperson of the Department of Physiology, and professor of physiology and medicine at the Morehouse School of Medicine, in Atlanta. Under his leadership of the Cardiovascular Research Institute, Dr. Gibbons directed NIH-funded research in the fields of vascular biology, genomic medicine and the pathogenesis of vascular diseases. During his tenure, the Cardiovascular Research Institute emerged as a center of excellence, leading the way in discoveries related to the cardiovascular health of minority populations. Dr. Gibbons received several patents for innovations derived from his research in the fields of vascular biology and the pathogenesis of vascular diseases.

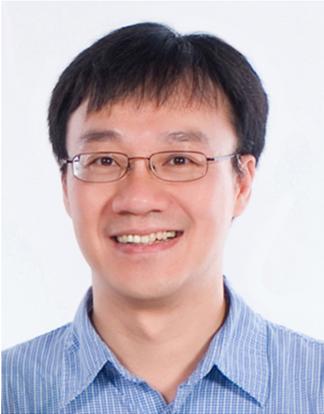
Dr. Gibbons earned his undergraduate degree from Princeton University in Princeton, N.J., and graduated *magna cum laude* from Harvard Medical School in Boston. He completed his residency and cardiology fellowship at the Harvard-affiliated Brigham and Women's Hospital in Boston. Prior to joining the Morehouse School of Medicine in 1999, Dr. Gibbons was a member of the faculty at Stanford University, from 1990-1996, and at Harvard Medical School from 1996-1999. Throughout his career, Dr. Gibbons has received numerous honors, including election to the Institute of Medicine of the National Academies of Sciences; selection as a Robert Wood Johnson Foundation Minority Faculty Development Awardee; selection as a Pew Foundation Biomedical Scholar; and recognition as an Established Investigator of the American Heart Association.

David Goff, M.D., Ph.D., Director, Division of Cardiovascular Sciences (DCVS), NHLBI, NIH



David C. Goff, Jr., M.D., Ph.D., is Director, Division of Cardiovascular Sciences, National Heart, Lung, and Blood Institute, National Institutes of Health. In this role, he leads a diverse team of scientists and administrators committed to turning discovery into cardiovascular health. Prior to joining the NHLBI, he served as Dean and Professor of Epidemiology in the Colorado School of Public Health and as Chair of the Department of Epidemiology and Prevention at the Wake Forest School of Medicine. He received an MD from the University of North Carolina and a PhD in epidemiology from the University of Texas-Houston School of Public Health. He trained in internal medicine at Baylor College of Medicine in Houston. He is an elected member of the American Epidemiological Society, and a Fellow of the American College of Physicians and the American Heart Association. He has served as a member of the Board of Directors for the Association of Schools and Programs of Public Health, President of the Board of Directors for the Denver Metro Division of the American Heart Association, Chair of the Council on Epidemiology and Prevention for the American Heart Association, and Chair of the Council on Quality of Care and Outcomes Research for the American Heart Association. The major focus of his research has been on developing, testing, and implementing better strategies for promoting cardiovascular health and preventing CVD. This work has involved 5 aspects, including etiologic research, efficacy trials, quality of care research, implementation research, and evidence synthesis. Etiologic research: He served as a Co-Investigator for several NHLBI-funded observational studies, including MESA, IRAS and ARIC. His most recent efforts focused on the CARDIA study, for which he served as Chair of the Steering Committee. He contributed to important randomized clinical trials, including ALLHAT, ACCORD, and SPRINT. In ALLHAT, he served at the Coordinating Center as a leader of the Lipid-Lowering Trial and as the primary liaison with the Regional Coordinators. In ACCORD and SPRINT, he served as a Clinical Center Network PI, member of the Steering Committee, and Chair of several subcommittees. In each case, these studies began with important unanswered questions about care for hypertension, dyslipidemia, or diabetes, and the results have influenced clinical care in major ways. He led several studies designed to test strategies to improve care in clinical practices, including AHA, CDC, and NHLBI-funded grants to test strategies to improve use of statins in coronary heart disease, ACE inhibitors and beta blockers in heart failure, and ATP III and JNC 7 guideline-based care in primary care practices. He directed an NHLBI-funded training grant that supported career development of scientists interested in this field. He led the HELP Prevent Diabetes Project, a community-based translation of the Diabetes Prevention Program (DPP). The program showed outstanding cost-effectiveness in the implementation project, and the model is now being evaluated in a dissemination project in NC. He participated in efforts to translate evidence into policy. He chaired the Working Group for the Public Health Action Plan to Prevent Heart Attacks and Stroke, and the Risk Assessment Working Group for Cardiovascular Risk Reduction for the NHLBI, ACC, and AHA. He served on the ACC/AHA Performance Measures Task Force, and Hypertension Guideline Committee.

Li-Yueh Hsu, D.Sc., Staff Scientist, Radiology and Imaging Sciences, Clinical Center, NIH



Li-Yueh Hsu, D.Sc., is a staff scientist at Radiology and Imaging Sciences Department of the NIH Clinical Center in Bethesda Maryland. He held a staff scientist position at National Heart, Lung and Blood Institute from 2002 to 2020. Dr. Hsu received his D.Sc. degrees in biomedical engineering from the George Washington University in Washington D.C in 1999. He is a senior member of the Institute of Electrical and Electronics Engineers and a frequent reviewer for several international journals and conferences. His work on multi-modality cardiac imaging has been published in many leading medical and engineering journals and proceedings. His broader research interests include multi-dimensional medical imaging, image computing, artificial intelligence, machine learning, computer vision, pattern recognition, computational modeling in biology and physiology. Prior to joining the NIH, Dr. Hsu was in the private sector developing computer-aided detection and diagnosis products for early-stage lung cancer.

Jay Humphrey, Ph.D., John C. Malone Professor of Biomedical Engineering and Chair, Yale University



Jay D. Humphrey Ph.D. is John C. Malone Professor and Chair of Biomedical Engineering at Yale University. He received the Ph.D. in Engineering Science and Mechanics from The Georgia Institute of Technology and completed a post-doctoral fellowship in Medicine - Cardiovascular at Johns Hopkins University. His research and teaching focuses on vascular mechanics and mechanobiology, with particular interest in hypertension, aneurysms, vascular aging, and tissue engineering. He has authored a graduate textbook (Cardiovascular Solid Mechanics), an undergraduate textbook (An Introduction to Biomechanics), and a handbook (Style and Ethics of Communication in Science and Engineering) and published 325+ archival journal papers. He served for 10 years as founding co-editor for the journal Biomechanics and Modeling in Mechanobiology, for 12 years on the World Council for Biomechanics, including as Chair of the Technical Program of the 2014 World Congress in Biomechanics, and served for two years as Chair of the US National Committee on Biomechanics. He is a Fellow of the American Institute of Medical and Biological Engineering, the International Academy of Medical and Biological Engineering, and the American Society of Mechanical Engineers, from which he received the H.R. Lissner Medal. He lives with his wife Rita of 39 years in Branford, CT.

Erin Iturriaga, D.N.P, M.S.N., R.N., Program Officer, Clinical Trials Specialist, DCVS, NHLBI



Dr. Iturriaga brings a nursing science and clinical trials expertise to the Division of Cardiovascular Sciences at the NHLBI. In her roles as a program officer and clinical trials specialist, she oversees a diverse portfolio of grants from basic science to transformative technology. She also oversees large clinical trials within her branch and led several initiatives that helped transform the use of technology to prevent, monitor or treat heart, lung, and blood diseases. She currently co leads the Clinical Studies Core for the Rapid Acceleration of Diagnostics (RADx) using Technology. She has worked on common data elements and data standards since her time working at the National Cancer Institute on the Cancer Bioinformatic Grid (caBIG) project and received a group award for originating SCORE, developing early phase clinical trial infrastructure and disseminating bioinformatics applications supporting the DCP Phase I/II Cancer Prevention Consortia. Dr. Iturriaga currently serves on the NHLBI Data Science Workgroup and the NHLBI/Division of Cardiovascular Sciences Workgroup on social determinants of health and health disparities. Previously, she served on the Tech4Aging White House Task Force, Office of Science and Technology, President Council of Advisors on Science and Technology (PCAST). She received her doctorate degree from Yale University, Yale School of Nursing.

Jonathan Kaltman, M.D., Senior Scientific Advisor/Lead in Data Science, NHLBI



Jonathan Kaltman, M.D. is a Senior Scientific Advisor and Lead in Data Science at the National Heart, Lung, and Blood Institute and is Adjunct Professor of Pediatrics at Children’s National Medical Center. At NHLBI, Dr. Kaltman provides leadership on NHLBI’s scientific direction in data science for large-scale research programs of national and international scope, including advising NHLBI senior leadership on the development, implementation and management of data science programs/projects to advance the mission and strategic goals of the NHLBI across heart, lung, blood, and sleep (HLBS) conditions; developing and coordinating diverse partnerships with other Institutes/Centers, Agencies, and external partners on advancing data science; and representing NHLBI by serving as a designated spokesperson to internal and external groups and public forums on matters pertaining to data science. He co-leads the development and evolution of BioData Catalyst, a cloud-based ecosystem supporting curation and analysis of large, multi-dimensional data, and is the chair of the Institute’s Data Science Working Group, which strategizes about Institute-wide data science initiatives.

George Em Karniadakis, Ph.D., Professor of Applied Mathematics in the Center for Fluid Mechanics, Brown University



George Karniadakis received his S.M. and Ph.D. from Massachusetts Institute of Technology (1984/87). He was appointed Lecturer in the Department of Mechanical Engineering at MIT and subsequently he joined the Center for Turbulence Research at Stanford / Nasa Ames. He joined Princeton University as Assistant Professor in the Department of Mechanical and Aerospace Engineering and as Associate Faculty in the Program of Applied and Computational Mathematics. He was a Visiting Professor at Caltech in 1993 in the Aeronautics Department and joined Brown University as Associate Professor of Applied Mathematics in the Center for Fluid Mechanics in 1994. After becoming a full professor in 1996, he continued to be a Visiting Professor and Senior Lecturer of Ocean/Mechanical Engineering at MIT. He is an AAAS Fellow (2018-), Fellow of the Society for Industrial and Applied Mathematics (SIAM, 2010-), Fellow of the American Physical Society (APS, 2004-), Fellow of the American Society of Mechanical Engineers (ASME, 2003-) and Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA, 2006-). He received the SIAM/ACM Prize on Computational Science & Engineering (2021), the Alexander von Humboldt award in 2017, the SIAM Ralf E Kleinman award (2015), the J. Tinsley Oden Medal (2013), and the CFD award (2007) by the US Association in Computational Mechanics. His h-index is 110 and he has been cited over 57,000 times.

Sanmi, Koyejo, Ph.D., Assistant Professor, Department of Computer Science, University of Illinois at Urbana-Champaign



Sanmi (Oluwasanmi) Koyejo is an Assistant Professor in the Department of Computer Science at the University of Illinois at Urbana-Champaign. Koyejo's research interests are in developing the principles and practice of trustworthy machine learning. Additionally, Koyejo focuses on applications to neuroscience and healthcare. Koyejo completed his Ph.D. in Electrical Engineering at the University of Texas at Austin, advised by Joydeep Ghosh, and completed postdoctoral research at Stanford University. His postdoctoral research was primarily with Russell A. Poldrack and Pradeep Ravikumar. Koyejo has been the recipient of several awards, including a best paper award from the conference on uncertainty in artificial intelligence (UAI), a Sloan Fellowship, a Kavli Fellowship, an IJCAI early career spotlight, and a trainee award from the Organization for Human Brain Mapping (OHBM). Koyejo serves on the board of the Black in AI organization.

Sweta Ladwa, M.P.H., P.M.P., Senior Scientific Program Manager (Contract), Information Technology and Applications Center (ITAC), NHLBI



Mrs. Sweta Ladwa is a Senior Scientific Program Manager serving the Information Technology and Applications Center (ITAC) within the Office of Management at NHLBI within the NIH. She supports institute data science initiatives and leads data management for NHLBI's cloud-based data science ecosystem, BioData Catalyst, where Heart, Lung, Blood, and Sleep (HLBS) researchers can go to find, search, access, share, store, and compute on petabytes of large-scale data sets. The NHLBI BioData Catalyst Ecosystem serves as a novel data science resource where users from a variety of disciplines and levels can perform various operations and access newly available scientific data to make significant strides in research and scientific discovery. Mrs. Ladwa supports enabling interoperable data access across various NIH cloud data ecosystems as part of NIH Office of Data Science Strategy's (ODSS) Cloud Platform Interoperability (NCPI) program. She also contributes to trans-NIH efforts related to the recent SARS COV-2 pandemic, including the Collaboration to Assess Risk and Identify long-term outcomes for Children with COVID-19 (CARING) as a collaboration between NICHD, NIAID, and NHLBI, and the Post-Acute Sequelae of COVID-19 (PASC) taskforce. Prior to joining the NHLBI team, Mrs. Ladwa served as a consultant to various agencies within the Department of Health and Human Services (HHS) including the Centers for Medicare and Medicaid Services (CMS), The National Cancer Institute (NCI/NIH), and the Office of the National Coordinator for Health IT (ONC). She led numerous efforts relating to Health Information Technology, Epidemiology, and Big Data in areas such as data aggregation, coordination, and visualization for rare and common cancers, development of FHIR Implementation Specifications for PCOR and other use cases, and curating de-novo and de-facto standards for biomedical research. Mrs. Ladwa earned her master's degree in Public Health, with a focus in Epidemiology and Biostatistics, from The George Washington University, and her bachelor's degree in Biology and Chemistry from Virginia Commonwealth University.

Alison Leaf, Ph.D., Senior Program Manager, Seven Bridges



Dr. Alison Leaf is a Senior Program Manager at Seven Bridges, the industry-leading bioinformatics ecosystem provider enabling researchers to extract meaningful insights from genomic and phenotypic data in order to advance precision medicine. As a Senior Program Manager, Dr. Leaf has spent the last 3 years managing Seven Bridges' efforts on the National Heart, Lung, and Blood Institute's BioData Catalyst project. She led a team of engineers and bioinformaticians in developing the cloud-based workspace environment "NHLBI BioData Catalyst Powered by Seven Bridges," which provides tools, applications, and workflows to enable researchers to find, access, share, store and compute on large scale datasets in secure workspaces. In addition to overseeing platform development, she works closely with researchers to ensure their success on the platform. Prior to joining Seven Bridges, Dr. Leaf was a Hellman Fellow in Science and Technology Policy at the American Academy of Arts and Sciences where she led initiatives to advance issues at the intersection of science and society. Dr. Leaf received her PhD in Cell Biology from the University of California, San Francisco and her Bachelor of Arts in Biochemistry from Cornell University.

Victor McCrary, Jr., Ph.D., Vice President for Research and Graduate Programs at the University of the District of Columbia, National Science Board Vice Chair



Victor R. McCrary, Vice President for Research and Graduate Programs at the University of the District of Columbia, leads the growth, development, direction and oversight of the University's research enterprise. He has held similar research leadership positions at the Johns Hopkins University Applied Physics Laboratory, Morgan State University, and the University of Tennessee. He is a change agent and serial innovator, responsible for developing comprehensive, sustainable research strategies, fostering trans-disciplinary research and technology commercialization, and expanding research programs via engagement with federal and state agencies and private entities, including his significant contributions to Morgan State University in being elevated to R2 high research status in the Carnegie Classification of Institutions of Higher Education. Dr. McCrary served two terms as the national president of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE). He is a Fellow of the American Chemical Society. He received his doctoral degree in chemistry from Howard University, a master's degree in engineering from the University of Pennsylvania, and a bachelor's degree in chemistry from The Catholic University of America.

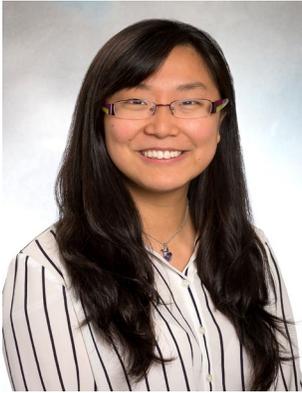
Dr. McCrary has authored and co-authored more than 60 technical papers and co-edited two books during his career at AT&T Bell Laboratories and the National Institute of Standards and Technology (NIST). He has received numerous honors and awards including co-recipient of the U.S. Department of Commerce's Gold Medal in 2000 for the development of the first global electronic book industry standards and the 2002 Percy Julian Award by the National Organization of Black Chemists and Chemical Engineers. In 2011, he was honored as Scientist of the Year by the Annual Black Engineer of the Year Award (BEYA) STEM Conference. In October 2016, President Barack Obama appointed Dr. McCrary to serve on the National Science Board which oversees the National Science Foundation. He chaired a task force which recently produced the report, "The Skilled Technical Working: Crafting America's Science and Engineering Enterprise", and in May 2020, was elected as the Vice Chair of the National Science Board.

Wendy Nilsen, Ph.D., Program Director, Smart and Connected Health, Directorate for Computer & Information Science & Engineering, National Science Foundation



Wendy J. Nilsen, Ph.D., is the acting deputy division director in the Information and Intelligent Systems Division of the Computer and Information Science and Engineering Directorate at the National Science Foundation (NSF). She also is the lead program director in the Smart Health program. Her work has focused on the intersection of computing and human functioning. Her interests span the areas of sensing, analytics, cyber-physical systems, information systems, machine learning, artificial intelligence and robotics. She also serves as cochair of the Health Information Technology Research and Development working group of the Networking and Information Technology Research and Development Program serving on numerous federal technology initiatives. Prior to joining NSF, Dr. Nilsen was at the National Institutes of Health.

Dandi Qiao, Ph.D., BioData Catalyst Fellows, Brigham and Women's Hospital



Dr. Dandi Qiao, Assistant Professor of Medicine, Channing Division of Network Medicine, Department of Medicine, at the Brigham and Women's Hospital and Harvard Medical School. She obtained her doctoral degree in the Department of Biostatistics at the Harvard T.H. Chan School of Public Health. She was trained as a statistical geneticist and her research has focused on the development and application of statistical approaches and algorithms to the genetic study of complex diseases, including Chronic Obstructive Pulmonary Disease (COPD) in particular. She is the principal investigator of a mentored career development award (K01) to study genetic determinants and epistasis of COPD, and she is a BioData Catalyst Fellow with an aim to identify genetic variants associated with COPD-related imaging phenotypes using large Whole-genome sequencing data on the cloud-based platform. As a methodologist, she has developed several novel methods for analyzing rare variant data and massively parallel reporter assay (MPRA) data and has published multiple R packages/software.

Danda Rawat, Ph.D., Director of Howard University Data Science and Cybersecurity Center (DSC2) Professor of Electrical Engineering and Computer Science, Howard University



Dr. Danda B. Rawat is a Professor in the Department of Electrical Engineering & Computer Science (EECS), Founder and Director of the Howard University Data Science and Cybersecurity Center, Director of DoD Center of Excellence in Artificial Intelligence & Machine Learning (CoE-AIML), Graduate Program Director of Howard CS Graduate Programs at Howard University, Washington, DC, USA. Dr. Rawat is engaged in research and teaching in the areas of cybersecurity, machine learning, big data analytics and wireless networking for emerging networked systems including cyber-physical systems, eHealth, Internet-of-Things, multi domain operations, smart cities, software defined systems and vehicular networks. He has secured over \$16 million in research funding from the US National Science Foundation (NSF), US Department of Homeland Security (DHS), US National Security Agency (NSA), US Department of Energy, National Nuclear Security Administration (NNSA), DoD and DoD Research Labs, Industry (Microsoft, Intel, etc.) and private Foundations. Dr. Rawat is the recipient of NSF CAREER Award in 2016, Department of Homeland Security (DHS) Scientific Leadership Award in 2017, Provost's Distinguished Service Award 2021, Researcher Exemplar Award 2019 and Graduate Faculty Exemplar Award 2019 from Howard University, the US Air Force Research Laboratory (AFRL) Summer Faculty Visiting Fellowship 2017, Outstanding Research Faculty Award (Award for Excellence in Scholarly Activity) at GSU in 2015, the Best Paper Awards (IEEE CCNC, IEEE ICII, BWCA) among others. He has delivered over 30 Keynotes and invited speeches at international conferences and workshops. Dr. Rawat has published over 200 scientific/technical articles and 11 books. He has been serving as an Editor/Guest Editor for over 70 international journals including the Associate Editor of IEEE Transactions of Service Computing, Editor of IEEE Internet of Things Journal, Associate Editor of IEEE Transactions of Network Science and Engineering and Technical Editors of IEEE Network. He has been in Organizing Committees for several IEEE flagship conferences. He served as a technical program committee (TPC) member for several international conferences. Dr. Rawat received the Ph.D. degree from Old Dominion University, Norfolk, Virginia. Dr. Rawat is a Senior Member of IEEE and ACM, a member of ASEE and AAAS, and a Fellow of the Institution of Engineering and Technology (IET).

Kenneth Rice, Ph.D., Professor, Department of Biostatistics, University of Washington



Dr. Kenneth Rice is a Professor of Biostatistics at the University of Washington, where he has worked since his appointment as Assistant Professor in 2004. Prior to this, he trained and worked at the University of Cambridge, in the UK. His research interests include methods for genetic association studies, in which he currently leads a coordinating center for NHLBI's large "TOPMed" study, meta-analysis, and Bayesian methods. He has taught a wide variety of graduate courses, advised 5 PhD students, 6 MS students, has published in excess of 200 peer-reviewed articles, and led multiple grants as PI including a T32 training grant. He is regularly asked to present his work around the world, and to teach short courses in the US and abroad. In 2018 he was elected a Fellow of the American Statistical Association, an honor intended for the top one third of 1% of its membership.

Asif Rizwan, Ph.D., Program Officer, Division of Blood Diseases and Resources (DBDR), NHLBI



Asif Rizwan, Ph.D., is a program officer at the Division of Blood Diseases and Resources at the National Heart, Lung, and Blood Institute (NHLBI), part of the National Institutes of Health (NIH). In this role, Dr. Rizwan oversees research activities and research training on the causes and prevention of blood diseases and disorders. Dr. Rizwan's major interests involve Data Sciences, Mathematical and Computational Modeling, Bioengineering and Health Equity through Technology. Prior to joining the NHLBI in 2019, Dr. Rizwan worked at the Congressionally Directed Medical Research Programs (CDMRP) where he was a Science Officer and provided scientific, program and portfolio management, and administrative support. Dr. Rizwan conducted his postdoctoral training in the Division of Cancer Imaging Research (DCIR) within the Russell H. Morgan Department of Radiology and Radiological Science at the Johns Hopkins University School of Medicine. He has published important works in multimodal molecular and cellular imaging to investigate and visualize molecular events that drive cancer growth, invasion, and metastasis. Dr. Rizwan received his Doctor of Philosophy in Physiology, Biophysics and System Biology from Cornell University and master's degree in Biomedical Engineering from the University of Texas at Arlington.

Dave Roberson, B.S., Community Engagement for Biomedical Research Platforms, Seven Bridges



David Roberson is a Community Associate at Seven Bridges. In this role he leads workshops, develops tutorials, and engages research groups in biomedical cloud research platforms that are powered by Seven Bridges. Each platform has a vibrant community associated with it. Seven Bridges is part of the National Heart Lung and Blood Institute's BioData Catalyst Ecosystem, the National Cancer Institute's Cancer Research Data Commons and the Gabriella Miller Kids First Pediatric Research Program. Dave has successfully on-boarded and guided 3 cohorts of National Heart, Lung and Blood Institute BioData Catalyst Fellows performing research on the ecosystem. Prior to joining Seven Bridges, David worked for over 10 years at the NCI's Cancer Genomics Research Laboratory as a wet lab assay developer and bioinformatician. He received a Bachelor of Science in Biology from James Madison University.

Beth Sheets, M.S., B.S., Program Manager, UC Santa Cruz Genomics Institute



Beth Sheets is a Program Manager for the Computational Genomics Platform at the University of California, Santa Cruz (UCSC) Genomics Institute. Beth received her Master's in Biology from San Francisco State University and her Bachelor's in Biology from University of Alabama at Birmingham. She was previously a research scientist in population genomics and bioinformatics at Stanford University. Using her experiences from a decade in research, she guides software teams to build cloud-based genomic science resources that are accessible and useful to researchers and clinicians. She currently works with two collaborative NIH initiatives, NHLBI BioData Catalyst and NHGRI AnVIL, which are bringing researchers into secure, collaborative, cloud-based workspaces that offer petabytes of hosted data and hundreds of scientific tools. Her team builds Dockstore.org, the scientific tool-sharing repository for these two NIH cloud initiatives, which provides researchers with the features and training to publish their bioinformatics pipelines using FAIR (Findable, Accessible, Interoperable, Reusable) standards. In all her work, she advocates for open, equitable and reproducible science.

Xin Tian, Ph.D., Mathematical Statistician, Division of Intramural Research, NHLBI



Xin Tian, Ph.D., is a senior mathematical statistician at Office of Biostatistics Research, Division of Intramural Research, National Heart, Lung, and Blood Institute, NIH. She is also an adjunct professor of statistics at the George Washington University, and an adjunct professor of medicine in School of Medicine, University of Maryland. She joined NHLBI after receiving Ph.D. in statistics from Rutgers University in 2003. Her research interests include design and analysis of clinical trials, longitudinal data analysis, disease risk tracking, and machine learning with applications to big medical studies in cardiovascular, pulmonary, and hematological diseases as well as clinical trials of stem cell transplantation.

Fayuan Wen, Ph.D., Post-doctoral Associate, Howard University



Dr. Fayuan Wen is a post-doc associate at the Center for Sickle Cell Disease, College of Medicine, Howard University. She has over 10 years of research experience in cellular and molecular biology with a specific training and expertise in bioinformatic data analysis for next-generation sequencing (NGS) including RNA-seq and Whole Genome Sequencing (WGS). During her PhD study and post-doc training, she developed the methodology and performed bioinformatic analysis of the proposed research in different area including whole genome sequencing analysis of sickle cell disease, host and virus interaction and cells' transcriptional response to chemical treatment. Dr. Wen is a member of Trans-Omics for Precision Medicine, National Heart, Lung and Blood Institute (TOPMED NHLBI) and American Society of Human Genetics (ASHG). She has been serving as a guest editor for the biotech journals in the field. She has been teaching in the areas of Biology, Microbiology and Bioinformatics. Since 2018, she has been collaborating with not only colleagues from Sickle Cell Disease working group from different institutes but also PIs and bioinformaticians from NHLBI/NIH, DCC (Data Coordinating Center) at the university of Washington and IRC (Informatics Research Center) at the University of Michigan to work on the TOPMed WGS project. Her current research focuses on identifying novel genetic markers of iron overload in sickle cell disease (SCD) patients in the TOPMed WGS project. The goal of the proposed research is to identify novel genetic markers of iron overload and validate previously identified mutation and genes in SCD. Dr. Wen is the recipient of Excellent Service Award 2018 from the Center for Sickle Cell Disease, Howard University. In 2020, she won an NHLBI award to become one of the first cohort of BioData Catalyst fellows. During the one-year fellowship, she has been actively analyzing WGS data using available software and programming in the cloud working environment to fulfil her project.

Colin Wu, Ph.D., Program Officer – Math Statistician, Office of Biostatistics Research, NHLBI



Dr. Colin O. Wu is a senior Mathematical Statistician at the Office of Biostatistics Research, Division of Intramural Research, National Heart, Lung and Blood Institute (NHLBI)NIH. He is also an adjunct professor of statistics at Georgetown University and the George Washington University. He received Ph.D. in statistics from the University of California, Berkeley, and was with the Johns Hopkins University before joining NHLBI. Dr. Wu’s research is focused on methods of machine learning and statistical modeling involving large and complex data and their applications in studies of heart, lung, blood and sleep disorders. Dr. Wu is an elected member of the International Statistical Institute and fellow of the American Statistical Association. He has extensive collaborative experience with hematologists, cardiologists, radiologists and other scientists at NHLBI and academic institutions.

Amber Voght, User Engagement Specialist, Renaissance Computing Institute



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