SOFTWARE AND AI/ML ALGORITHMS

Faculty Profiles | Johns Hopkins University

JOHNS HOPKINS UNIVERSITY

JOHNS HOPKINS TECHNOLOGY VENTURES

RAMA CHELLAPPA, PH.D.

[Chellappa Website]

Bloomberg Distinguished Professor, Electrical and Computer Engineering and Biomedical Engineering

AFFLIATIONS

Chief Scientist, Johns Hopkins Institute for Assure Autonomy; National Academy of Engineering; lifetime fellow, Institute of Electrical and Electronics Engineers (IEEE)

AREAS OF SPECIALIZATION

Computer vision, computational medicine, biomedical data science, facial recognition technology including developing detailed face models based on shape, appearance, texture, and bone and muscle structure, machine learning and statistical pattern recognition, and gait analysis.

RAMA CHELLAPPA, PH.D.

PUBLICATIONS

- A Synthesis-based Approach for Thermal-to-Visible Face Verification
- Artificial intelligence and body composition
- Multi-modal human authentication using silhouettes, gait and rgb
- Soft-NMS--improving object detection with one line of code
- Domain adaptation for object recognition: An unsupervised approach

J. WEBSTER STAYMAN, PH.D.

[Stayman Website]

Assistant Professor, Biomedical Engineering; Electrical and Computer Engineering

AFFLIATIONS

Advanced Imaging Algorithms and Instrumentation Laboratory; The Imaging for Surgery, Therapy, and Radiology Lab (I-STAR Lab).

AREAS OF SPECIALIZATION

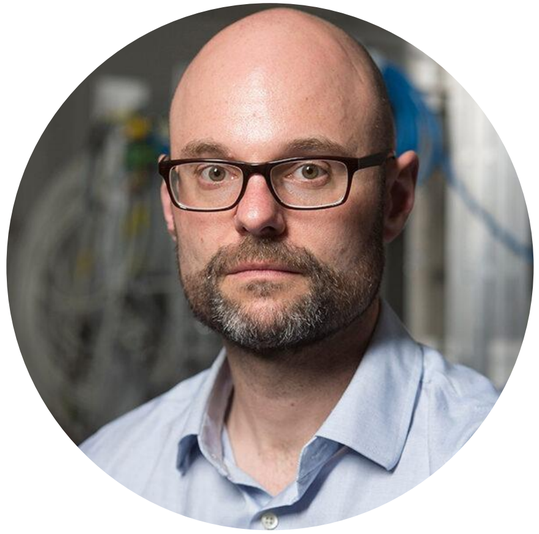
Medical imaging, sophisticated image reconstruction algorithms, optimization (including x-ray, CT, cone-beam CT, phase contrast CT), acquisition strategies for high-performance on low-fidelity or sparse data, device design and optimization, adaptive imaging, computational imaging, task-based acquisition, reconstruction, machine learning, and estimation theory.

J. WEBSTER STAYMAN, PH.D.

PUBLICATIONS

- A dedicated cone-beam CT system for musculoskeletal extremities imaging: Design, optimization, and initial performance characterization
- Mobile C-arm cone-beam CT for guidance of spine surgery: image quality, radiation dose, and integration with interventional guidance
- Self-calibration of cone-beam CT geometry using 3D–2D image registration
- Dedicated cone-beam CT system for extremity imaging

WOJTEK ZBIJEWSKI, PH.D.



[Zbijewski Website]

Assistant Professor, Biomedical Engineering

AFFLIATIONS

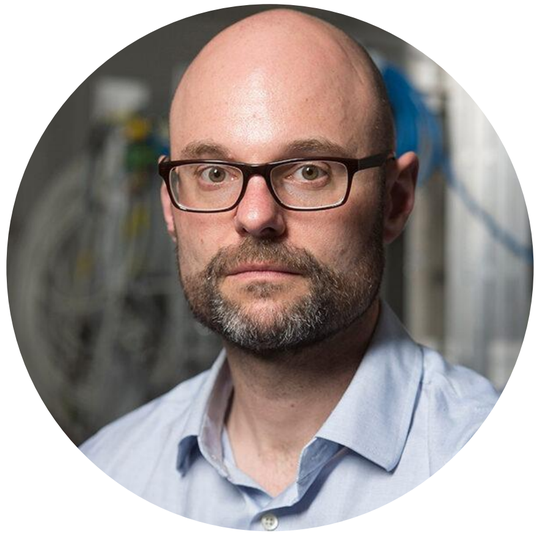
Carnegie Center for Surgical Innovation; The Imaging for Surgery, Therapy, and Radiology Lab (I-STAR Lab).

AREAS OF SPECIALIZATION

Medical imaging, optimization of X-ray CT imaging chain, modeling and evaluation of imaging systems, CT algorithms, quantitative CT and cone-beam CT, imaging biomarkers of bone and joint health, and musculoskeletal radiology.

WOJTEK ZBIJEWSKI, PH.D.

JOHNS HOPKINS
TECHNOLOGY VENTURES



PUBLICATIONS

- Modelling the physics in the iterative reconstruction for transmission computed tomography
- spektr 3.0—A computational tool for x-ray spectrum modeling and analysis
- Dedicated cone-beam CT system for extremity imaging
- Analysis of Fourier-domain task-based detectability index in tomosynthesis and cone-beam CT in relation to human observer performance

KATSUYUKI (KEN) TAGUCHI, PH.D., M.SC.

[Taguchi Website]

Professor, Radiology and Radiological Science

AFFLIATIONS

I-STAR Laboratory; KU Lab

AREAS OF SPECIALIZATION

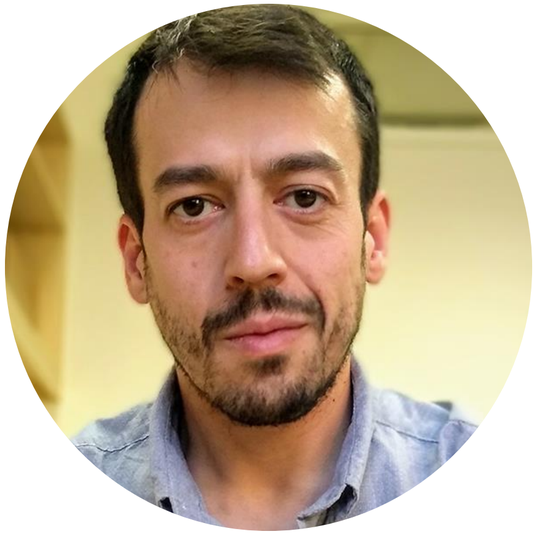
Advanced CT imaging technologies including cone-beam (multi-slice) CT, cone-bean cardiac-reconstruction algorithm for 64-slice CT; medical imaging, 3-D and 4D image reconstruction, photon counting, spectral CT

KATSUYUKI (KEN) TAGUCHI, PH.D., M.SC.

PUBLICATIONS

- Vision 20/20: single photon counting x-ray detectors in medical imaging
- Algorithm for image reconstruction in multi-slice helical CT
- Achieving routine submillisievert CT scanning: report from the summit on management of radiation dose in CT

ALEJANDRO SISNIEGA-CRESPO, PH.D.



[Sisniega-Crespo Website]

Assistant Research Professor, Biomedical Engineering

AFFLIATIONS

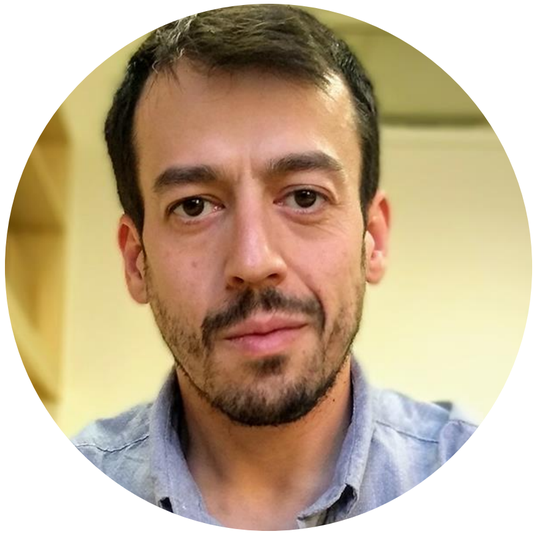
Carnegie Center for Surgical Innovation; Imaging for Surgery, Therapy, and Radiology Lab (I-STAR)

AREAS OF SPECIALIZATION

3D image reconstruction, high-resolution cone-beam CT, Monte Carlo models, high-speed computing, image processing, diagnostic imaging, image-guided procedures

ALEJANDRO SISNIEGA-CRESPO, PH.D.

JOHNS HOPKINS
TECHNOLOGY VENTURES



PUBLICATIONS

- 3.0—A computational tool for x-ray spectrum modeling and analysis
- Monte Carlo study of the effects of system geometry and antiscatter grids on cone-beam CT scatter distributions
- High-fidelity artifact correction for cone-beam CT imaging of the brain
- Motion compensation in extremity cone-beam CT using a penalized image sharpness criterion
- Modeling and design of a cone-beam CT head scanner using task-based imaging performance optimization

BRIAN S. CAFFO, PH.D.

[Caffo Website]

Professor of Biostatistics at the Bloomberg School of Public Health; Department of Biomedical Engineering

AFFLIATIONS

Statistical Methods and Applications for Research in Technology (SMART at JHU); JHU Data Science Lab

AREAS OF SPECIALIZATION

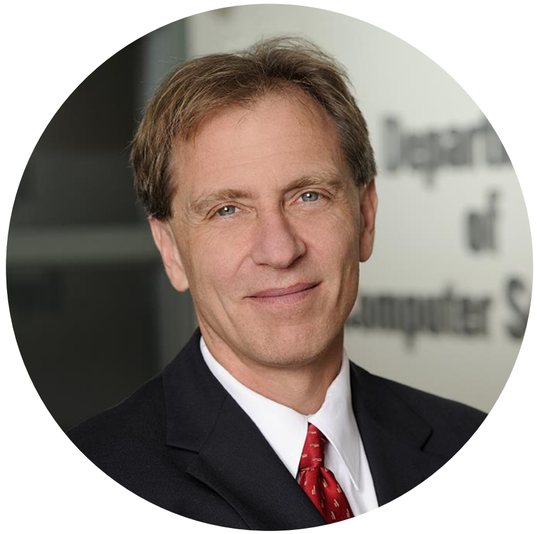
Big, complex data in the neurosciences; statistics in neuroimaging and neuroscience

BRIAN S. CAFFO, PH.D.

PUBLICATIONS

- Neuroconductor: An R platform for medical imaging analysis
- Spatial Bayesian variable selection models on functional magnetic resonance imaging time-series data
- A parcellation based nonparametric algorithm for independent component analysis with application to fMRI data

GREGORY D. HAGER, PH.D.



[Hager Website]

Mandell Bellmore Professor of Computer Science, Department of Electrical and Computer Engineering & Department of Mechanical Engineering

AFFLIATIONS

Founding Director, Malone Center for Engineering in Healthcare; IEEE Fellow; former deputy director of the NSF Engineering Research Center for Surgical Systems and Technology

AREAS OF SPECIALIZATION

Collaborative and vision-based robotics, rea-time computer vision, time-series analysis of image data, medical applications of image analysis and robotics

LAURENT YOUNES, PH.D.

[Younes Website]

Professor and Chair, Applied Mathematics and Statistics

AFFLIATIONS

Member, JHU Center for Imaging Science; Fellow of the Institute for Mathematical Statistics

AREAS OF SPECIALIZATION

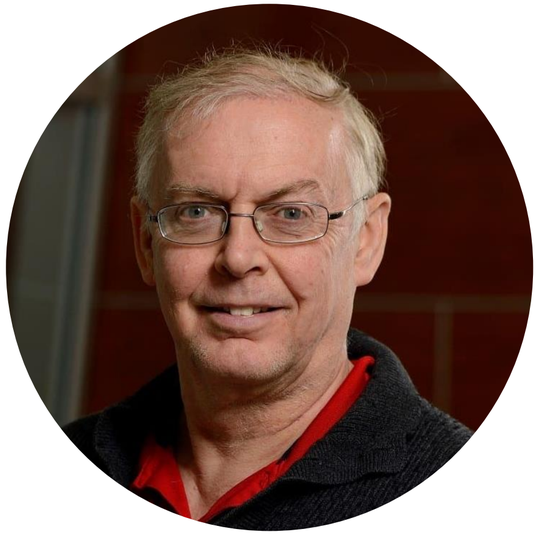
Shape recognition algorithms and image analysis, as applied to medical imaging data; computational anatomy; Indications of focus: Alzheimer's Disease, Parkinson's Disease, cardiac disease, mental illness

LAURENT YOUNES, PH.D.

PUBLICATIONS

- Shape analysis of hypertrophic and hypertensive heart disease using MRI-based 3D surface models of left ventricular geometry
- Hypothetical preclinical Alzheimer disease groups and longitudinal cognitive change
- Ex vivo 3D diffusion tensor imaging and quantification of cardiac laminar structure

ALAN L. YUILLE, PH.D.



[Yuille Website]

Bloomberg Distinguished Professor, Cognitive Science & Computer Science

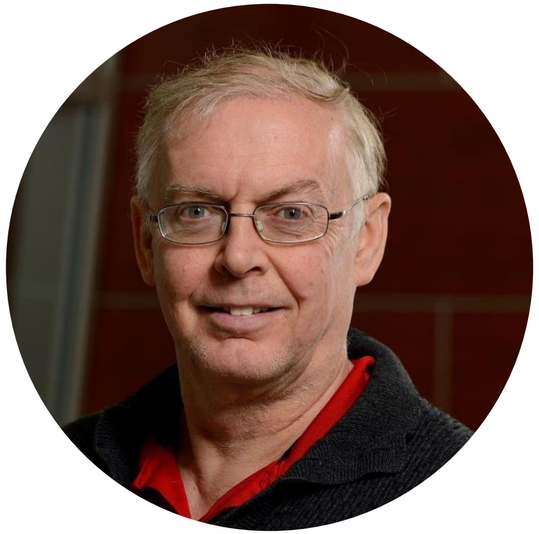
AFFLIATIONS

Director, Research Group on Compositional Cognition, Vision, and Learning; Center for Brains, Minds and Machines (MIT); NSF Expedition in Computing, Visual Cortex on Silicon

AREAS OF SPECIALIZATION

Computer vision, vision science, medical image analysis, AI and neural networks, neuroscience

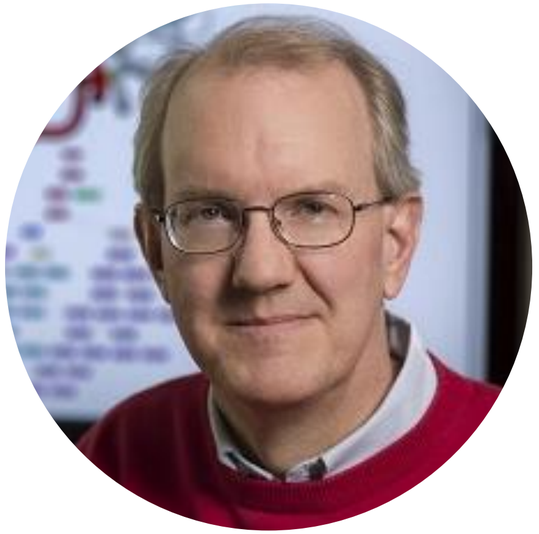
ALAN L. YUILLE, PH.D.



PUBLICATIONS

- Deeplab: Semantic image segmentation with deep convolutional nets, atrous convolution, and fully connected crfs
- Transunet: Transformers make strong encoders for medical image segmentation

JERRY PRINCE, PH.D.



Prince Website

William B. Kouwenhoven Professor, Department of Electrical and Computer Engineering

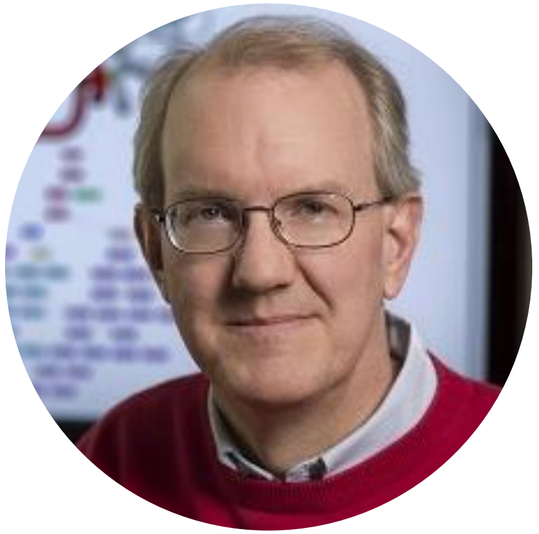
AFFLIATIONS

Fellow, Institute of Electrical and Electronics Engineering (IEEE); Fellow, American Institute for Medical and Biological Engineering; Medical Image Computing and Computer Assisted Interventions (MICCAI) Society

AREAS OF SPECIALIZATION

3-D medical image reconstruction, registration, segmentation, and shape and motion analysis; optical coherence tomography (OCT) imaging of the retina; image processing and computer vision, CT, MRI

JERRY PRINCE, PH.D.



PUBLICATIONS

- Evaluation of sparse-view reconstruction from flat-panel-detector cone-beam CT
- HACA3: A unified approach for multi-site MR image harmonization
- Longitudinal deep network for consistent OCT layer segmentation
- ESPRESO: An algorithm to estimate the slice profile of a single magnetic resonance image

YONG DU, PH.D., M.S.

[Du Website]

Associate Professor of Radiology and Radiological Science

AFFLIATIONS

Senior Member, Institute of Electrical and Electronics Engineers (IEEE)

AREAS OF SPECIALIZATION

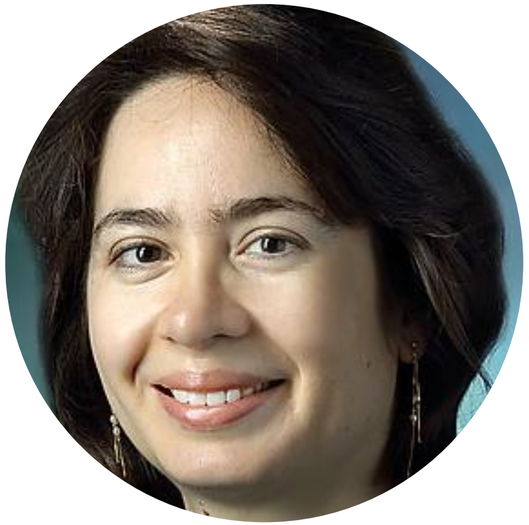
SPECT and PET imaging physics, image reconstruction, photon transport simulation and modeling, quantitative image biomarker and data analysis, tracer kinetic modeling

YONG DU, PH.D., M.S.

PUBLICATIONS

- Transmorph: Transformer for unsupervised medical image registration
- PET imaging of microglia by targeting macrophage colony-stimulating factor 1 receptor (CSF1R)
- ViT-V-Net: Vision Transformer for Unsupervised Volumetric Medical Image Registration
- Imaging CAR T cell therapy with PSMA-targeted positron emission tomography

ANDREIA VASCONCELLOS FARIA, M.D., PH.D.



[Faria Website]

Associate Professor, Radiology and Radiological Science

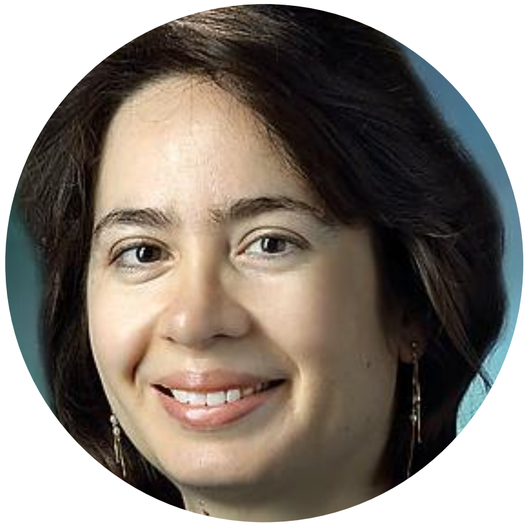
AFFLIATIONS

Founder, Faria Lab

AREAS OF SPECIALIZATION

Image post-processing, quantification, and multimodal MRI analysis; MRI; DTI; fMRI: atlas-based analysis; automated MRI segmentation; stroke; psychosis; aphasia

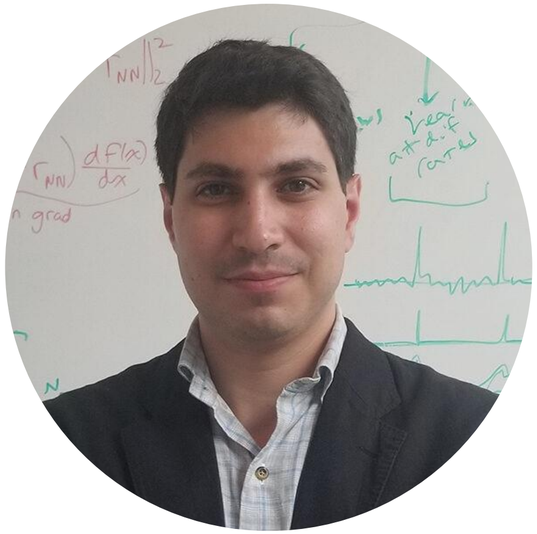
ANDREIA VASCONCELLOS FARIA, M.D., PH.D.



PUBLICATIONS

- Stereotaxic white matter atlas based on diffusion tensor imaging in an ICBM template
- Atlas-based whole brain white matter analysis using large deformation diffeomorphic metric mapping: application to normal elderly and Alzheimer's disease participants
- MRICloud: delivering high-throughput MRI neuroinformatics as cloud-based software as a service

ADAM CHARLES, PH.D.



[Charles Website]

Assistant Professor, Biomedical Engineering

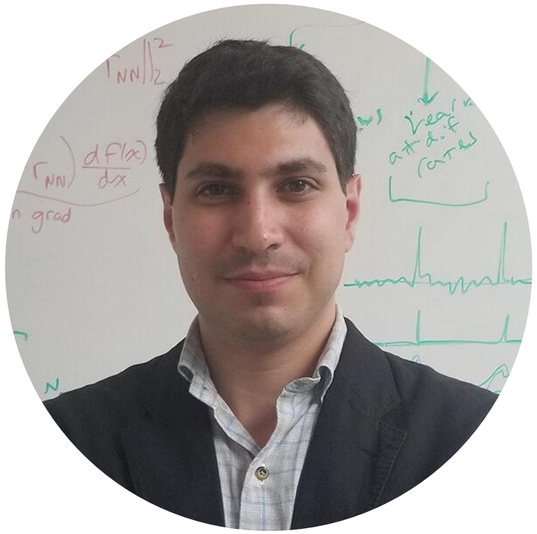
AFFLIATIONS

Center for Imaging Science (CIS); Kavli Neuroscience Discovery Institute (NDI); Mathematical Institute for Data Science (MINDS)

AREAS OF SPECIALIZATION

Machine learning and signal processing for neural imaging, data analysis, remote sensing, theoretical/computational neuroscience

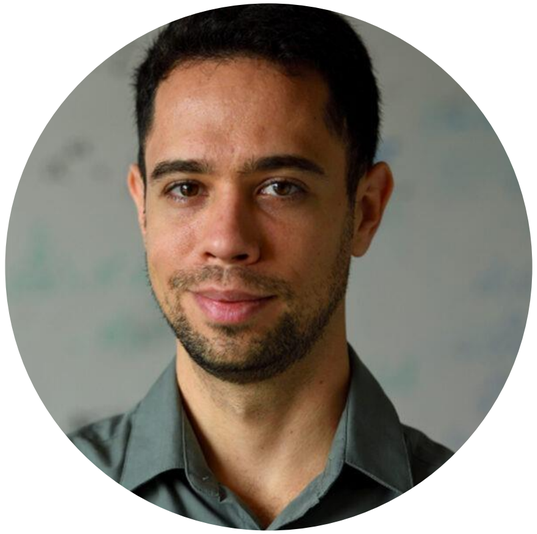
ADAM CHARLES, PH.D.



PUBLICATIONS

- Dynamic Filtering of Time-Varying Sparse Signals viaMinimization
- Spectral Superresolution of Hyperspectral Imagery Using Reweighted Spatial Filtering
- Matrix-normal models for fMRI analysis

JEREMIAS SULAM, PH.D.



[Sulam Website]

Assistant Professor, Biomedical Engineering and Computer Science

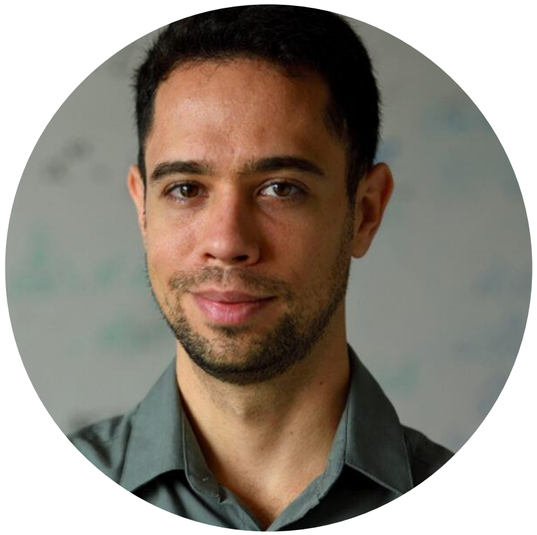
AFFLIATIONS

Member, Center for Imaging Science; Member, Kavli Neuroscience Discovery Institute; Member, Mathematical Institute for Data Science (MINDS); Director, Sulam Group Lab

AREAS OF SPECIALIZATION

Inverse problems in computer vision and signal processing, machine learning and deep learning in biomedical applications

JEREMIAS SULAM, PH.D.



PUBLICATIONS

- Image Denoising Through Multi-Scale Learnt Dictionaries
- Classifying medical images using deep convolution neural network (CNN) architecture
- Maximizing AUC with Deep Learning for Classification of Imbalanced Mammogram Datasets.
- Label Cleaning Multiple Instance Learning: Refining Coarse Annotations on Single Whole-Slide Images

SIAMAK ARDEKANI, M.D., PH.D., M.S.

[Ardekani Website]

Assistant Research Professor, Department of Biomedical Engineering

AFFLIATIONS

Member, Center for Imaging Science

AREAS OF SPECIALIZATION

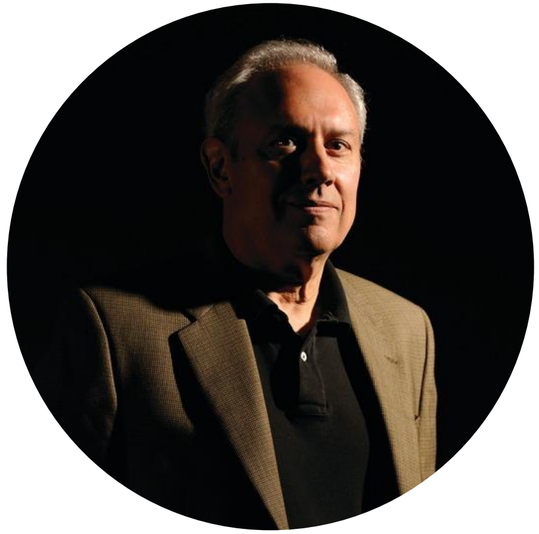
Medical imaging, computational models to extract clinically relevant information from medical images, magnetic resonance imaging, computed tomography, quantification and visualization of anatomical structures

SIAMAK ARDEKANI, M.D., PH.D., M.S.

PUBLICATIONS

- Geometric distortion correction of high-resolution 3 T diffusion tensor brain images
- OpenSourcePACS: an extensible infrastructure for medical image management
- Computational method for identifying and quantifying shape features of human left ventricular remodeling
- Shape analysis of hypertrophic and hypertensive heart disease using MRI-based 3D surface models of left ventricular geometry
- Diffusion tensor imaging of deep gray matter in children treated for brain malignancies

DONALD GEMAN, PH.D.



Geman Website

Professor, Department of Applied Mathematics and Statistics

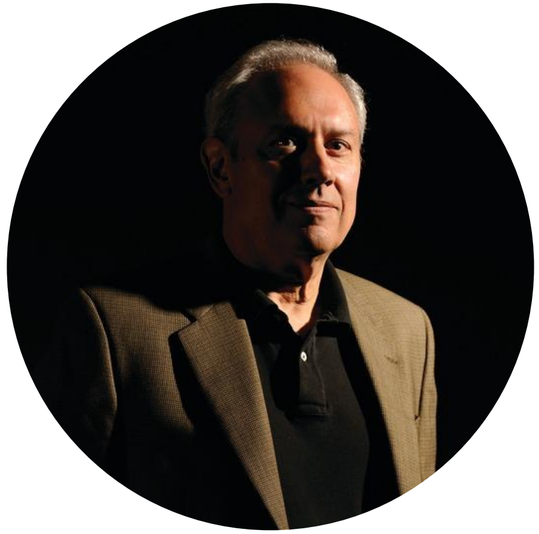
AFFLIATIONS

Member, Center for Imaging Science, Institute for Computational Medicine;
Member, National Academy of Sciences

AREAS OF SPECIALIZATION

Image analysis, statistical learning, bioinformatics, machine vision, computer vision, machine learning, stochastic processes, computational medicine, Gibbs Sampler algorithm for Bayesian computation and randomized decision trees for classification

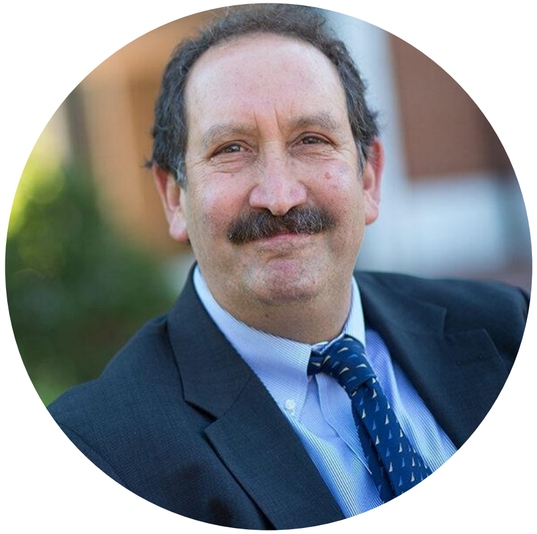
DONALD GEMAN, PH.D.



PUBLICATIONS

- Stochastic relaxation, Gibbs distributions, and the Bayesian restoration of images
- Tackling the widespread and critical impact of batch effects in high-throughput data
- Visual turing test for computer vision systems
- Feature Selection for Unsupervised and Supervised Inference: The Emergence of Sparsity in a Weight-Based Approach.
- Computational medicine: translating models to clinical care

MICHAEL I. MILLER, PH.D.



Miller Website

Bessie Darling Massey Professor, Biomedical Engineering; Professor, Electrical and Computer Engineering

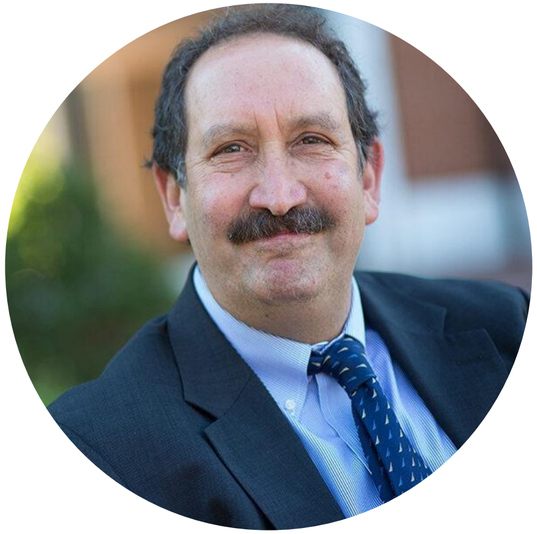
AFFLIATIONS

Co-Director, Kavli Neuroscience Discovery Institute; Member, Center for Imaging Science; Institute for Computational Medicine; Mathematical Institute for Data Science (MINDS)

AREAS OF SPECIALIZATION

Data science, computational medicine, neurodegenerative disease, advanced medical imaging technologies, tools to analyze brain scans for early detection of disease, computational anatomy, pattern theory, brain atlas

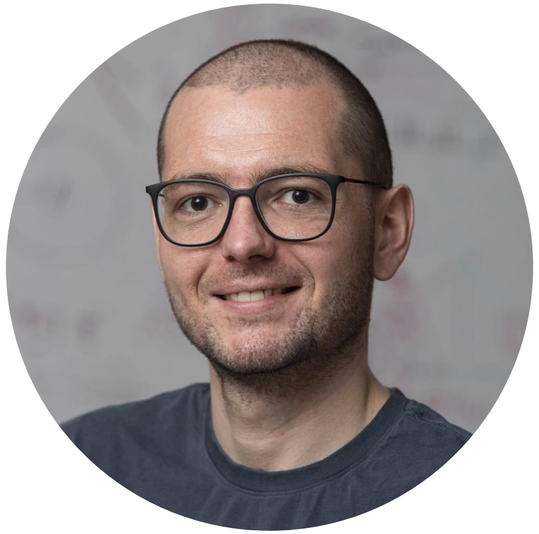
MICHAEL I. MILLER, PH.D.



PUBLICATIONS

- Stereotaxic white matter atlas based on diffusion tensor imaging in an ICBM template
- Computational anatomy: An emerging discipline
- Human brain white matter atlas: identification and assignment of common anatomical structures in superficial white matter
- Atlas-based whole brain white matter analysis using large deformation diffeomorphic metric mapping: application to normal elderly and Alzheimer's disease participants
- Diffusion tensor imaging for understanding brain development in early life

MATHIAS UNBERATH, PH.D.



[Unberath Website]

Assistant Professor, Department of Computer Science; Secondary Appointment Ophthalmology/School of Medicine

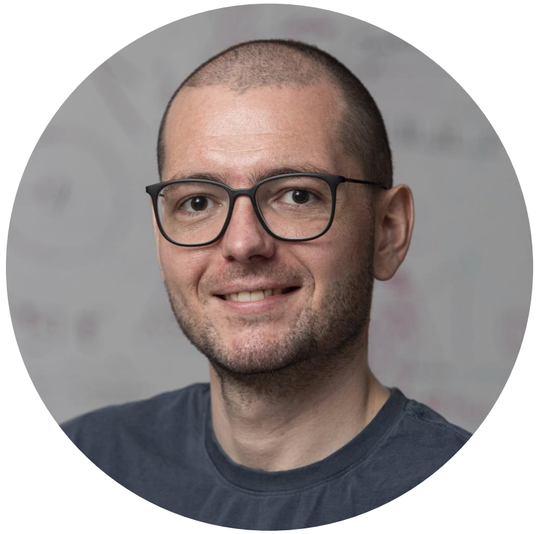
AFFLIATIONS

Director, Advanced Robotics and Computationally AugmenteD Environments Lab (ARCADE); Fellow, Malone Center for Engineering in Healthcare

AREAS OF SPECIALIZATION

Computer vision, machine learning, interaction design, augmented reality, robotics

MATHIAS UNBERATH, PH.D.



PUBLICATIONS

- Deep learning computed tomography: Learning projection-domain weights from image domain in limited angle problems
- X-ray-transform Invariant Anatomical Landmark Detection for Pelvic Trauma Surgery
- DeepDRR - A Catalyst for Machine Learning in Fluoroscopy-guided Procedures
- Marker-free motion correction in weight-bearing cone-beam CT of the knee joint
- On-the-fly augmented reality for orthopedic surgery using a multimodal fiducial
- Image guided percutaneous spine procedures using an optical see-through head mounted display: proof of concept and rationale

VISHAL PATEL, PH.D.

[Patel Website]

Associate Professor, Electrical and Computer Engineering

AFFLIATIONS

Member, Vision and Image Understanding Lab

AREAS OF SPECIALIZATION

Biomedical image analysis, biometrics, computer vision, machine learning, signal and image processing

VISHAL PATEL, PH.D.

PUBLICATIONS

- Density-aware single image de-raining using a multi-stream dense network
- Medical transformer: Gated axial-attention for medical image segmentation
- Secure and robust iris recognition using random projections and sparse representations
- SAR image despeckling using a convolutional neural network
- Unext: Mlp-based rapid medical image segmentation network

RUSSELL TAYLOR, PH.D.

[Taylor Website]

John C. Malone Professor, Department of Computer Science, Department of Mechanical Engineering

AFFLIATIONS

Director, Laboratory for Computer Sensing and Robotics; Director, NSF Engineering Research Center for Computer-Integrated Surgical Systems and Technologies (CISST ERC)

AREAS OF SPECIALIZATION

Robotics, human-machine cooperative systems, medical imaging and modeling, computer-integrated interventional systems

SUSUMU MORI, PH.D.

[Mori Website]

Professor, Radiology and Radiological Science

AFFLIATIONS

Director, Center for Brain Imaging Science, Johns Hopkins Medicine Brain Science Institute; Member, F.M. Kirby Research Center for Functional Magnetic Resonance Imaging; Member, Johns Hopkins Medical Institute's Laboratory of Brain Science Anatomical MRI

AREAS OF SPECIALIZATION

Development of novel MRI technologies to study brain anatomy, MRI data acquisition and image analysis, diffusion tensor imaging (DTI), microimaging of brain development and white-matter disease, brain atlases in animal models; stereotaxic operation devices

SUSUMU MORI, PH.D.

PUBLICATIONS

- Three-dimensional tracking of axonal projections in the brain by magnetic resonance imaging
- Principles of diffusion tensor imaging and its applications to basic neuroscience research
- Diffusion tensor imaging and beyond
- Human brain white matter atlas: identification and assignment of common anatomical structures in superficial white matter
- MRICloud: delivering high-throughput MRI neuroinformatics as cloud-based software as a service

RADIOLOGY AND HARDWARE

QIN QIN, PH.D., M.S.

[Qin Website]

Associate Professor, Radiology and Radiological Science

AFFLIATIONS

F.M Kirby Research Center for Functional Brain Imaging (Kennedy Krieger Institute)

AREAS OF SPECIALIZATION

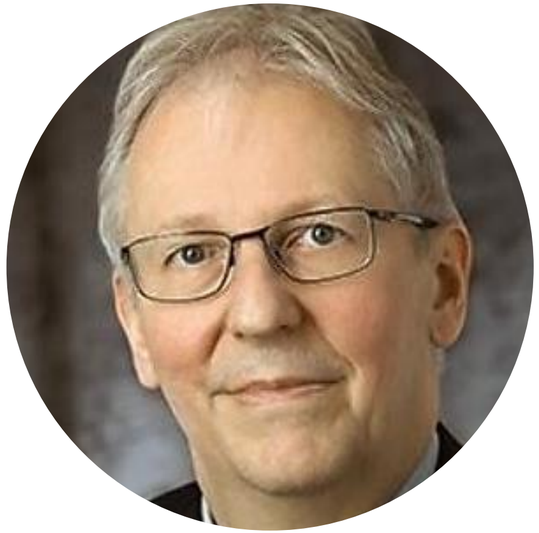
Development and validation of novel MRI techniques for cardiovascular disease and cancer, arterial spin labeling techniques, quantitative MRI measurements of cerebral blood flow, volume, oxygenation and oxygen metabolism; advanced velocity-selective pulse trains for MRI angiography and perfusion mapping in absence of contrast agents

QIN QIN, PH.D., M.S.

PUBLICATIONS

- Intracranial arterial wall imaging using three-dimensional high isotropic resolution black blood MRI at 3.0 Tesla
- Calibration and validation of TRUST MRI for the estimation of cerebral blood oxygenation
- MRI techniques to measure arterial and venous cerebral blood volume
- Velocity-selective-inversion prepared arterial spin labeling
- Measurement of absolute arterial cerebral blood volume in human brain without using a contrast agent

PETER C.M. VAN ZIJL, PH.D.



[Van Zijl Website]

Professor, Radiology and Radiological Science; Chief, Neuroscience, Division of MR Research

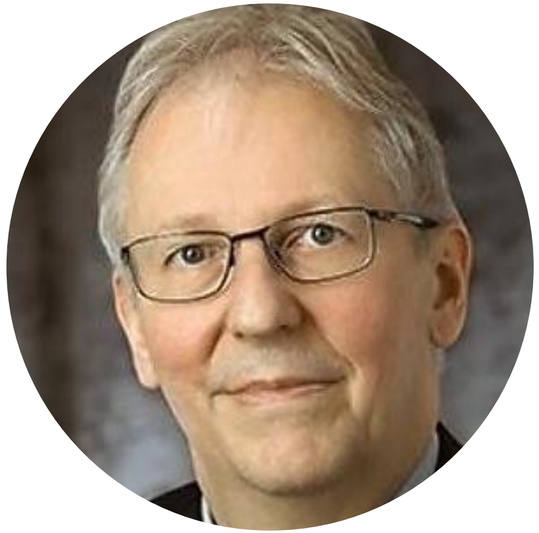
AFFLIATIONS

Founding Director, F.M. Kirby Research Center for Functional Brain Imaging at the Kennedy Krieger Institute; Fellow, International Society for Magnetic Resonance in Medicine

AREAS OF SPECIALIZATION

Brain imaging, novel MRI and nuclear MR technologies, MR spectroscopy (MSR) and MRS imaging, diffusion tensor imaging (DTI), axonal mapping, physiological imaging (blood flow, blood volume, blood oxygenation), glucose metabolism measurement, magnetization-transfer processes

PETER C.M. VAN ZIJL, PH.D.



PUBLICATIONS

- Three-dimensional tracking of axonal projections in the brain by magnetic resonance imaging
- Stereotaxic white matter atlas based on diffusion tensor imaging in an ICBM template
- Tract probability maps in stereotaxic spaces: analyses of white matter anatomy and tract-specific quantification
- Chemical exchange saturation transfer (CEST): what is in a name and what isn't?
- Practical data acquisition method for human brain tumor amide proton transfer (APT) imaging

HYE YOUNG HEO, PH.D., M.S.

[Heo Website]

Associate Professor, Radiology and Radiological Science

AFFLIATIONS

Member, F.M. Kirby Research Center for Functional Brain Imaging

AREAS OF SPECIALIZATION

Magnetic resonance imaging, brain imaging, developing new methodologies of in vivo magnetic resonance imaging to study brain function and disease, novel MRI contrast agents such as chemical exchange saturation transfer (CEST) and T1rho, proton exchange-based pH imaging techniques

HYE YOUNG HEO, PH.D., M.S.

PUBLICATIONS

- APT-weighted MRI: techniques, current neuro applications, and challenging issues
- Applying amide proton transfer-weighted MRI to distinguish pseudoprogression from true progression in malignant gliomas
- Predicting IDH mutation status in grade II gliomas using amide proton transfer-weighted (APTw) MRI
- Identifying recurrent malignant glioma after treatment using amide proton transfer-weighted MR imaging: a validation study with image-guided stereotactic biopsy
- Molecular MRI differentiation between primary central nervous system lymphomas and high-grade gliomas using endogenous protein-based amide proton transfer MR imaging at 3 Tesla

XU LI, PH.D.

[Li Website]

Associate Professor, Radiology and Radiological Science

AFFLIATIONS

Member, F.M. Kirby Research Center for Functional Brain Imaging

AREAS OF SPECIALIZATION

Development of new imaging methods for mapping the magnetic properties of living systems, quantification of magnetic susceptibility in high-field MRI, magnetioacoustic tomography with magnetic induction (MAT-MI), neurodegeneration, neurodevelopment, multiple sclerosis, Huntington's Disease, Alzheimer's disease, restless leg syndrome, axonal mapping, brain atlas

XU LI, PH.D.

PUBLICATIONS

- Quantitative susceptibility mapping: report from the 2016 reconstruction challenge
- Human brain atlas for automated region of interest selection in quantitative susceptibility mapping: application to determine iron content in deep gray matter structures
- Imaging electrical impedance from acoustic measurements by means of magnetoacoustic tomography with magnetic induction (MAT-MI)
- Magnetoacoustic tomography with magnetic induction for imaging electrical impedance of biological tissue
- Lesion heterogeneity on high-field susceptibility MRI is associated with multiple sclerosis severity

HANZHANG LU, PH.D.

[Lu Website]

Elias A. Zerhouni, M.D. Professor, Radiology and Radiological Science

AFFLIATIONS

Director, MRI Service Center; Chief - Neurofunction Section, MR Research Division; Fellow, International Society for Magnetic Resonance in Medicine (ISMRM); Distinguished Investigator, Academy for Radiology & Biomedical Imaging Research

AREAS OF SPECIALIZATION

Physiological MRI, brain MRI, novel MRI techniques to measure cerebral blood volume, brain oxygenation and metabolism, cerebral blood flow, blood-brain barrier permeability, cerebrovascular reactivity, aging and neurodegenerative disease, cerebrovascular disease

HANZHANG LU, PH.D.

PUBLICATIONS

- Diffusional kurtosis imaging: the quantification of non-gaussian water diffusion by means of magnetic resonance imaging
- Recommended implementation of arterial spin-labeled perfusion MRI for clinical applications: a consensus of the ISMRM perfusion study group and the European consortium for ASL
- Functional magnetic resonance imaging based on changes in vascular space occupancy

JUNGHOON LEE, PH.D., M.S.

[Lee Website]

Associate Professor, Radiation Oncology & Molecular Radiation Sciences

AFFLIATIONS

Medical Imaging Computing and Analysis (MICA); Carnegie Center for Surgical Innovation; NSF Engineering Research Center for Computer-Integrated Surgical Systems and Technology at JHU

AREAS OF SPECIALIZATION

Signal and image processing in medical imaging, computed tomography, magnetic resonance imaging, novel image reconstruction, multi-modal image registration, segmentation, image-guided interventions, radiation therapy, computer vision

YE QIAO, PH.D., M.S.

[Qiao Website]

Associate Professor, Radiology and Radiological Science

AFFLIATIONS

Member, Neurovascular Center

AREAS OF SPECIALIZATION

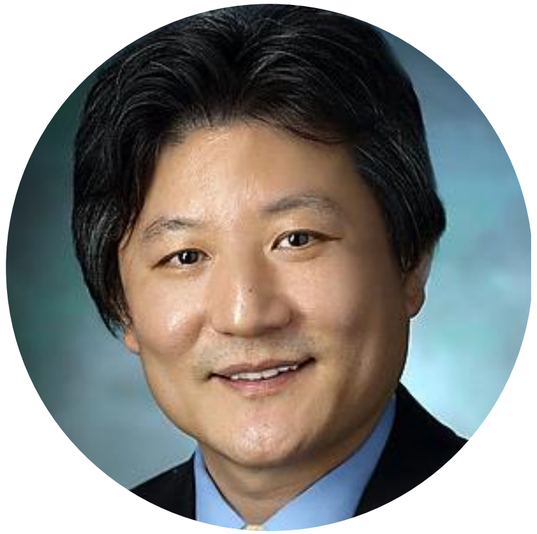
Development and implementation of vascular magnetic resonance techniques for cerebrovascular disease, detection and characterization of atherosclerotic plaques, intracranial vascular MRI

YE QIAO, PH.D., M.S.

PUBLICATIONS

- Intracranial vessel wall MRI: principles and expert consensus recommendations of the American Society of Neuroradiology
- Intracranial arterial wall imaging using three-dimensional high isotropic resolution black blood MRI at 3.0 Tesla
- Carotid artery wall imaging: perspective and guidelines from the ASNR vessel wall imaging study group and expert consensus recommendations of the American Society of Neuroradiology
- Patterns and implications of intracranial arterial remodeling in stroke patients
- MR imaging measures of intracranial atherosclerosis in a population-based study

KENICHI OISHI, M.D., PH.D.



[Oishi Website]

Professor, Radiology and Radiological Science

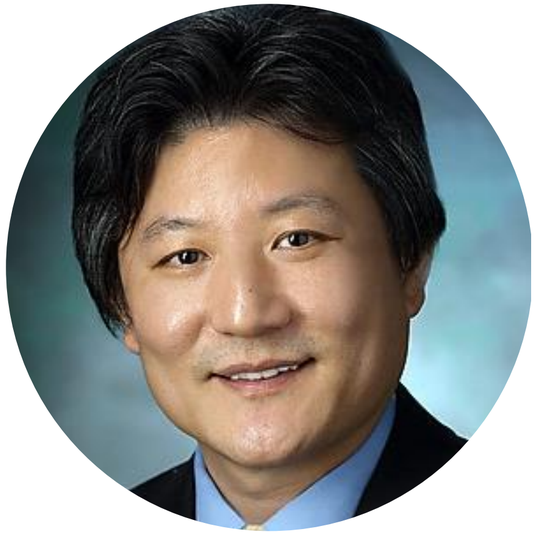
AFFLIATIONS

Member, MRI Service Center

AREAS OF SPECIALIZATION

Magnetic resonance imaging focusing on neurology, neuroscience, and neuroinformatic technologies, electronic brain atlases, brain injury, artificial intelligence

KENICHI OISHI, M.D., PH.D.



PUBLICATIONS

- Quantification of Diffusion Magnetic Resonance Imaging for Prognostic Prediction of Neonatal Hypoxic-Ischemic Encephalopathy
- A Neural Network Approach to Identify Left-Right Orientation of Anatomical Brain MRI
- Acquiring a Low-Dimensional, Environment-Independent Representation of Brain MR Images for Content-Based Image Retrieval
- Multi-modal multi-resolution atlas of the human neonatal cerebral cortex based on microstructural similarity
- Loc-VAE: Learning Structurally Localized Representation from 3D Brain MR Images for Content-Based Image Retrieval

DAN STOIANOVICI, PH.D.

[Stoianovici Website]

Professor, Urology, Mechanical Engineering, Neurosurgery

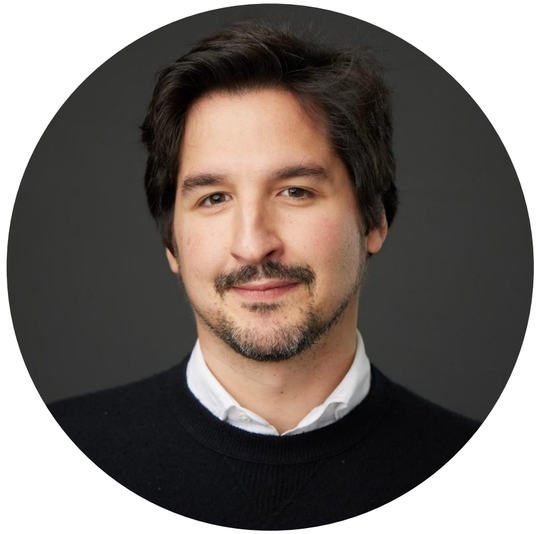
AFFLIATIONS

Director, Urology Robotics Program

AREAS OF SPECIALIZATION

Design, manufacture, and control of robotics for direct image-guided intervention (DIGI)

ALI UNERI, PH.D.



Uneri Website

Assistant Research Professor, Biomedical Engineering

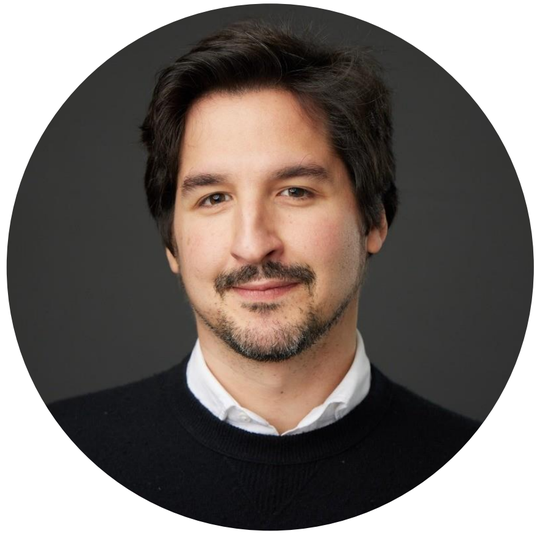
AFFLIATIONS

Member, Carnegie Center for Surgical Innovation; Member, Imaging for Surgery, Therapy, and Radiology Labs (I-STAR Labs)

AREAS OF SPECIALIZATION

Image-guided surgery, surgical robotics, image registration, 3D imaging, surgical navigation, algorithms and systems for computer-assisted, image-guided, and robotic surgery, hardware and software systems integration for image-guided interventions

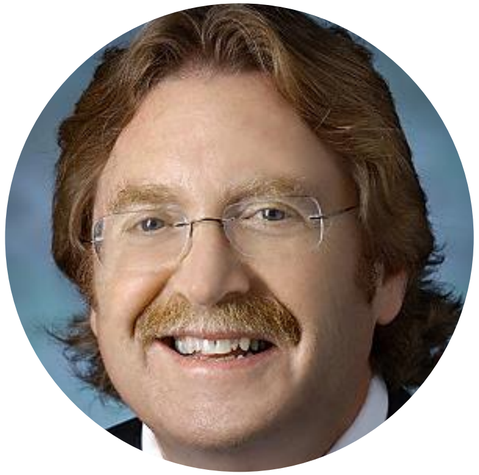
ALI UNERI, PH.D.



PUBLICATIONS

- New steady-hand eye robot with micro-force sensing for vitreoretinal surgery
- Mobile C-arm cone-beam CT for guidance of spine surgery: Image quality, radiation dose, and integration with interventional guidance
- Method for presenting force sensor information using cooperative robot control and audio feedback
- Demons deformable registration of CT and cone-beam CT using an iterative intensity matching approach
- 3D–2D image registration for target localization in spine surgery: investigation of similarity metrics providing robustness to content mismatch

ELLIOT K. FISHMAN, M.D.



[Fishman Website]

Elliot K. Fishman Professorship in Radiology, Professor of Radiology and Radiological Science

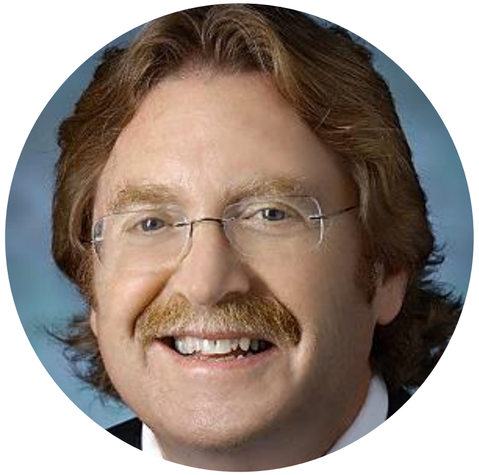
AFFLIATIONS

Sydney Kimmel Comprehensive Cancer Center

AREAS OF SPECIALIZATION

MDCT/CTA development and design, cardiac imaging, oncologic imaging, 3D medical visualization

ELLIOT K. FISHMAN, M.D.



PUBLICATIONS

- Prevalence of unsuspected pancreatic cysts on MDCT
- Three-dimensional volume rendering of spiral CT data: theory and method
- CT evaluation of the colon: inflammatory disease
- Volume rendering versus maximum intensity projection in CT angiography: what works best, when, and why

LAURA MARIE FAYAD, M.D., M.S.

[Fayad Website]

Professor of Radiology and Radiological Science

AFFLIATIONS

Director, Translational Research Program in the Department of Radiology

AREAS OF SPECIALIZATION

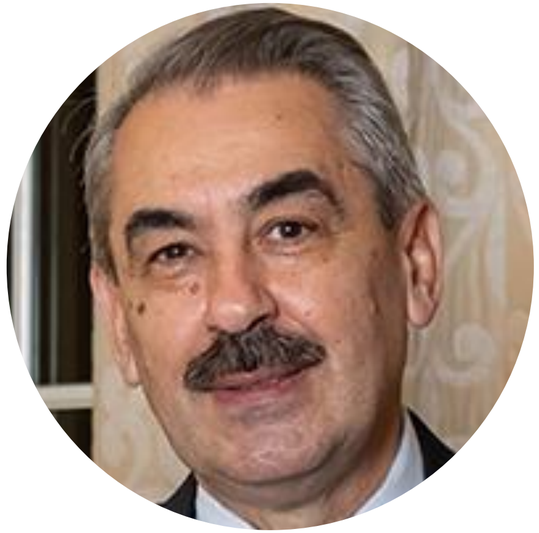
Novel imaging techniques for bone and soft tissue tumors and peripheral nerve abnormalities, fast musculoskeletal MRI sequence development and optimization, diffusion-weighted imaging, dynamic sequences, metabolic MR imaging

LAURA MARIE FAYAD, M.D., M.S.

PUBLICATIONS

- Musculoskeletal tumors: how to use anatomic, functional, and metabolic MR techniques
- Musculoskeletal infection: role of CT in the emergency department
- Diffusion-weighted MR imaging for characterizing musculoskeletal lesions
- Detection of soft-tissue sarcoma recurrence: added value of functional MR imaging techniques at 3.0 T
- Image overlay guidance for needle insertion in CT scanner

IULIAN IORDACHITA, PH.D.



[Iordachita Website]

Research Professor, Department of Mechanical Engineering

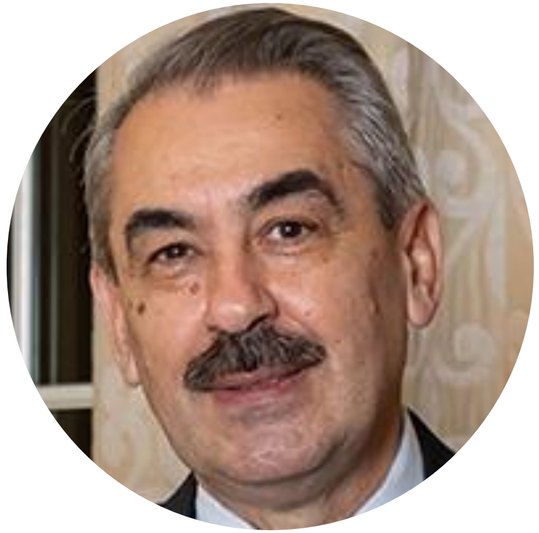
AFFLIATIONS

Member, Laboratory for Computational Sensing and Robotics; Director, Advanced Medical Instrumentation and Robotics (AMIRo) Research Lab

AREAS OF SPECIALIZATION

Medical and surgical robotics, medical instrumentation and smart surgical tools, image-guided and computer-assisted surgery, mechanisms and mechanical transmissions for robots

IULIAN IORDACHITA, PH.D.



PUBLICATIONS

- High-resolution, small animal radiation research platform with x-ray tomographic guidance capabilities
- MRI-compatible pneumatic robot for transperineal prostate needle placement
- New steady-hand eye robot with micro-force sensing for vitreoretinal surgery
- Multi-force sensing surgical instrument and method of use for robotic surgical systems
- Method and apparatus for robotically assisted cochlear implant surgery

DORIS DA MAY LIN, M.D., PH.D.

Associate Professor, Radiology and radiological Science

AREAS OF SPECIALIZATION

Development of neuroimaging tools targeting cellular and molecular processes that are amenable to non-invasive in vivo imaging, incorporating molecular biology into radiology, neuroradiology

[Lin Website]

DORIS DA MAY LIN, M.D., PH.D.

PUBLICATIONS

- Proton MR spectroscopic imaging in ataxia-telangiectasia
- Extending thrombolysis to 4.5-9 h and wake-up stroke using perfusion imaging: a systematic review and meta-analysis of individual patient data
- Routine clinical brain MRI sequences for use at 3.0 Tesla
- Diffusion tensor imaging in children with periventricular leukomalacia: variability of injuries to white matter tracts
- Clinical MR spectroscopy: techniques and applications

SENSORS AND WEARABLES

CIPRIAN M. CRAINICEANU, PH.D.

[Crainiceanu Website]

Professor of Biostatistics at the Bloomberg School of Public Health

AFFLIATIONS

Johns Hopkins Center on Aging & Health

AREAS OF SPECIALIZATION

Complex, ultrahigh dimensional data obtained from wearable and implantable computing and neuroimaging studies; signal processing; brain imaging and other high-dimensional functional data; wearable computing, multimodality brain imaging, Bayesian inference, mixed effects modeling, sleep

CIPRIAN M. CRAINICEANU, PH.D.

PUBLICATIONS

- Neuroconductor: An R Platform for Medical Imaging Analysis
- Big Data and Neuroimaging
- Longitudinal High-Dimensional Principal Components Analysis with Application to Diffusion Tensor Imaging of Multiple Sclerosis

VADIM ZIPUNNIKOV, PH.D.

[Zipunnikov Website]

Assistant Professor of Biostatistics at the Bloomberg School of Public Health

AFFLIATIONS

Member, Statistical Methods and Applications for Research in Technology (SMART); Co-leader, Wearable and Implantable Technology Group (WIT); Biostatistics co-director, Motor Activity Research Consortium for Health (mMARCH).

AREAS OF SPECIALIZATION

Interfacing data generated from wearables with larger databases, predictive biomarkers, ecological momentary assessment (EMA), cardiac imaging

VADIM ZIPUNNIKOV, PH.D.

PUBLICATIONS

- Electronic devices and applications to track physical activity
- Relationship between left atrial appendage morphology and stroke in patients with atrial fibrillation
- Association of left atrial function and left atrial enhancement in patients with atrial fibrillation: cardiac magnetic resonance study
- Big GABA: Edited MR spectroscopy at 24 research sites
- Magnetic resonance image intensity ratio, a normalized measure to enable interpatient comparability of left atrial fibrosis

NATALIA TRAYANOVA, PH.D.

Murray B. Sachs Professor of Biomedical Engineering and Medicine, Director of Alliance for Cardiovascular Diagnostic and Treatment Innovation, Director of Research in Health and Medicine in the AI-X Foundry

AREAS OF SPECIALIZATION

Machine learning in cardiology, data science and cardiac modeling, cardiac electrophysiology

Developing personalized digital-twin technologies and machine learning approaches for prognostic and therapeutic applications in cardiovascular disease (“Your Personal Virtual Heart”)

- Predicting ablation targets in arrhythmogenic right ventricular cardiomyopathy, post-infarct ventricular tachycardia
- Deep learning for ventricular arrhythmia risk in hypertrophic cardiomyopathy patients
- Predicting increased hemodynamics and stroke risk in atrial fibrillation
- Deep learning to segment contrast-enhanced cardiac MRI

Trayanova Website

Trayanova Publications

Trayanova Licensable Technologies

Trayanova Patents

NATALIA TRAYANOVA, PH.D.

PUBLICATIONS

- Evaluation of a deep learning-enabled automated computational heart modeling workflow for personalized assessment of ventricular arrhythmias, Journal of Physiology, 2023.
- Computational Re-Entry Vulnerability Index Mapping to Guide Ablation in Patients With Postmyocardial Infarction Ventricular Tachycardia, Clinical Electrophysiology, 2023.
- Fat infiltration in the infarcted heart as a paradigm for ventricular arrhythmias, Nature Cardiovascular Research, 2022.
- Deep learning a person's risk of sudden cardiac death, The Lancet, 2022.

CEDRIC MANLHIOT, PH.D.

Assistant Professor of Pediatrics, Director of the Cardiovascular Analytic Intelligence Initiative (CV-Ai2)

AREAS OF SPECIALIZATION

Clinical prediction models, data technology for clinical decision support

Improving and implementing predictive models of cardiovascular disease through analytic intelligence

Heart Life Trajectory prediction from lifelong data from patients with structural heart disease, optimizing therapeutic and surgical interventions

Cardiac Outpatient Warning System with wearable, real-time analytics to notify patient and care provider

Predictive Decision Support Tools and implementation into real-time clinical decision support for individualization of therapy and better patient outcomes

Manlhiot Website

Manlhiot Publications

Manlhiot Licensable Technologies

Manlhiot Patents

CEDRIC MANLHIOT, PH.D.

PUBLICATIONS

- Association Between the Incidence of Hospitalizations for Acute Cardiovascular Events, Weather, and Air Pollution, JACC: Advances, 2023.
- Data Quality Degradation on Prediction Models Generated From Continuous Activity and Heart Rate Monitoring: Exploratory Analysis Using Simulation, JMIR Cardiology, 2023.
- Deep Learning-Based Approach to Automatically Assess Coronary Distensibility Following Kawasaki Disease, Pediatric Cardiology, 2022.
- Artificial intelligence in pediatric cardiology: taking baby steps in the big world of data, Current Opinion in Cardiology, 2022.
- Medicine-Based Evidence in Congenital Heart Disease: How Artificial Intelligence Can Guide Treatment Decisions for Individual Patients, Frontiers in Pediatric Cardiology, 2021.

XINGDE LI, PH.D.

Professor, Biomedical Engineering, Electrical & Computer Engineering, Oncology

AFFLIATIONS

Laboratory of Biophotonics Imaging Technologies (BIT), Carnegie Center for Surgical Innovation, Kevli Neuroscience Discovery Institute

AREAS OF SPECIALIZATION

Medical imaging and devices, neurophotonics, translational biophotonics, optical coherence tomography, two-photon fiberscopy/endomicroscopy, multimodal imaging, mass spectrometry imaging, AI-assisted image analysis and acquisition

XINGDE LI, PH.D.

PUBLICATIONS

- Gold nanostructures: engineering their plasmonic properties for biomedical applications
- Detection of human brain cancer infiltration ex vivo and in vivo using quantitative optical coherence tomography
- Endoscopic optical coherence tomography: technologies and clinical applications
- Nonlinear optical endomicroscopy for label-free functional histology in vivo
- Robust and fast characterization of OCT-based optical attenuation using a novel frequency-domain algorithm for brain cancer detection

JIN U. KANG, PH.D.

Jacob Suter Jammer Professor, Department of Electrical and Computer Engineering

AFFLIATIONS

Member, JHU Kavli Neuroscience Discovery Institute; Member, Laboratory for Computational Sensing and Robotics; Fellow, Optical Society of America; Fellow, International Optics Society (SPIE); Fellow, American Institute for Medical and Biological Engineering

AREAS OF SPECIALIZATION

Optical imaging, sensing, fiber optic devices, photonic systems, endoscopic common-path fiber optical coherence tomography (OCT) techniques, real-time robotic surgical monitoring, image-guided robotic tools, dermatology

JIN U. KANG, PH.D.

PUBLICATIONS

- Method and system for providing recommendation for optimal execution of surgical procedures
- A sub-millimetric, 0.25 mN resolution fully integrated fiber-optic force-sensing tool for retinal microsurgery
- Autonomous robotic laparoscopic surgery for intestinal anastomosis
- Real-time intraoperative 4D full-range FD-OCT based on the dual graphics processing units architecture for microsurgery guidance

MICHAEL T. MCMAHON, PH.D.

[McMahon Website]

Professor, Radiology and Radiological Science

AFFLIATIONS

F.M. Kirby Center for Functional Brain Imaging; Member, International Society for Magnetic Resonance in Medicine (ISMRM); Member, Society for Molecular Imaging (SMI)

AREAS OF SPECIALIZATION

Chemical exchange saturation transfer (CEST) MRI contrast agents, contrast agent design, MRI pulse sequence development, kidney imaging, cancer imaging

MICHAEL T. MCMAHON, PH.D.

PUBLICATIONS

- Natural D-glucose as a biodegradable MRI contrast agent for detecting cancer
- Mesoporous Silica-Coated Hollow Manganese Oxide Nanoparticles as Positive T_1 Contrast Agents for Labeling and MRI Tracking of Adipose-Derived Mesenchymal Stem Cells
- Nuts and bolts of chemical exchange saturation transfer MRI
- New “multicolor” polypeptide diamagnetic chemical exchange saturation transfer (DIACEST) contrast agents for MRI
- Dynamic glucose-enhanced (DGE) MRI: translation to human scanning and first results in glioma patients
- Furin-mediated intracellular self-assembly of olsalazine nanoparticles for enhanced magnetic resonance imaging and tumour therapy

GUANSHU LIU, PH.D., M.S.

[Liu Website]

Associate Professor, Radiology and Radiological Science

AFFLIATIONS

Member, F.M. Kirby Research Center for Functional Brain Imaging

AREAS OF SPECIALIZATION

Brain imaging, development of magnetic resonance (MR) molecular imaging techniques, chemical exchange saturation transfer (CEST)

GUANSHU LIU, PH.D., M.S.

PUBLICATIONS

- Natural D-glucose as a biodegradable MRI contrast agent for detecting cancer
- Nuts and bolts of chemical exchange saturation transfer MRI
- Dynamic glucose-enhanced (DGE) MRI: translation to human scanning and first results in glioma patients
- Furin-mediated intracellular self-assembly of olsalazine nanoparticles for enhanced magnetic resonance imaging and tumour therapy
- Design and characterization of a new irreversible responsive PARACEST MRI contrast agent that detects nitric oxide

NIRBHAY NARAYAN YADAV, PH.D.

[Yadav Website]

Associate Professor, Radiology and Radiological Science

AFFLIATIONS

Member, F.M. Kirby Research Center for Functional Brain Imaging

AREAS OF SPECIALIZATION

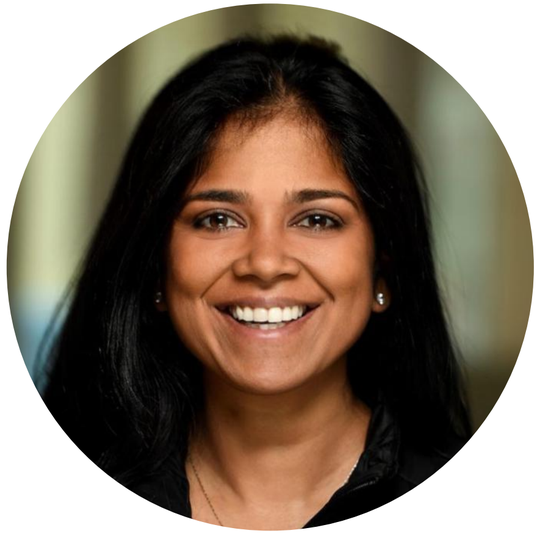
Magnetic resonance imaging, neuroimaging, magnetization transfer, nuclear magnetic resonance (NMR), chemical exchange saturation transfer (CEST), contrast agents, cancer imaging, neurodegeneration, image analysis, machine learning

NIRBHAY NARAYAN YADAV, PH.D.

PUBLICATIONS

- Chemical exchange saturation transfer (CEST): what is in a name and what isn't?
- Dynamic glucose-enhanced (DGE) MRI: translation to human scanning and first results in glioma patients
- Variable delay multi-pulse train for fast chemical exchange saturation transfer and relayed-nuclear overhauser enhancement MRI
- Investigation of the contribution of total creatine to the CEST *Z*-spectrum of brain using a knockout mouse model
- Characterization of tumor vascular permeability using natural dextrans and CEST MRI

SUCHI SARIA, PH.D.



[Saria Website]

John C. Malone Associate Professor of Computer Science

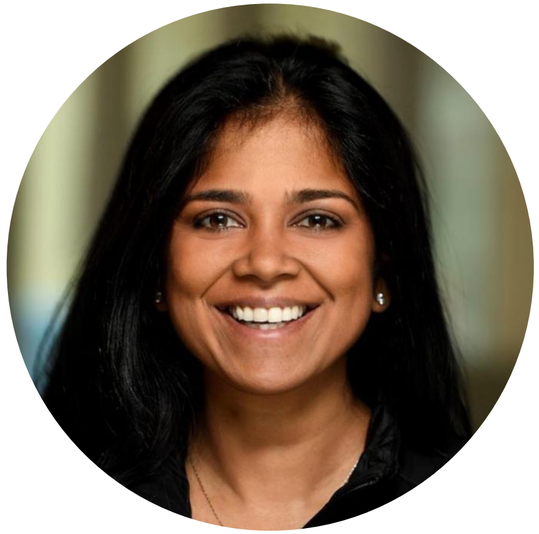
AFFLIATIONS

Director, Machine Learning and Healthcare Lab; Research Director, Malone Center for Engineering in Healthcare; Mathematical Institute for Data Science (MINDS); Laboratory for Computational Sensing and Robotics

AREAS OF SPECIALIZATION

Diagnostic and treatment planning tools that use statistical machine-learning; Machine learning platforms for improving disease diagnosis and directing “personalized” healthcare decision-making; Modeling and prediction of real-world temporal systems

SUCHI SARIA, PH.D.



PUBLICATIONS

- Big data in health care: using analytics to identify and manage high-risk and high-cost patients
- Measuring Medication Response using Wearables for Parkinson's Disease
- Measuring Patient Mobility in the ICU using a Novel Non-Invasive Sensor
- A targeted real-time early warning score (TREWScore) for septic shock

JUN HUA, PH.D.

Associate Professor, Radiology and Radiological Science

AFFLIATIONS

Member, F.M. Kirby Research Center for Functional Brain Imaging

AREAS OF SPECIALIZATION

Imaging technology development, applications in brain disease, MRI technology for physiological imaging, cerebral blood volume, functional brain MRI, neurodegenerative disease

Hua Website

JUN HUA, PH.D.

PUBLICATIONS

- Practical data acquisition method for human brain tumor amide proton transfer (APT) imaging
- Nuclear Overhauser enhancement (NOE) imaging in the human brain at 7 T
- Multi-parametric neuroimaging reproducibility: a 3-T resource study
- Quantitative description of the asymmetry in magnetization transfer effects around the water resonance in the human brain
- Dynamic glucose-enhanced (DGE) MRI: translation to human scanning and first results in glioma patients

HARIS IQBAL SAIR, M.D.

Associate Professor of Radiology and Radiological Science

AFFLIATIONS

Malone Center for Engineering in Healthcare

AREAS OF SPECIALIZATION

Functional MRI, functional imaging in neurological disease, pre-surgical brain mapping, machine learning, AI in imaging

Sair Website

HARIS IQBAL SAIR, M.D.

PUBLICATIONS

- Derivation of a three biomarker panel to improve diagnosis in patients with mild traumatic brain injury
- Circulating brain-derived neurotrophic factor has diagnostic and prognostic value in traumatic brain injury
- American society of functional neuroradiology–recommended fMRI paradigm algorithms for presurgical language assessment
- Presurgical brain mapping of the language network in patients with brain tumors using resting-state f MRI: Comparison with task f MRI
- Neurovascular uncoupling in resting state fMRI demonstrated in patients with primary brain gliomas

HAI-QUON MAO, PH.D.

Professor, Department of Materials Science and Engineering; Director, Institute of NanoBioTechnology (INBT)

AREAS OF SPECIALIZATION

Biomaterials, therapeutic delivery, regenerative, engineering, and immunoengineering.

SUMMARY OF WORK

Dr. Mao's work focuses on developing novel biomaterials for therapeutic delivery through therapeutic engineering, regenerative engineering, and immunoengineering.

Mao Lab Website

Mao Lab Publications

Mao's Patents

CURRENT PROJECTS

- Kinetically controlled polyelectrolyte nanoparticle assembly and its scalable manufacturing for delivery of biologic therapeutics
- Engineering polycation- and lipid-based non-viral nanoparticles for delivery of nucleic acid therapeutics via systemic, local, or oral administration

HAI-QUON MAO, PH.D.

PUBLICATIONS

- Payload distribution and capacity of mRNA lipid nanoparticles.
- Multi-step screening of DNA/lipid nanoparticles and co-delivery with siRNA to enhance and prolong gene expression.
- Quaternary nanoparticles enable sustained release of bortezomib for hepatocellular carcinoma.
- Size-Controlled and Shelf-Stable DNA Particles for Production of Lentiviral Vectors.
- Scalable Purification of Plasmid DNA Nanoparticles by Tangential Flow Filtration for Systemic Delivery.
- Flash technology-based self-assembly in nanoformulation: from fabrication to biomedical applications.
- Surface-Functionalized PEGylated Nanoparticles Deliver Messenger RNA to Pulmonary Immune Cells.

JOHN LING, PH.D.

Assistant Professor of Pathology

AREAS OF SPECIALIZATION

RNA splicing, therapeutics, neuropathology, genetic engineering, gene therapy, bioinformatics.

SUMMARY OF WORK

Dr. Ling's research employs large-scale computational analyses of next-generation sequencing data to identify novel disease mechanisms, including splicing-based mechanisms, with the goal of translating these discoveries to the clinic.

Ling's Website

Ling's Publications

Ling's Patents

LICENSABLE TECHNOLOGIES

- Method for using alternative splicing to control specificity of gene therapy
- Target Validation of Splicing Repression, a Major Function of TDP-43 in the Motor Neuron

JOHN LING, PH.D.

PUBLICATIONS

- Payload distribution and capacity of mRNA lipid nanoparticles.
- Cell-specific regulation of gene expression using splicing-dependent frameshifting.
- ASCOT identifies key regulators of neuronal subtype-specific RNA splicing.
- Splicing repression is a major function of TDP-43 in motor neurons.
- Recount3: summaries and queries for large-scale RNA-seq expression and splicing.

SARAH WOODSON, PH.D.

T.C. Jenkins Professor of Biophysics at Johns Hopkins University

AREAS OF SPECIALIZATION

RNA folding, RNA dynamics, small regulatory RNAs, and ribosome assembly.

SUMMARY OF WORK

Dr. Woodson's research studies how RNA molecules fold into specific three-dimensional structures and how the RNA and proteins components of cellular complexes come together.

CURRENT PROJECTS - INVESTIGATING

- How conditions inside the cell alter the way the RNA folds.
- How new structures arise as the RNA sequence evolves.
- How small, non-coding RNAs (sRNA) and RNA chaperones act by base pairing with a target.
- Messenger RNA, decreasing or increasing translation of the target gene.

Woodson Lab Website

Woodson Lab Publications

SARAH WOODSON, PH.D.

PUBLICATIONS

- Small RNAs and Hfq capture unfolded RNA target sites during transcription.
- Direct observation of RNA structure and dynamics in repeat-RNA assemblies using single molecule fluorescence microscopy.
- Ribosomes clear the way for siRNA targeting.
- RNA toxicity and perturbation of rRNA processing in spinocerebellar ataxia type 2.
- Single-molecule FRET studies of RNA structural rearrangements and RNA-RNA interactions.
- Intrinsically disordered interaction network in an RNA chaperone revealed by native mass spectrometry.

GREGORY NEWBY, PH.D.

JOHNS HOPKINS
TECHNOLOGY VENTURES

Assistant Professor of Genetic Medicine

AREAS OF SPECIALIZATION

Genome editing, base editing, molecular medicine, CRISPR-Cas9

SUMMARY OF WORK

Dr. Newby's research has been foundational to developing CRISPR-Cas9 base editing and prime editing. His current work focuses on using efficient genome editing tools to re-wire regulatory elements surrounding disease-associated genes and form the basis of new therapeutics.

Newby Lab Website

Newby Lab Publications

GREGORY NEWBY, PH.D.

PUBLICATIONS

- Efficient prime editing in mouse brain, liver and heart with dual AAVs.
- Shuttle Peptide Delivers Base Editor RNPs to Rhesus Monkey Airway Epithelial Cells In Vivo.
- Protospacer modification improves base editing of a canonical splice site variant and recovery of CFTR function in human airway epithelial cells.
- Cas9-based diagnostic assay and methods of using.
- Nonviral base editing of *KCNJ13* mutation preserves vision in a model of inherited retinal channelopathy.
- Adenine base editors and uses thereof.

JOSHUA MODELL, PH.D.

Assistant Professor of Molecular Biology and Genetics

AREAS OF SPECIALIZATION

CRISPR-Cas9 systems

SUMMARY OF WORK

Dr. Modell's work synthesizes genetic, genomic and cellular analyses to better understand the basic biology of CRISPR systems and to inform the next generation of CRISPR-based technologies.

Modell Lab Website
Modell Lab Publications

JOSHUA MODELL, PH.D.

PUBLICATIONS

- A natural single-guide RNA repurposes Cas9 to autoregulate CRISPR-Cas expression.
- CRISPR–Cas systems exploit viral DNA injection to establish and maintain adaptive immunity.
- Viral recombination systems limit CRISPR-Cas targeting through the generation of escape mutations.