



Mirabela Rusu

Assistant Professor of Radiology (Integrative Biomedical Imaging Informatics)

CONTACT INFORMATION

- **Administrative Contact**

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Bio

BIO

Dr. Rusu received a Master of Engineering in Bioinformatics from the National Institute of Applied Sciences in Lyon, France. She continued her training at University of Texas Health Science Center in Houston, where she received a Master of Science and PhD degree in Health Informatics for her work in biomolecular structural data integration of cryo-electron micrographs and X-ray crystallography models.

During her postdoctoral training at Case Western Reserve University, Dr. Rusu has developed computational tools for the integration and interpretation of multi-modal medical imaging data and focused on studying prostate and lung cancers. Prior to joining Stanford, Dr. Rusu was a Lead Engineer and Medical Image Analysis Scientist at GE Global Research Niskayuna NY where she was involved the development of analytic methods to characterize biological samples in microscopy images and pathologic conditions in MRI or CT.

ACADEMIC APPOINTMENTS

- Assistant Professor, Radiology
- Member, Bio-X
- Member, Stanford Cancer Institute

HONORS AND AWARDS

- Above and Beyond (6), GE Global Research (2015-2017)
- School of Engineering Innovation Award, Case Western Reserve University (2014)
- Postdoctoral Award for poster presentation at the Research ShowCASE, Case Western Reserve University (2013)
- Winner, Grand Challenge Automated SEgmentation of Prostate Structures, NCI-ISBI (2013)
- James T. and Nancy Beamer Willerson Endowed Scholarship, University of Texas Health Science Center in Houston (2010)
- Paul Boyle Award for Excellence in Student Research, University of Texas Health Science Center in Houston (2007)
- Undergraduate Research Fellowship, Keck Center for Computational and Structural Biology, Houston (2006)
- International Mobility Fellowship, Rhone-Alpes Region, France (2005)

PROFESSIONAL EDUCATION

- PhD, University of Texas Health Science Center at Houston , Health Informatics | Structural Bioinformatics (2011)
- MS, University of Texas Health Science Center at Houston , Health Informatics | Structural Bioinformatics (2008)
- Master of Engineering, National Institute of Applied Sciences , BioSciences | Bioinformatics and Modeling (2006)

PATENTS

- Anant Madabhushi, Mirabela Rusu. "United States Patent US9767555B2 Disease characterization from fused pathology and radiology data", Case Western Reserve University

LINKS

- Lab Website: <http://rusulab.stanford.edu>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Dr. Mirabela Rusu focuses on developing analytic methods for biomedical data integration, with a particular interest in radiology-pathology fusion. Such integrative methods may be applied to create comprehensive multi-scale representations of biomedical processes and pathological conditions, thus enabling their in-depth characterization.

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Indrani Bhattacharya, Wei Shao

Doctoral Dissertation Advisor (AC)

Rewa Sood

Publications

PUBLICATIONS

- **Multiscale, multimodal analysis of tumor heterogeneity in IDH1 mutant vs wild-type diffuse gliomas** *PLOS ONE*
Berens, M. E., Sood, A., Barnholtz-Sloan, J. S., Graf, J. F., Cho, S., Kim, S., Kiefer, J., Byron, S. A., Halperin, R. F., Nasser, S., Adkins, J., Cuyugan, L., Devine, et al
2019; 14 (12): e0219724
- **AUTOMATED DETECTION OF PROSTATE CANCER ON MULTIPARAMETRIC MRI USING DEEP NEURAL NETWORKS TRAINED ON SPATIAL COORDINATES AND PATHOLOGY OF BIOPSY CORES**
Chen, L., Bien, N., Fan, R., Cheong, R., Rajpurkar, P., Thong, A., Wang, N., Ahmadi, S., Rusu, M., Brooks, J., Ng, A., Sonn, G.
LIPPINCOTT WILLIAMS & WILKINS.2019: E1098
- **ANISOTROPIC SUPER RESOLUTION IN PROSTATE MRI USING SUPER RESOLUTION GENERATIVE ADVERSARIAL NETWORKS**
Sood, R., Rusu, M., IEEE
IEEE.2019: 1688–91
- **Spatial integration of radiology and pathology images to characterize breast cancer aggressiveness on pre-surgical MRI**
Rusu, M., Daniel, B., West, R., Angelini, E. D., Landman, B. A.
SPIE-INT SOC OPTICAL ENGINEERING.2019
- **Framework for the co-registration of MRI and Histology Images in Prostate Cancer Patients with Radical Prostatectomy**
Rusu, M., Kunder, C., Fan, R., Ghanouni, P., West, R., Sonn, G., Brooks, J., Angelini, E. D., Landman, B. A.

 SPIE-INT SOC OPTICAL ENGINEERING.2019

- **A deep learning-based algorithm for 2-D cell segmentation in microscopy images** *BMC BIOINFORMATICS*
Al-Kofahi, Y., Zaltsman, A., Graves, R., Marshall, W., Rusu, M.
2018; 19: 365
- **An Application of Generative Adversarial Networks for Super Resolution Medical Imaging**
Sood, R., Topiwala, B., Choutagunta, K., Sood, R., Rusu, M., Wani, M. A., Kantardzic, M., Sayedmouchaweh, M., Gama, J., Lughofer, E.
IEEE.2018: 326–31
- **Co-registration of pre-operative CT with ex vivo surgically excised ground glass nodules to define spatial extent of invasive adenocarcinoma on in vivo imaging: a proof-of-concept study.** *European radiology*
Rusu, M., Rajiah, P., Gilkeson, R., Yang, M., Donatelli, C., Thawani, R., Jacono, F. J., Linden, P., Madabhushi, A.
2017
- **Computational imaging reveals shape differences between normal and malignant prostates on MRI** *SCIENTIFIC REPORTS*
Rusu, M., Puryrsko, A. S., Verma, S., Kiechle, J., Gollamudi, J., Ghose, S., Herrmann, K., Gulani, V., Paspulati, R., Ponsky, L., Bohm, M., Haynes, A., Moses, et al
2017; 7
- **Prostate shapes on pre-treatment MRI between prostate cancer patients who do and do not undergo biochemical recurrence are different: Preliminary Findings** *Sci Rep*
Ghose, S., Shiradkar, R., Rusu, M., Mitra, J., Thawani, R., Feldman, M., Gupta, A., Ponsky, L., Puryrsko, A., Madabhushi, A.
2017; 7 (1): 15829
- **Field Effect Induced Organ Distension (FORge) Features Predicting Biochemical Recurrence from Pre-treatment Prostate MRI** *Medical Image Computing and Computer Assisted Intervention. Medical Image Computing and Computer-Assisted Intervention (MICCAI)*
Ghose, S., Shiradkar, R., Rusu, M., Mitra, J., Thawani, R., Feldman, M., Gupta, A., Puryrsko, A., Ponsky, L., Madabhushi, A.
2017: 442-449
- **Co-Registration of ex vivo Surgical Histopathology and in vivo T2 weighted MRI of the Prostate via multi-scale spectral embedding representation** *Sci. Rep*
Li, L., Pahwac, S., Penzias, G., Rusu, M., Gollamudi, J., Viswanath, S., Madabhushi, A.
2017; 7: 8717
- **Identifying in vivo DCE MRI markers associated with microvessel architecture and gleason grades of prostate cancer** *JOURNAL OF MAGNETIC RESONANCE IMAGING*
Singanamalli, A., Rusu, M., Sparks, R. E., Shih, N. N., Ziober, A., Wang, L., Tomaszewski, J., Rosen, M., Feldman, M., Madabhushi, A.
2016; 43 (1): 149-158
- **Radiomics Analysis on FLT-PET/MRI for Characterization of Early Treatment Response in Renal Cell Carcinoma: A Proof-of-Concept Study** *Transl Oncol*
Antunes, J., Viswanath, S., Rusu, M., Valls, L., Hoimes, C., Avril, N., Madabhushi, A.
2016; 9 (2): 155-162
- **AutoStitcher: An Automated Program for Efficient and Robust Reconstruction of Digitized Whole Histological Sections from Tissue Fragments** *Sci Rep*
Penzias, G., Janowczyk, A., Singanamalli, A., Rusu, M., Shih, N., Feldman, M., Stricker, P. D., Delprado, W., Tiwari, S., Böhm, M., Haynes, A., Ponsky, L., Viswanath, et al
2016; 6: 29906
- **Framework for 3D histologic reconstruction and fusion with in vivo MRI: Preliminary results of characterizing pulmonary inflammation in a mouse model** *MEDICAL PHYSICS*
Rusu, M., Golden, T., Wang, H., Gow, A., Madabhushi, A.
2015; 42 (8): 4822-4832
- **Prostatome: A combined anatomical and disease based MRI atlas of the prostate** *MEDICAL PHYSICS*
Rusu, M., Bloch, B. N., Jaffe, C. C., Genega, E. M., Lenkinski, R. E., Rofsky, N. M., Feleppa, E., Madabhushi, A.
2014; 41 (7)
- **Identifying Quantitative In Vivo Multi-Parametric MRI Features For Treatment Related Changes after Laser Interstitial Thermal Therapy of Prostate Cancer** *Neurocomputing*
Viswanath, S., Toth, R., Rusu, M., Sperling, D., Madabhushi, A.

2014; 144: 13-23

- **Anisotropic Smoothing Regularization (AnSR) in Thirion's Demons Registration Evaluates Brain MRI Tissue Changes Post-Laser Ablation** *IEEE Engineering in Medicine and Biology Sciences*
Hwuang, E., Danish, S., Rusu, M., Sparks, R., Toth, R., Madabhushi, A.
2013: 4006-4009
- **Automated tracing of filaments in 3D electron tomography reconstructions using Sculptor and Situs** *JOURNAL OF STRUCTURAL BIOLOGY*
Rusu, M., Starosolski, Z., Wahle, M., Rigort, A., Wriggers, W.
2012; 178 (2): 121-128
- **Evolutionary bidirectional expansion for the tracing of alpha helices in cryo-electron microscopy reconstructions** *JOURNAL OF STRUCTURAL BIOLOGY*
Rusu, M., Wriggers, W.
2012; 177 (2): 410-419
- **An assembly model of rift valley Fever virus.** *Frontiers in microbiology*
Rusu, M., Bonneau, R., Holbrook, M. R., Watowich, S. J., Birmanns, S., Wriggers, W., Freiberg, A. N.
2012; 3: 254-?
- **Developing a denoising filter for electron microscopy and tomography data in the cloud** *Biophysical Reviews*
Starosolski, Z., Szczepanski, M., Wahle, M., Rusu, M., Wriggers, W.
2012: 1-7
- **Evolutionary tabu search strategies for the simultaneous registration of multiple atomic structures in cryo-EM reconstructions** *JOURNAL OF STRUCTURAL BIOLOGY*
Rusu, M., Birmanns, S.
2010; 170 (1): 164-171
- **Using Sculptor and Situs for simultaneous assembly of atomic components into low-resolution shapes** *Journal of Structural Biology*
Birmanns, S., Rusu, M., Wriggers, W., et al
2010; 173: 428-435
- **Biomolecular pleiomorphism probed by spatial interpolation of coarse models** *BIOINFORMATICS*
Rusu, M., Birmanns, S., Wriggers, W.
2008; 24 (21): 2460-2466
- **VITA - An Interactive 3-D Visualization System to Enhance Student Understanding of Mathematical Concepts in Medical Decision-making** *IEEE Computer-Based Medical Systems*
Iyengar, M., Svirbely, J., Rusu, M., Smith, J.
2008
- **A mammalian microRNA expression atlas based on small RNA library sequencing** *CELL*
Landgraf, P., Rusu, M., Sheridan, R., Sewer, A., Iovino, N., Aravin, A., Pfeffer, S., Rice, A., Kamphorst, A. O., Landthaler, M., Lin, C., Socci, N. D., Hermida, et al
2007; 129 (7): 1401-1414