

# Swati Rane

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## EDUCATION

**Pune Institute of Computer Technology, Pune University, India** **Aug. 1999 – Aug. 2003**  
B.E., Electronics and Telecommunication, G.P.A. = 4.00/4.00 (Rank 1/72)

**Texas A&M University, College Station, TX** **Aug. 2003 – Aug. 2005**  
M.S., Electrical Engineering, G.P.A. = 3.63/4.00  
Thesis Title: Parallel Magnetic Resonance Imaging: Characterization and Comparison

**Georgia Institute of Technology, Atlanta, GA** **Aug. 2005 – Aug. 2009**  
Ph.D., Bioengineering, G.P.A. = 3.88/4.00  
Thesis Title: Diffusion Tensor Imaging and Tractography at Very Long Diffusion Time

## SKILLS/CERTIFICATIONS

**FSL/Freesurfer Training Workshop, Redmond, WA (Certification)**

**Philips Medical Systems, Cleveland OH (Certification)**

SDM Training Module  
PPE Training Module

**Siemens MED Training Center, Cary NC (Certification)**

IDEA Sequence Programming Course (for VB13)  
IDEA Imaging Calculation Programming Course (for VB13)

### Other

MATLAB, AFNI, SPM, DTIStudio

## ACADEMIC APPOINTMENT

**(Status: US Permanent Resident)**

**Vanderbilt University School of Medicine** **Sept. 2009 – Present**

Research Fellow, Vanderbilt University Institute of Imaging Science (Radiology and Radiological Sciences)

Mentor: Gore, John

Emphasis: Development and application of novel functional MRI mechanisms to neurodegenerative diseases.

- **Application of functional MRI methods and MR spectroscopy to understand patho-physiology of Alzheimer's disease** (Collaborators: Angela Jefferson, Neurology and Manus Donahue, Radiology and Radiological Sciences): Multi-parametric MR imaging (fMRI, VASO, DTI, Chemical Exchange and Saturation Transfer (CEST) and T1rho), and MRS to identify hemodynamic, genetic and cognitive biomarkers to identify early onset of Alzheimer's disease
- **Application of volumetric MRI to understand patho-physiology of Parkinson's disease and assess effect of overlapping biomarkers in Alzheimer's and Parkinson's disease** (Collaborators: Daniel Claassen, Neurology and Manus Donahue, Radiology and Radiological Sciences): Multi-variate analysis to identify shared and distinct roles of genetic and fluid biomarkers.
- **Development and application of contrast-based and contrast-free cerebral blood volume measurement techniques to study hippocampal dysfunction in Schizophrenia** (Collaborator: Stephan Heckers, Psychiatry): Development of functional cerebral blood volume measurement approaches, test for feasibility of application to neurodegenerative disorders and suitability for high field strengths (3T and 7T).

- **Development of novel MR methods to quantify lymphatic flow in breast cancer related lymphedema** (Collaborators: Paula Donahue, Physical Medicine and Rehabilitation and Manus Donahue, Radiology and Radiological Sciences): Development of a non-invasive MR imaging protocol, based on spin labeling methods, to study lymphatic flow and lymph node structure to identify risk of secondary lymphedema, following surgery, especially after breast tissue removal
- **Other:** Application of flow compensated VASO method to study skeletal muscle contraction and recovery and comparison with standard NIRS approach, Evaluation of morphometric changes in phenotypes of Parkinson's disease

## PROFESSIONAL ACTIVITIES

### Peer Reviewer

Journal of Magnetic Resonance Imaging  
 Magnetic Resonance Imaging  
 The Open Neuroimaging Journal  
 BiomedCentral Research Notes  
 International Society for Magnetic Resonance In Medicine (ISMRM)

### Session Chair

Imaging Methods: MRI and DTI, Neuroscience 2007, (Society for Neuroscience, SFN)

### Talks

- On the measurement of cerebral blood volume – May 6, 2011, Vanderbilt University Institute of Imaging Science Seminar
- Post-processing strategies for perfusion based imaging – Oct 5, 2011, Reconstruction and Post-Processing Project (RAPP), Vanderbilt University
- Functional imaging of neurological disorders – Feb 6, 2012, Vanderbilt Psychiatry Neuroimaging Program – Neuroimaging Seminar

### Other

- Student Representative for Undergraduate Curriculum Design, All India Council for Technical Education, 2001
- Coordinator, Impetus and Concepts - Engineering Project Exhibit at Pune Institute of Technology, 2003
- IBM Workshop Organizer: Title - Managing Different Generations, Region D Conference, Society of Women Engineers (SWE), 2009
- Organizer: 9<sup>th</sup> VUIIS Annual Retreat, 2012, Florence, AL, USA
- Seminar Coordinator (2011- 2012), Vanderbilt University Institute of Imaging Science

### Awards

- JN Tata Endowment Scholarship for graduate studies in USA
- The Lila Poonawala Fellowship for graduate studies in USA
- Govt. Of India National Merit Scholarship
- Maharashtra State Govt. Student Scholarship
- Electrical Engineering Graduate Scholarship, Texas A&M University, Fall 2003, Fall 2004
- ISMRM Student Stipend Award, 2005, 2007, 2012
- Honorable Mention, 9<sup>th</sup> Annual VUIIS Research Retreat, Florence, AL, 2012
- Summa Sum Laude, 20<sup>th</sup> ISMRM Meeting, 2012
- Magna Cum Laude, 20<sup>th</sup> ISMRM Meeting, 2012
- Best Postdoctoral Poster Award, 10<sup>th</sup> Annual VUIIS Retreat, Chattanooga, TN, 2013
- Magna Cum Laude, 21<sup>st</sup> ISMRM Meeting, 2013

**TEACHING ACTIVITIES****Texas A&M University**

ELEN 214: Electrical Circuit Theory

Spring 2004

ELEN 325: Electronics

Summer 2004

ELEN 248: Introduction to Digital Systems

Spring 2005

**Georgia Institute of Technology**

BMED 2300: Problem based learning II (Undergraduate)

Fall 2006

**Vanderbilt University**

BMED 331: NeuroImaging (Graduate)

Fall 2010

Guest Lectures on DTI, PET including imaging principles and clinical relevance

**LIST OF GRANTS/SUPPORT****Current**

R01 MH 70560 (PI: Heckers, Stephan) Imaging hippocampal function in psychosis. 06/01/2013 – 04/30/2018

R01 HL111516 (PI: Jefferson, Angela) Vascular factors underlying abnormal cognitive aging. 03/27/2012 – 02/28/2017

R01 AG034962 (PI: Jefferson, Angela) Cardiac function as a mechanism for maladaptive brain aging. 03/15/2011 - 02/28/2017

**Awarded**

Biomarkers Across Neurodegenerative Disease (BAND) – Alzheimer's Association, Michael J. Fox Foundation, and W. Garfield Weston Foundation, Awarded July 2014 (PI: Rane Swati) Cortical and functional distinctions in Alzheimer's and Parkinson's disease

**Pending**

American Federation for Aging Research (PI: Rane) Perfusion characteristics in older adults using novel arterial spin labeling approaches

**Completed**

5R01 EB000461-11 (PI: Gore JC) Integrated imaging of brain function at 7T

R01 4-04-650-1031 (PI: Donahue MJ) Characterizing hemodynamic compensation and stroke risk in stenosis patients

VICTR V0000019667 (PI: Rane S; Mentor: Gore JC) T1rho imaging of vascular reactivity during hyperoxia

**PUBLICATIONS AND PRESENTATIONS****Journal Publications**Ji J.X., Son J.B. and Rane S.D., PULSAR: A MATLAB Toolbox for Parallel Magnetic Resonance Imaging Using Array Coils and Multiple Channel Receivers, Concepts in Magnetic Resonance Part B, Magnetic Resonance Engineering, vol. 31B(1), pp.~24-36, February 2007,Rane S.D., Nair G., and Duong T.Q., DTI at Long Diffusion Time Improves Fiber Tracking in Fixed Rhesus Monkey Brains, NMR Biomed., vol.23(5), pp.~459 - 467, June 2010, PMID: 20175137Rane S.D., and Duong T.Q., Comparison of in vivo and ex vivo Diffusion Tensor Imaging in Rhesus Macaques at Short and Long Diffusion times, The Open NeuroImaging Journal, Special Issues: Neuroimaging of Non-Human Primates, vol. 5, pp~172 - 178, November 2011, PMID: 22253659

Rane S., Kose S., Gore J.C., Heckers S. Altered Functional and Structural Connectivity in a Schizophrenia Patients with Complete Agenesis of the Corpus Callosum, *The American Journal of Psychiatry*, vol. 170(1), pp.~122 Letter to the Editor, 2013, PMID: 23288389

Rane S., Ally B.A., Hussey E., Wilson T., Thornton-Wells T., Gore J.C., Donahue M.J., Inverse correspondence between hippocampal perfusion and verbal memory performance in older adults, *Hippocampus*, vol. 23(3), pp~213-220, 2013, PMID: 23109214

Rane S., and Gore J.C., Measurement of T1 of human arterial and venous blood at 7T, *Magnetic Resonance Imaging*, vol. 31(3), pp~477-479, 2013, PMCID: PMC3561475

Rane S., Donahue P., Towse T., Ridner S., Jordi J., Chappell M., Gore J.C., Donahue M.J., Clinical Feasibility of Noninvasive Visualization of Lymphatic Flow using Principles of Spin Labeling MRI: Implications for Lymphedema Assessment, *Radiology*, vol. 269(3), pp.~893-902, 2013, PMID: 23864103

Rane S., Spear J., Zu Z., Donahue M.J., Gore J.C., Functional MRI Using Spin Lock Editing Preparation Pulses, *Magnetic Resonance Imaging*, vol. 32(7), pp.~813-818, 2014, PMID: 24848291

Rane S., Mason E., Hussey E., Gore J.C., Ally B., Donahue M.J., The effect of echo time and post-processing procedure on blood oxygenation level-dependent (BOLD) functional connectivity analysis, *NeuroImage*, in press, vol. 15, pp.~39-47, 2014, PMCID: PMC4066393

Donahue M.J., Faraco C.C., Strother M.K., Chappell M.A., Rane S., Dethrage L., Hendrikse J., Seiro J.C., Bolus arrival time and cerebral blood flow response to hypercarbia, *Journal of Cerebral Blood Flow and Metabolism*, vol. 34, pp.~1243-1252, 2014.

Donahue M.J., Rane S., Hussey E., Mason E., Pradhan S., Waddell K., and Ally B.A.,  $\gamma$ -aminobutyric acid (GABA) concentration inversely correlates with basal perfusion in human visual cortex, *Journal of Cerebral Blood Flow and Metabolism*, vol. 34(3), pp.~532-541, 2014

Langdon W., van der Kolk A., Rane S., Donahue M.J., Strother M., Correlating Hemodynamic MRI with high-field Intracranial Vessel Wall Imaging in Stroke, accepted in *Journal of Radiology Case Reports*, vol. 8(6), pp.~1-10, 2014

Donahue M.J., Hussey E., Rane S., Porchak T., van Osch M., Hartkamp N., Hendrikse J., Ally B., Vessel-encoded arterial spin labeling (VE-ASL) reveals elevated flow territory asymmetry in older adults with substandard verbal memory performance. *Journal of Magnetic Resonance Imaging*, vol. 39(2), pp.~377-286, 2014, PMCID: PMC3735670

Talati P., Rane S., Kose S., Gore J., Heckers S., Anterior-Posterior Cerebral Blood Volume Gradient in Human Subiculum accepted in *Hippocampus*, 2014

Talati P., Rane S., Kose S., Blackford J., Gore J., Donahue MJ., Heckers S., Increased Hippocampal CA1 Cerebral Blood Volume in Schizophrenia, in press in *NeuroImage Clinical*, 2014

## **Research Monograph**

Rane Swati, *Parallel Magnetic Resonance Imaging: Characterization and Comparison*, VDM Verlag Dr. Mueller, Jan. 7, 2008, ISBN (10 digit): 3836434350

## **Peer-reviewed Scientific Meeting Presentations (14/30)**

Rane S.D. Ji J.X., A MATLAB Toolbox for Parallel Imaging using Multiple Phased-Array Coils, 13th Scientific Meeting and Exhibition, ISMRM 2005, Miami, FL

Rane S. D., Duong T., Diffusion Tensor Imaging at Long Diffusion Time, Neuroscience 2007, Society for Neuroscience, San Diego, CA

Meda S., Cobb J., Wilson T., Hussey E., Ally B., Rane S., Donahue M., Thornton-Wells T., Quantitative 3T T1rho imaging as an early biomarker of Alzheimer's Disease: A preliminary voxel-wise analysis in MCI, at-risk, and control subjects, Alzheimer's Association International Conference on Alzheimer's Disease 2012, British Columbia, Canada.

Rane S., Donahue M, Gore J, Quantitative measurement of functional cerebral blood volume changes with multi-echo fMRI at 7T, 20th Scientific Meeting and Exhibition, ISMRM 2012, Melbourne, Australia

Rane S., Porchak T., Ally B., Hussey E., Thornton-Wells T., Meda S., Gore J., Donahue M., Multi-modal MRI analysis for assessing memory impairment in the early stages of AD, 20th Scientific Meeting and Exhibition, ISMRM 2012, Melbourne, Australia

Rane S., Donahue P., Jordi J., Gore J., Donahue M., Noninvasive characterization of lymphatic flow velocity using principles of spin labeling, **Summa Cum Laude**, 20th Scientific Meeting and Exhibition, ISMRM 2012, Melbourne, Australia

Rane S., Kose S., Heckers S., Avison M., Gore J., Experimental evaluation of in vivo transverse relaxivity of Magnevist in brain tissue, **Magna Cum Laude**, 20th Scientific Meeting and Exhibition, ISMRM 2012, Melbourne, Australia

Donahue M., Hussey E., Porchak T., Rane S., van Osch M., Hartkamp N., Hendrikse J., Ally B., Planning-free regional arterial spin labeling provides evidence for flow asymmetry as a risk factor for dementia, 20th Scientific Meeting and Exhibition, ISMRM 2012, Melbourne, Australia

Rane S., Spear J., Zhong Z., Donahue M.J., Gore, J.C., Functional MRI Using Spin-Lock Sequence to Modulate BOLD Activation, 21st Scientific Meeting and Exhibition, ISMRM 2013, Salt Lake City, UT

Rane S., Ally B., Wilson T., Thornton-Wells T., Gore J.C., Hussey E., Donahue M.J., BOLD Functional Connectivity Analysis based on Intravascular Weighting and Parenchymal R2\*, 21st Scientific Meeting and Exhibition, ISMRM 2013, Salt Lake City, UT

Rane S., Donahue P., Towse T., Jordi J., Chappell M., Donahue M.J., Measurement of reduced lymphatic flow velocity under conditions of obstructed lymphatic flow using spin labeling approach, 21st Scientific Meeting and Exhibition, ISMRM 2013, Salt Lake City, UT

Rane S., Mason E., Pradhan S., Waddell K., Gore J.C., Ally B., Donahue M.J., Baseline GABA concentration more strongly predicts baseline BOLD signal synchrony than CBV in the visual cortex, **Magna Cum Laude**, 21st Scientific Meeting and Exhibition, ISMRM 2013, Salt Lake City, UT

Mason E., Rane S., Hussey E., Pradhan S., Waddell K., Donahue M.J., Ally B., Glutamate Concentration is Directly Correlated with Alpha Power Attenuation from Eyes Closed to Eyes Open in Human Occipital Lobe, **Magna Cum Laude**, 22nd Scientific Meeting and Exhibition, ISMRM 2014, Italy