

**DEBASIS MITRA***Creativity with purpose*

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**OBJECTIVE**

To make a broad impact contribution in imaging science and data science, primarily focused toward solving problems in bio-medicine, science, and engineering, by introducing discrete domain artificial intelligence techniques

**AREAS OF INTEREST**

Medical Imaging, Imaging Science, Inverse Problems  
 Constraint Reasoning, Artificial Intelligence  
 Protein Structure Analyses, Bio-informatics  
 Mathematical Physics

**EDUCATION**

Ph.D.	Computer Sc.	May, 1994	Center for Advanced Computer Studies University of Louisiana at Lafayette (ULL)
Ph.D.	Physics	May, 1984	Indian Institute of Technology (IIT) Kharagpur, India
M.Sc.	Physics	May, 1977	IIT, Kharagpur, India

**PROFESSIONAL EXPERIENCE****Academic Positions**

2009 - to date	Professor, School of Computing Florida Institute of Technology (FIT), Melbourne, Florida
2001 - 2009	Associate Professor, FIT
1999-2001	Associate Professor (Tenured), Department of Computer Science, Jackson State University (JSU), Jackson, Mississippi
1994-1999	Assistant Professor (Tenure track), JSU

**Research Affiliations (paid)**

2013 – to date	Affiliated, Department of Radiology and Biomedical Imaging, University of California San Francisco, California
2009 – to date	Affiliated Scientist, Dept. of Radiotracer Development & Imaging Technology, Lawrence Berkeley National Lab (LBNL), California
2008 (Summer)	1. Indian Institute of Technology, Mumbai, 2. Tata Institute of Fundamental Research, Mumbai
2007 (Summer)	Oxford University, Constraint Reasoning Lab, UK
2002 (Summer)	1. Vienna Technical University, Database and AI Group, Austria, 2. Asian Institute of Technology, Bangkok, Thailand
2001 (Summer)	Linkoping University, AI Lab, Sweden
2000-2001 (Summer)	Invited Professor, University of Paris-South, CNRS/LIMSI Lab, France
1997-98 (Summers)	NSF Engineering Research Center, Mississippi State University
1995-96 (Summers)	LBNL, Data Management group, Berkeley (10 wks each year)

**Industrial Experience**

1982-1989

Seismic Geophysicist, Oil and Natural Gas Corporation, India

**AWARDS**

- **HEADWAE, 2000:** An award for excellence in research, teaching, and service from the State Legislature of Mississippi (2001)
- **CAREER award:** National Science Foundation

**SIGNIFICANT GRANTS AND PROJECTS****Energy-Independent Single Photon Molecular Imaging Technology**

National Institute of Health / UC at San Francisco: (\$66,479) 05/01/13 - 04/30/16.  
Parallelize SPECT reconstruction algorithms on high-performance computing platform.

**Molecular Imaging of Cardiac Hypertrophy using MicroPET and Pinhole SPECT Project**

National Institute of Health / Lawrence Berkeley National Lab (\$77,773): 11/02/11 - 04/30/15. Develop dynamic SPECT reconstruction algorithm directly from sinogram.

**ReMI database for nuclear medical imaging group at Lawrence Berkeley Lab**

National Institute of Health / Lawrence Berkeley National Lab (\$46,041.91): 08/01/11 - 07/31/12. Develop web-enabled database for archiving raw data from research in medical imaging (ReMI); Patient motion correction on SPECT sinogram.

**Creativity in Physics: SGER**

National Science Foundation (NSF, IIS-0732566, \$99,331): 08/01/11 - 07/31/12. Applied Constraint Reasoning framework in modeling creative activities in Physics.

**Muon Radiography for Nuclear Contraband Detection**

Department of Homeland Security (Domestic Nuclear Detection Office, DNDO, Homeland Security): 2007-2010, as Co-PI (PI: Dr. Marcus Hohlman, Department of Physics and Space Sciences, FIT), \$228,705, 2007-08, and \$571,453 for 2008-09. We developed reconstruction algorithms for muon tomography.

**CAREER award: Temporal/Multi-dimensional Reasoning with Uncertainty**

National Science Foundation (NSF, IIS-0296042): 1998-2001, extended to 2002 (~\$300,000). Developed and implemented graph-theoretic algorithms for spatio-temporal constraint propagation.

**System Definition and Object Oriented Programming for a Rocket Engine Numerical Simulation**

NASA Glenn (formerly, Lewis) Research Center (NCC3-437), 10/23/1995 – 12/31/1999, \$284,267 (PI since 1997). Objectification of rocket engine numerical simulation legacy codes.

**Intelligent Interface to the Numerical Simulators of Aerospace Transportation Engines**

NASA Glenn (formerly, Lewis) Research Center (NCC3-2277), 7/22/1999 – 8/1/2001, \$35,032. Design of an intelligent user interface to rocket engine numerical-simulation packages.

**TEACHING**

Design and Analysis of Algorithms, Formal Languages and Automata Theory, Artificial Intelligence, Databases, Temporal Databases, Constraint Reasoning, Computational Molecular Biology, Medical Imaging, Scientific Computation, *Developing: Quantum Information System*

**ADDITIONAL PROFESSIONAL ACTIVITIES****Conference Organizer:**

General Co-chair, (with Dr. Philip K. Chan, FIT), The Nineteenth FLAIRS conference (originally Florida AI Research Society), 2006

Organizer: AAI Spring Symposium: *Foundations and Applications of Spatio-temporal Reasoning (FASTR)*, Stanford, 2003

**Sample Reviewing Activities:**

Applied Intelligence Journal (Editorial board), IEEE Transactions on Nuclear Science, Journal of Molecular Biology, FLAIRS (Florida AI Research Symposium 2000–05), TIME 2003-04, International Conference on Industrial Applications of AI (IEA/AIE), 2000-02, *Grant proposals: NSF* (CISE/IIS panel), NASA (on AI, for Program manager R. Morris)

**Representative Publications***Medical Imaging*

- Boutchko R, Mitra D, Baker S, Jagust W, and Gullberg GT. (2015) "Clustering Initiated Factor Analysis (CIFA) Application for Tissue Classification in Dynamic Brain PET." *Journal of Cerebral Blood Flow & Metabolism – Nature*, doi:10.1038/jcbfm.2015.69.
- Abdalah M, Boutchko, R, Mitra D, and Gullberg GT. "Reconstruction of 4-D Dynamic SPECT Images From Inconsistent Projections Using a Spline Initialized FADS Algorithm (SIFADS)." *IEEE Transactions in Medical Imaging*, 34(1): 216-228, 2015.
- Eiland D, Mitra D, Abdalah M, Butchko R, and Gullberg GT. (2012) "SinoCor: Inter-frame and Intra-frame motion correction tool," *Proc. IEEE Nuclear Science Symposium and Medical Imaging Conference*, Anaheim, CA.

*Muon Tomography*

- Gnanvo K, Grosso LV, Hohlman M, Locke JB, Quintero A, and Mitra D. (2011) "Imaging of high-Z material for nuclear contraband detection with a minimal prototype of a muon tomography station based on GEM detectors." *Nuclear Instruments and Methods in Physics Research A*, 652: 16–20, 2011. (Citation: 31, January 2015)
- Mitra D, Banerjee A, Waweru S, White S, Gnanvo K, and Hohlmann M. (2009) "Simulation Study of Muon Scattering For Tomography Reconstruction." (*Oral presentation in the joint session NSS/MIC Conf. Record IEEE Nuclear Sc. Symposium and Medical Imaging Conference*, Orlando, Florida.

*Constraint Reasoning and Artificial Intelligence*

- Mitra D, and Launay F. (2010) "Explanation Generation over Temporal Interval Algebra." Chapter in '*Qualitative Spatio-Temporal Representation and Reasoning: Trends and Future Directions.*' Hazarika SM. (Editor), Information Science Publishing, ISBN: 1616928689. (Citation: 8, January 2015)
- Renz J, and Mitra D. (2004) "Qualitative Direction Calculi with Arbitrary Granularity." *Proc. 8<sup>th</sup> Pacific Rim Conference on AI (PRICAI)*, pp: 65-74, Auckland, New Zealand. (Citation: 106, January 2015)
- Mitra D, and Pal N. (1999) "Complexity studies of a temporal constraint propagation algorithm: A statistical analyses," *Journal of Experimental and Theoretical Artificial Intelligence*, 11:155-183.
- Shoshani A, Preston P, Jacobsen J, and Mitra D. (1996) "Characterization of Temporal Sequences in Geophysical Databases." *Proc. Statistical and Scientific Database Management (SSDBM) conference*, Sweden.
- Mitra D. (1998) "Cluster Forming Interval Sub-algebras," *Constraint journal*, 3:179-189.

*Computational Biology*

- Mitra D, Samant G, Sengupta K. (2006) "Correlogram-based method for comparing biological sequences." *Springer Lecture Notes in Artificial Intelligence*, Series: "Advances in Applied Artificial Intelligence," Ali M, and Dapoigny R. (Eds.) ISBN 3-540-35453-0.

*Mathematical Physics*

- Basu D, and Mitra D. (1981) "The Lorentz group in oscillator realization III - the group  $SO(3,1)$ ," *Journal of Mathematical Physics*, 22(5): 946-953.

*Software License*

- Mitra D, Eiland D, Boutchko R, and Gullberg GT. (2013) "SinoCor: Sinogram Level Motion Correction in SPECT." *Lawrence Berkeley National Laboratory Software License CR-3016*, 2013.
- Boutchko R., and Mitra D (submitted 2015) "CIFA – Cluster Initiated Factor Analysis." *Lawrence Berkeley National Laboratory Software License*.
- Abdalah A., Boutchko R, Mitra D, and Gullberg GT. (submitted 2015) "Spline Initialized Factor Analysis in Dynamic Structures." *Lawrence Berkeley National Laboratory Software License*.

*Publications from short projects**Computer Security and Machine Learning*

- Tandon G, Chan PK, and Mitra D. (2005) "Data cleaning and enriched representations for anomaly detection in system calls." Book chapter in *Machine Learning and Data Mining for Computer Security: Methods and Applications*, Maloof M. (Ed.), Springer.

*Creativity in Science*

- Mitra D. (2008) "Three generations of research in computational creativity and beyond," in *Association for Advancement of Artificial Intelligence Tech Report on Creative Intelligent Systems*. Ventura D, Maher ML, and Colton S (Eds.).

*Software Engineering*

- Mitra D, and Bond P. (2002) "Component-oriented Programming as an AI-planning Problem," *Springer Lecture Notes in Artificial Intelligence*. Series: Hendtlass T, and Ali M. (Eds.) "Developments in Applied Artificial Intelligence." ISBN 3-540-67689-9.

*Expert Systems and Artificial Intelligence*

- Nathan W, Campbell E, Al-Gharab M, Johnson D, Schoolar R, Winters F, and Mitra D. (1996) "An Expert System for Recognizing Plants from External Features." *Proc. ESRI User's Conference*, Palm Springs, California.

*Psychology*

- Gifford KA, Mitra D, and Baker JA. (2008) "Exploratory analysis: understanding the benefits of applying data mining techniques to a sexual abuse database." *Conf. record The American Professional Society on the Abuse of Children 16th Annual Colloquium*, Phoenix, Arizona.

*Distance Education*

- Bernholdt DE, Fox GC, Markowski NTR, Podgorny M, Mitra D, and Malluhi Q. (1998) "Synchronous Learning at a Distance: Experiences with TANGO." *Proc. Supercomputing'98 conference*, Orlando, Florida.

*Intelligent Tutoring Systems and Artificial Intelligence*

- Sen RK, and Mitra D. (1987) "A logic based response analyzer for computer aided learning." *Proc. The IEEE International Symposium on Electronic Devices, Circuits and Systems*, Kharagpur, India.