

# ARNAB RAY

## PERSONAL INFORMATION

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ADDRESS: 5825 UNIVERSITY RESEARCH COURT, SUITE 1300, COLLEGE PARK MD 20740-3823  
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CITIZENSHIP: INDIAN (US PERMANENT RESIDENT)

## WORK EXPERIENCE

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JUNE 2005–CURRENT	<i>Research Scientist</i> AT FRAUNHOFER CENTER FOR EXPERIMENTAL SOFTWARE ENGINEERING, MARYLAND MANAGED AND DELIVERED RESEARCH PROJECTS IN THE DOMAIN OF MODEL-BASED DEVELOPMENT AND V&V FOR FRAUNHOFER'S AUTOMOTIVE, AEROSPACE AND MEDICAL DEVICE CUSTOMERS
JUNE 2007–CURRENT	<i>Assistant Adjunct Professor</i> AT UNIVERSITY OF MARYLAND, COLLEGE PARK DEVELOPED AND TAUGHT ENPM 613 SOFTWARE DESIGN AND IMPLEMENTATION
AUGUST 2004- MAY 2005	<i>Engineer</i> AT QUANTECH GLOBAL SERVICES, MICHIGAN (CONTRACTED TO GENERAL MOTORS), WORKED ON RESEARCH PROJECTS IN THE DOMAIN OF REQUIREMENTS ENGINEERING AND MODEL-BASED DEVELOPMENT FOR GENERAL MOTORS CORPORATION
SUMMER 2001	SUMMER INTERN AT STANFORD UNIVERSITY WORKED ON DEVELOPING MODELS FOR A MEDICAL DEVICE SYSTEM (COMPUTER ASSISTED RESUSCITATING ALGORITHM) USING THE STANFORD TEMPORAL PROVER (STEP)

## EDUCATION

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JULY 2004 DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE,  
**State University of New York at Stony Brook**, NEW YORK  
THESIS: "COMPOSITIONAL MODELING OF INTERACTION-CENTRIC DISTRIBUTED SYSTEMS"  
ADVISOR: PROF. RANCE CLEAVELAND

JULY 2001 MASTER OF SCIENCE IN COMPUTER SCIENCE,  
**State University of New York at Stony Brook**, NEW YORK  
THESIS: "OBSERVATIONAL MODELS OF PROBABILISTIC BEHAVIOR"  
ADVISOR: PROF. RANCE CLEAVELAND

JULY 1999 BACHELOR OF SCIENCE AND ENGINEERING IN COMPUTER SCIENCE,  
**Jadavpur University**, INDIA

## RESEARCH INTERESTS

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Model-based Software Engineering, Requirements Engineering and Management, Formal Methods, Software Architecture, Information Flow and Software Security

## RESEARCH GRANTS AND PROJECTS

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- 2008–2009 PRINCIPAL INVESTIGATOR  
SPONSOR: National Science Foundation  
TITLE: “FORMAL APPROACHES TO VERIFYING MEDICAL DEVICE SOFTWARE”  
AWARD AMOUNT: \$ 55,000
- 2009–2010 PRINCIPAL INVESTIGATOR  
SPONSOR: Food and Drug Administration [FDA-SOL-09-1059816]  
TITLE: “MODEL-BASED DEVELOPMENT OF MEDICAL SOFTWARE”  
AWARD AMOUNT: \$ 38,000
- 2006– PROJECT MANAGER  
SPONSOR: Robert Bosch Corporation  
TITLE: “DESIGN VERIFICATION AND SOFTWARE VISUALIZATION”  
AWARD AMOUNT: \$ 200,000
- 2009–2011 PROJECT MANAGER  
SPONSOR: National Science Foundation (subcontract from University of Maryland)  
TITLE: “VERIFICATION OF OPEN-LOOP EMBEDDED CONTROL SYSTEMS”  
AWARD AMOUNT: \$ 60,000

## PUBLICATIONS

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- Arnab Ray and Rance Cleaveland. Architectural Interaction Diagrams- AIDs For System Modeling. International Conference on Software Engineering (ICSE) 2003 , Pages 396-406.
- Security Check: A Formal Yet Practical Framework For Secure Computer Architecture. New Security Paradigms Workshop (NSPW) 2003, Pages 59-65.
- Arnab Ray and Rance Cleaveland. Unit Verification: The CARA Experience. International Journal On Software Tools For Technology Transfer (STTT) 2004. Issue: Volume 5, Number 4. Springer-Verlag. Pages 351-369
- Arnab Ray, Rance Cleaveland and Arne Skou. An Algebraic Theory Of Boundary Crossing Transitions. Semantic Foundations of Engineering Design Languages (SFEDL), European Joint Conferences on Theory and Practice of Software (ETAPS) 2004, Electronic Notes in Theoretical Computer Science Volume 108, 13 December 2004, Pages 21-37
- Arnab Ray and Rance Cleaveland. Formal Modelling of Middleware-based Systems. Formal Foundations of Embedded Software and Component-Based Architecture (FESCA), European Joint Conferences on Theory and Practice of Software (ETAPS) 2004, Electronic Notes in Theoretical Computer Science Volume 115, 18 January 2005, Pages 69-88
- Arnab Ray, Bikram Sengupta and Rance Cleaveland. Secure Requirements Elicitation Through Triggered Message Sequence Charts. International Conference on Distributed Computing and Internet Technologies (ICDCIT) 2004, Pages 273-282
- Prem Uppuluri, Uday Joshi and Arnab Ray. Preventing Race Condition Attacks on File Systems. ACM Symposium on Applied Computing (ACM SAC) 2005, Pages 346-353.
- Arnab Ray. Enforcing Distributed Information Flow Policies Architecturally: the SAID Approach. Seventh International Conference on Coordination Models and Languages COORDINATION 2005, Pages 125-139.
- Arnab Ray and Rance Cleaveland. A Software Architectural Approach to Security by Design. 30th Annual International Computer Software and Applications Conference (COMP-

SAC) 2006, Pages 83-86.

- Arnab Ray, Rance Cleaveland, Shengbing Jiang and Thomas E Fuhrman. Model-based Verification and Validation of Distributed Controller Architectures. Society for Automotive Engineers (SAE) CONVERGENCE 2006, Document Number: 2006-21-0046.
- Arnab Ray and Rance Cleaveland. Executable Specifications for Real-time Distributed Systems. Model-driven High-level Programming of Embedded Systems, European Joint Conferences on Theory and Practice of Software (ETAPS) 2007, Electronic Notes in Theoretical Computer Science Volume 203 Issue 4, 5 June 2008, Pages 3-17.
- Chris Ackermann, Arnab Ray, Rance Cleaveland, Juergen Heit, Chris Martin and Charles Shelton. Model Based Design Verification: A Monitor Based Approach. Society for Automotive Engineers (SAE) World Congress 2008, Document Number: 2008-01-0741
- Mikael Lindvall, Chris Ackermann, William Straton, Deane Sibol, Arnab Ray, Lyly Yonkwa, Jan Kresser, Sally Godfrey and Jens Knodel. Using Sequence Diagrams To Detect Communication Problems Between Systems. IEEE Aerospace Conference 2008, Pages 1-11
- Arnab Ray. Authorization, Access Control and Information Flow. Invited book chapter in Wiley Encyclopedia of Computer Science and Engineering. (Benjamin Wah, ed.) Hoboken: John Wiley and Sons, Inc. Volume 1 pages 213-223
- Chris Ackermann, Arnab Ray, Rance Cleaveland, Chris Martin and Charles Shelton. Integrating Functional and Non-Functional Design Verification for Embedded Software Systems. Society for Automotive Engineers (SAE) World Congress 2009, Document Number: 2009-01-0152.
- Arnab Ray, Raoul Jetley and Paul Jones. Engineering High Confidence Medical Device Software. SIGBED Review, Special Issue on the 2nd Joint Workshop on High Confidence Medical Devices, Software, and Systems (HCMDSS) and Medical Device Plug-and-Play (MD PnP) Interoperability, Volume 6, Number 2, July 2009
- Arnab Ray, Iris Morschhaeuser, Chris Ackermann, Rance Cleaveland, Charles Shelton and Chris Martin. "Validating Automotive Control Software using Instrumentation-Based Verification." Proceedings of the 2009 IEEE/ACM International Conference on Automated Software Engineering (ASE 2009), Auckland, New Zealand, November 2009, pages 15-25. IEEE Computer Society Press
- Arnab Ray and Raoul Jetley. Model Based Development: An Emerging Approach for Engineering Medical Device Software. AAMI Biomedical Instrumentation and Technology (BI&T) journal Volume 44, Number 1, Pages 51-53, February 2010

## SERVICE

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REVIEWER:	Transactions on Software Engineering, Empirical Software Engineering, ACM Computing Surveys, Software and System Modeling, International Conference on Software Engineering 2006, International Computer Software and Applications Conference COMPSAC 2008
PROGRAM COMMITTEE MEMBER:	International Conference on Distributed Computing and Internet Technologies (ICDCIT) 2006, Middleware 2007 Workshop on Modelling Software Architectures of Middleware-intensive Applications (MoSAMinA) 2007
LOCAL ARRANGEMENTS CHAIR:	Maryland Software Day 2007 and 2009