

Dr. Soumyadip Bandyopadhyay

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Current address	Dr. Soumyadip Bandyopadhyay D 66 BITS Pilani K K Birla Goa Campus NH 17B Bypass Road, Zuarinagar Goa-403726 Country: India	
Education	Indian Institute of Technology, Kharagpur, West Bengal, India Degree: <i>Ph.D.</i> <ul style="list-style-type: none">• Computer Science and Engineering• Formal Verification Research Group• Professor Chittaranjan Mandal and Professor Dipankar Sarkar¹• Thesis Title: Path Based Equivalence Checking of Petri Net Representation of Programs for Translation Validation West Bengal University of Technology, Kolkata, , West Bengal, India Degree: <i>B.Tech</i> <ul style="list-style-type: none">• Computer Science and Engineering• C.G.P.A: 8.43 in scale of 10.0	2009–2017 2004-2008
Work Experience	<ul style="list-style-type: none">• Research Scientist, ABB Corporate Research (July 2023 to Till date)• Senior Formal Verification Engineer, NVIDIA, (May 2022 to June 2023)• Assistant Professor, Dept of CSIS, BITS Pilani K K Birla Goa Campus (December 2018 to May 2022)• Post Doctoral Fellow, System Analysis and Modeling Group, Hasso Plattner Institute, Potsdam, Germany (August 2017 to October 2018)• Assistant Professor, Dept of CSIS, BITS Pilani K K Birla Goa Campus (December 2016 to July 2017)	
Research interest	<ul style="list-style-type: none">• Formal methods• Program Equivalence• Software Verification• Generative AI• PLC verification• Data path verification• High Level Synthesis• Model driven engineering	
Honours and Awards	<ul style="list-style-type: none">• Best paper ICSoft 2021• Selected in 7th HLF as top 50 young researcher in computer science• Post Doctoral fellowship from System Analysis and Modeling Group, Hasso Plattner Institute, Germany, 2017• Tata Consultancy Service Innovation Lab Research Fellowship, 2012• Academic of science Czech Republic Scholarship, 2007	
Professional activities	<ul style="list-style-type: none">• Reviewer at CAV-2014, EMSOFT-2015, DAC 2020, ACM TOSEAM, Acta Informatica,• PC member ICSoft 2018,2019, 2020, 2021, 2022, 2023, VLSI D 2023, INDICON, 2023, MPM4CPS 2021, 2022, 2023, ISEC 2018, 2019, 2020, 2021, 2022• Senior IEEE Member, ACM Member, INSTICC Member• PERR 2022 (Co-chair) co-located with FLOC 2022	
Journals Publications	<ul style="list-style-type: none">• Soumyadip Badyopadhyay, Dipankar Sarkar, Chittaranjan Mandal, Holger Giese, "Translation Validation of Coloured Petri Net Models of Programs on Integers", Acta Informatica (SCI Q2)	

¹Dept. of Computer Science and Engineering

- **Soumyadip Bandyopadhyay**, Dipankar Sarkar, Chittaranjan Mandal, "Equivalence checking of Petri net models of programs using static and dynamic cut-points", **Acta Informatica** (SCI Q2)
- **Soumyadip Bandyopadhyay**, Dipankar Sarkar, Kunal Banerjee, Chittaranjan A. Mandal, Krishnam Raju, "A Path Construction Algorithm for Translation Validation using PRES+ Models", **Parallel processing letters** (SCI Q3)

Conference and workshop Publications

- Md Tauseef Alam, Sorbajit Goswami, Khushi Singh, Raju Halder, Abyayananda Maiti, **Soumyadip Bandyopadhyay**, "SolGen: Secure Smart Contract Code Generation Using Large Language Models Via Masked Prompting", **ISEC 2025**
- Heiko Koziol, Virendra Ashiwal, **Soumyadip Bandyopadhyay**, Chandrika K R, "Automated Control Logic Test Case Generation using Large Language Models", **ETFA 2024**
- Rakshit Mittal, Dominique Blouin, Anish Bhobe and **Soumyadip Bandyopadhyay**, "Solving the Instance Model-View Update Problem in AADL", **MODELS 2022** (Core rank A)
- Rakshit Mittal, Dominique Blouin, **Soumyadip Bandyopadhyay**, "PNPEq: Verification of Scheduled Conditional Behavior in Embedded Software", **APSEC 2021** (Core rank B)
- Rakshit Mittal, Rochishnu Banerjee, Dominique Blouin, **Soumyadip Bandyopadhyay**, "Towards an Approach for Translation Validation of Thread-level Parallelizing Transformations using Colored Petri Nets", **ICSOFT 2021 (Best Paper)** (Core rank B)
- Rakshit Mittal, Rochishnu Banerjee, Santonu Sarkar, **Soumyadip Bandyopadhyay**, "Translation Validation of Loop involving Code Optimizing Transformations using Petri Net based Models of Programs", **Petri Nets workshop 2020**
- Shivam, Nilanjana Goswami, Veeky Baths, **Soumyadip Bandyopadhyay**, "AES: Automated Evaluation Systems for Computer Programming Course", **ICSOFT 2019** (Core rank B)
- **Soumyadip Bandyopadhyay**, Dipankar Sarkar, Chittaranjan Mandal, "SamaTulyataOne: A Path Based Equivalence Checker", **ISEC 2019**
- Santonu Sarkar, Prateek Kandelwal, **Soumyadip Bandyopadhyay**, Holger Giese, "Analysis of GPGPU Programs for Data-race and Barrier Divergence", **ICSOFT 2018** (Core rank B)
- **Soumyadip Bandyopadhyay**, Santonu Sarkar, Dipankar Sarkar and Chittaranjan Mandal; SamaTulyata, "An Efficient Path Based Equivalence Checking Tool", **ATVA 2017** (Core rank A)
- **Soumyadip Bandyopadhyay**, Santonu Sarkar and Kunal Banerjee, "An End-to-End Formal Verifier for Parallel Programs", **ICSOFT 2017** (Core rank B)
- **Soumyadip Bandyopadhyay** and Kunal Banerjee, "PRESGen: A Fully Automatic Equivalence Checker for Validating Optimizing and Parallelizing Transformations", **HPDC workshop 17**
- **Soumyadip Bandyopadhyay**, Dipankar Sarkar and Chittaranjan Mandal, "An efficient path based equivalence checking for Petri net based models of programs", **ISEC-2016**
- **Soumyadip Bandyopadhyay** and Kunal Banerjee, "Implementing an Efficient Path Based Equivalence Checker for Parallel Programs", **HPDC workshop 16**
- Kunal Banerjee, **Soumyadip Bandyopadhyay**, and Santonu Sarkar, "Data-Race Detection: The Missing Piece for an End-to-End Semantic Equivalence Checker for Parallelizing Transformations of Array-Intensive Programs", **PLDI workshop 2016**
- **Soumyadip Bandyopadhyay**, Dipankar Sarkar and Chittaranjan Mandal, "Validating SPARK: High Level Synthesis compiler", **ISVLSI-2015**
- **Soumyadip Bandyopadhyay**, Dipankar Sarkar and Chittaranjan Mandal, "A Path-Based Equivalence Checking Method for Petri net based Models of Programs", **ICSOFT-EA-2015** (Core rank B)
- **Soumyadip Bandyopadhyay**, Dipankar Sarkar, Chittaranjan A. Mandal, "An Efficient Equivalence Checking Method for Petri net based Models of Programs", **ICSE 2015** (Core rank A*)
- **Soumyadip Bandyopadhyay**, Kunal Banerjee, Dipankar Sarkar, Chittaranjan A. Mandal, "Translation Validation for PRES+ Models of Parallel Behaviours via an FSM-D Equivalence Checker", **VDAT 2012**

Poster Publications

- **Soumyadip Bandyopadhyay**, "Behavioural verification using Petri net based models of programs", **POPL-2015 (ACM student research competition)**
- **Soumyadip Bandyopadhyay**, Dipankar Sarkar, Chittaranjan A. Mandal, "Translation Validation using Path-Based Equivalence Checking of Petri net based Models of Programs", **WEPL 2015**

Book chapter

- Bedir Tekinerdogan, Rakshit Mittal, Rima Al-Ali, Mauro Iaconod, Eva Navarroe, **Soumyadip Bandyopadhyay**, Ken Vanherpen and Ankica Barisic, "A feature-based ontology for cyber physical systems", **Chapter 3, Book Title : Multi-Paradigm Modelling Approaches for Cyber-Physical**, Elsevier Press. ISBN No. 9780128191064

	<ul style="list-style-type: none"> • Holger Giese , Dominique Blouin , Rima Al-Ali , Hana Mkaoua, Soumyadip Bandyopadhyay, Mauro Iacono, Moussa Amrani, Stefan Klikovits and Ferhat Erata "An ontology for multiparadigm modelling", Chapter 4, Book Title: Multi-Paradigm Modelling Approaches for Cyber-Physical, Elsevier Press. ISBN No. 9780128191064 • Dominique Blouin, Rima Al-Ali, Holger Giese, Stefan Klikovits, Soumyadip Bandyopadhyay, Ankica Barisic and Ferhat Erata, "An integrated ontology for multi-paradigm modelling for cyberphysical systems" , Chapter 5, Book Title: Multi-Paradigm Modelling Approaches for Cyber-Physical, Elsevier Press, ISBN No. 9780128191064 	
Sponsored and Consultancy Projects	<ul style="list-style-type: none"> • "APP based learning for Python program" Funding Agency: 6th Sense and AGH advisor Duration : 2021-2023, Amount: 15.81L • "Modelling and Verification of Bio-Inspired system", Funding Agency: DST under BIO-CPS incubation, Duration 2020-2025, Amount: 40L • "AES: Automated Evaluation Systems for Computer Programing Course in Any University" Funding Agency: BITS Pilani, Duration: 2018-2021, Project Amount : 2L • "SamaTulyata: Automated Evaluation for Computer Programming Course " Funding Agency: TLC BITS Goa, Duration: 2019-2020, Project Amount: 1L • " Verification of Industrial control systems" Funding Agency: ABB Corporate Research, Amount: 20L 	
Industrial Projects	<ul style="list-style-type: none"> • CodeGenAI:Explore potential of Generative AI and Large Language Model (LLM) to support engineering: <ul style="list-style-type: none"> • Generation of control logic utilizing ABB control libraries and ABB notations. • Generation of test code to improve quality, save efforts in FAT. • Streamlined and integrated user interface to let control engineer interact with GenAI. • SamaTulyata4PLC: Formally proof the modern system should be functionally equivalent to the Heritage systems. Building a tool for equivalence checking between modern systems vs heritage systems. 	
Tool develop	<ul style="list-style-type: none"> • SamaTulyata4PLC for software migration using LLM • ABB Co-pilot for PLC code generation and unit testing • SamaTulyata: Eclipse based Program equivalence tool using Petri net • Autoval: Automatic evaluation of student's Program using program equivalence • Raise-2: Test case based analysis tool for Computing course • CatGrader: Category based grading for computer programing course. • OsarteDM: Model transformation Tool for Cyber physical system 	
Programming	C, Verilog, Linux Shell scripting, L ^A T _E X, C++.	
Formal Tools worked with	KLEE, CBMC, JasperGold, Hector, Helena, SAL, Pluto, Par4All, CPN	
Language known	English and Bengali	
Referees	<p>Prof. Dipankar Sarkar Retired Professor Dept. of Computer Science and Engineering IIT Kharagpur e-mail: ds@cse.iitkgp.ac.in</p> <p>Dr. Dominique Blouin Associate Professor Telecom paris, France e-mail: dominique.blouin@telecom-paris.fr</p>	<p>Prof. Sandeep Shukla Professor Dept. of Computer Science and Engineering IIT Kanpur e-mail: sandeeps@iitk.ac.in</p> <p>Dr. Mattias Ulbrich Researcher Karlsruhe Institute of Technology, Germany e-mail: ulbrich@kit.edu</p>