Balasubramanian Ayikudi Ramachandrakumar

Kerschensteinerstrasse 9, 35039 Marburg – Germany
015166936388 • bayikudi@mpi-sws.org • arbalan96.github.io/

Personal Data

Born : 19 August 1996; Surandai, Tamil Nadu, India
Citizenship : Indian
Languages : Tamil (Mother tongue), English (Fluent), Hindi (Intermediate), German (Basic)

Academic Work Experience

- **Post-doctoral Researcher** — **Apr. 2025 - Present**
  Max Planck Institute for Software Systems
- **Interim Professor (Vertretungsprofessor)** — **Oct. 2024 - Mar. 2025**
  Technical University of Munich
  Professorship for 6 months in between my post-doctoral position
- **Post-doctoral Researcher** — **Sep. 2023 - Sep. 2024**
  Max Planck Institute for Software Systems
- **Research Fellow** — **Sep. 2019 - Aug. 2023**
  Technical University of Munich

Education

- **PhD in Computer Science (Summa cum laude)** — **2019 - 2024**
  Technical University of Munich
  Submission - Aug. 2023, Defense - April 17, 2024
- **Master of Science in Computer Science (Gold medal)** — **2017 - 2019**
  Chennai Mathematical Institute
- **Bachelor of Science in Mathematics and Computer Science (Honours)** — **2014 - 2017**
  Chennai Mathematical Institute

Conference Publications

19 conference publications (CORE Ranking - 7 A*, 7 A, 5 Others). Among those 19 publications, 7 are single-author publications. 99 Citations - Google Scholar.

- A. R. Balasubramanian, M. Hague, R. Majumdar, R. S. Thinniyam and G. Zetzsche. *General Decidability Results for Systems with Continuous Counters*. Accepted at Principles of Programming Languages (POPL): 2026.
- S. Akshay, A. R. Balasubramanian, S. Chakraborty and G. Zetzsche. *Presburger Functional Synthesis: Complexity and Tractable Normal Forms*. Accepted at the International Conference on the Principles of Knowledge Representation and Reasoning (KR): 2025.
- A. R. Balasubramanian, D. Chistikov and R. Majumdar. *Pushdown Model Checking above*

the Cubic Bottleneck. In IEEE Computer Society, Logic in Computer Science (LICS): 2025. *Distinguished Paper Award; Invited to TheoretiCS special issue*.

- A. R. Balasubramanian. *Decidability and Complexity of Decision Problems for Affine Continuous VASS*. In ACM, Logic in Computer Science (LICS): 2024.
- A. R. Balasubramanian, R. Majumdar, R. S. Thinniyam and G. Zetzsche. *Reachability in Continuous Pushdown VASS*. In ACM, Principles of Programming Languages (POPL): 2024.
- A. R. Balasubramanian. *Coefficient Synthesis for Threshold Automata*. In Springer, Reachability Problems (RP): 2022. *Invited to Fundamenta Infomaticae special issue*.
- A. R. Balasubramanian. *Complexity of Coverability in Depth-Bounded Processes*. In LIPIcs, International Conference on Concurrency Theory (CONCUR): 2022.
- A. R. Balasubramanian, Lucie Guillou and Chana Weil-Kennedy. *Parameterized Analysis of Reconfigurable Broadcast Networks*. In Springer, International Conference on Foundations of Software Science and Computation Structures (FoSSaCS): 2022.
- A. R. Balasubramanian. *Complexity of Coverability in Bounded Path Broadcast Networks*. In LIPIcs, Foundations of Software Technology & Theoretical Computer Science (FSTTCS): 2021.
- A. R. Balasubramanian and Chana Weil-Kennedy. *Reconfigurable Broadcast Networks and Asynchronous Shared-Memory Systems are Equivalent*. In EPTCS, Symposium on Games, Automata, Logics and Formal Verification (GandALF): 2021.
- A. R. Balasubramanian and K. S. Thejaswini. *Adaptive Synchronisation of Pushdown Automata*. In LIPIcs, International Conference on Concurrency Theory (CONCUR): 2021.
- A. R. Balasubramanian, Timo Lang and Revantha Ramanayake. *Decidability and Complexity in Weakening and Contraction Hypersequent Substructural Logics*. In IEEE Computer Society, Logic in Computer Science (LICS): 2021.
- A. R. Balasubramanian, Javier Esparza and Mikhail Raskin. *Finding Cut-offs in Leaderless Rendez-Vous Protocols is Easy*. In Springer, International Conference on Foundations of Software Science and Computation Structures (FoSSaCS): 2021. *Invited to LMCS special issue*.
- A. R. Balasubramanian. *Parameterized Complexity of Safety of Threshold Automata*. In LIPIcs, Foundations of Software Technology & Theoretical Computer Science (FSTTCS): 2020.
- A. R. Balasubramanian, Javier Esparza,and Marijana Lazić. *Complexity of Verification and Synthesis of Threshold Automata*. In Springer, International Symposium on Automated Technology for Verification and Analysis (ATVA): 2020.
- A. R. Balasubramanian and Igor Walukiewicz. *Characterizing Consensus in the Heard-Of model*. In LIPIcs, International Conference on Concurrency Theory (CONCUR): 2020.
- A. R. Balasubramanian. *Complexity of controlled bad sequences over finite sets of* $\mathbb{N}^d$. In ACM, Logic in Computer Science (LICS): 2020.
- A. R. Balasubramanian. *Parameterized Verification of Coverability in Well-Structured Broadcast Networks*. In EPTCS, Symposium on Games, Automata, Logics and Formal Verification (GandALF): 2018. *Invited to Information and Computation special issue*.
- A. R. Balasubramanian, Nathalie Bertrand and Nicolas Markey. *Parameterized Verification of Synchronization in Constrained Reconfigurable Broadcast Networks*. In Springer, Tools and Algorithms for the Construction and Analysis of Systems (TACAS): 2018.

Journal Publications

- A. R. Balasubramanian, Javier Esparza, Mikhail Raskin. *Finding Cut-offs in Leaderless Rendez-Vous Protocols is Easy.* In Logical Methods in Computer Science: 2023. *Special issue of FoSSaCS 2021*.
- A. R. Balasubramanian. *Parameterized Verification of Coverability in Infinite State Broadcast Networks.* In Information and Computation: 2021. *Special issue of GandALF 2018*.

Awards and Honours

- Ranked second place on the appointment list for a "W1 professorship for Software Development and Verification (with tenure track to W2)" at the University of Münster.
- Distinguished Paper Award at LICS 2025 for the paper "Pushdown Model Checking above the Cubic Bottleneck".
- Recipient of the CMI Gold Medal of Excellence for my Masters degree as the student with the best academic record.
- Was awarded the INSPIRE scholarship for my Bachelors degree by the Department of Science and Tech, Govt of India.
- Was among the top 26 students selected to attend the International Olympiad in Informatics Training Camp (IOITC) of India in the year 2014.

Invitations to Program Committees, Workshops and Seminars

- STACS 2026 Program Committee
- ATVA 2025 Program Committee
- Autobóz 2025 Organizing Committee
- Autobóz 2024 Invitational Research Workshop
- Dagstuhl Seminar 24171 - Automated Synthesis: Functional, Reactive and Beyond
- Dagstuhl Seminar 18211 - Formal Methods and Fault-Tolerant Distributed Computing: Forging an Alliance

Invited Talks

- *Reachability in Continuous Pushdown VASS* at the MTV LaBRI Seminar - March 28, 2024.
- *Complexity of Coverability in Depth-Bounded Processes* at the OFCOURSE student talk series - September 8, 2022.
- *Complexity of Verification and Synthesis of Threshold Automata* at the 7th Workshop on Formal Reasoning in Distributed Algorithms (FRIDA) 2020 - September 5, 2020.

Teaching Experience

- Interim Professor at Technical University of Munich (TUM)
  - Complexity Theory (MSc, English): WS 2024/2025
  - Master Seminar on Advanced Complexity Theory (MSc, English): WS 2024/2025

  As an interim professor, I was responsible for designing the curriculum for the courses, conducting

the weekly lectures and setting and grading the assignments and the final exam.

- Co-Lecturer at Rheinland-Pfälzische Technische Universität Kaiserslautern-Landau (RPTU)
  - Algorithms and Data Structures (BSc, English): SS 2024

  My responsibilities as a co-lecturer included conducting the weekly lectures.
- (Co-)Head TA at Technical University of Munich (TUM)
  - Logic (MSc, English) - SS 2023
  - Automata and Formal Languages (MSc, English) - WS 2022/2023, WS 2021/2022
  - Petri Nets (MSc, English) - SS 2022
  - Master Seminar on Advanced Complexity Theory (MSc, English) - WS 2021/2022
  - Complexity Theory (MSc, English) - SS 2021
  - Efficient Algorithms and Data Structures (MSc, English) - WS 2020/2021
  - Games on Graphs (MSc, English) - SS 2020
- (Co-)Head TA at Chennai Mathematical Institute (CMI)
  - Complexity Theory (BSc/MSc, English) - Jan - Apr 2018
  - Theory of Computation (BSc, English) - Aug - Nov 2017, 2016
  - Advanced Programming (BSc, English) - Jan - Apr 2016

  My responsibilities as a (co-)head TA included designing (weekly) exercise sheets for the students, conducting tutorial sessions and co-organizing and setting questions for the final exam.

Student Supervision

- Franzisco David Schmidt: Bachelor's thesis on parameterized hardness of nested counter systems (2025).
- Mika Alkabetz: Bachelor's thesis on fine-grained complexity of integer counter systems (2025).
- Zixuan Fan: Guided research project on quantified Horn formulas over linear rational arithmetic (2024/2025).
- Lucie Guillou: Internship on parameterized analysis of reconfigurable broadcast betworks (2022).
- Florian Kessler: Guided research project on exact values for longest controlled bad sequences over vectors of natural numbers (2021/2022).

Community Service

Reviewed submissions for MFCS 2025, ICALP 2025, LICS 2024, CONCUR 2024, CONCUR 2023, MFCS 2023, FoSSaCS 2023, TACAS 2023, Petri Nets 2023, FoSSaCS 2022, TACAS 2022, Petri Nets 2022, CONCUR 2022, Petri Nets 2021, CAV 2021, ATVA 2021, ATVA 2020, ICALP 2020, LMCS.

Internationally Based Activities, Networks and Relations

Below, I detail the research projects that I am/had been a part of which consists of researchers from abroad who are outside my groups (at TUM and MPI-SWS).

- Ongoing research project with Prof. Matthew Hague from the Royal Holloway University of London, UK and Prof. Ramanathan S. Thinniyam from Uppsala University, Sweden on continuous

Petri nets.

- Ongoing research project with Prof. B. Srivathsan from CMI, India on suffix-reading automata.
- Research project with Prof. S. Akshay and Prof. Supratik Chakraborty from IIT Bombay, India on Skolem synthesis for Presburger arithmetic. Resulted in a joint publication at KR 2025.
- Research project with Prof. Dmitry Chistikov from the University of Warwick, UK on fine-grained complexity of automata models. Resulted in a joint publication at LICS 2025.
- Research project with Timo Lang and Prof. Revantha Ramanayake from TU Wien, Austria on substructural logics. Resulted in a joint publication at LICS 2021.
- Research project with K. S. Thejaswini from the University of Warwick, UK on adaptive synchronisation. Resulted in a joint publication at CONCUR 2021.
- Research internship at LSV, France under Prof. Philippe Schnoebelen and Prof. Sylvain Schmitz during May-July 2019. Resulted in a publication at LICS 2020.
- Research internship at LaBRI, France under Prof. Igor Walukiewicz during May-November 2018. Resulted in a joint publication at CONUCR 2020.
- Research internship at INRIA-Rennes, France under Prof. Nathalie Bertrand and Prof. Nicholas Markey during May-July 2017. Resulted in a joint publication at TACAS 2018.