

# Curriculum Vitae and Academic Profile

Balaji Raman

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# Brief Curriculum Vitae<sup>1</sup>

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<sup>1</sup>Other details such as list of publications, awards, consultancy projects, etc., are included as separate chapters in this document.

# Balaji Raman

3 Kottai Pillayar Koil Street,  
Saidapet, Vellore, Tamilnadu, India 632012.  
rb.india@gmail.com  
+91 (0)416 22 11 22 4, +91 77 08 62 24 73,  
Date of Birth: 15th June 1980.  
balajiraman.wordpress.com

- EMPLOYMENT**
- Indian Institute of Information Technology (Sri City, Andhra Pradesh, India)**  
Associate Professor, (2018 - Present), Vellore Institute of Technology, (2016 - 2018),  
*Embedded Systems and Automotive Infotronics*
  - Mentor Graphics, Grenoble Area, France**  
R&D Software Engineer, (2013 - 2015).  
*Software for circuit simulators for Mixed-Signal design.*
  - Laboratoire VERIMAG, Grenoble, France**  
Post-Doctoral Researcher, (2011 - 2013).  
Advisors: Prof. Joseph Sifakis and Prof. Saddek Bensalem.  
*Stochastic Modeling and Performance Analysis of Embedded Systems.*
  - Laboratoire d'Informatique, École Polytechnique, Palaiseau, France**  
Post-Doctoral Research Scientist, (2009 - 2011).  
Advisors: Prof. Peter Clote and Prof. Jean-Marc Steyaert.  
Research Area: Computational Biology, Bioinformatics.  
*Search and structure prediction of riboswitches.*
  - School of Computing, National University of Singapore.**  
Research Assistant, (2003 - 2004).  
Advisor: Prof. Tulika Mitra.  
*System-level modeling for multi-core systems.*
- EDUCATION**
- School of Computing, National University of Singapore.**  
PhD in Computer Science, Specialization in Embedded Systems, 2010.  
Title: *Application-specific Workload Shaping in Resource-constrained Media Players.*  
Advisors: Prof. Samarjit Chakraborty and Prof. Wei Tsang Ooi.  
Masters (by Research) in Computer Science, Specialization in Embedded Systems, 2003.  
Title: *Fast Design Space Exploration of Instruction Caches.*  
Advisor: Prof. Tulika Mitra.
  - School of Computer and Communication Sciences, École Polytechnique Fédéral De Lausanne (EPFL), Switzerland.**  
Visiting Research Scholar (Jan - Jul, 2008).
  - University of Madras, India.**  
Bachelors in Computer Science and Engineering, 2001.
- RESEARCH INTERESTS**
- Analytical Models for Performance Evaluation of Computer Systems,  
Computer System Architecture, Embedded Systems, Multimedia Systems,  
Computational Biology, Bio-informatics, Model Checking, Mixed-Signal Simulation.  
*Specific Interest:* System-level-design of Multi-Processor System-on-chip devices.
- AWARDS**
- Best Paper Award Nomination, CODES+ISSS 2006 (among the top two papers).  
President's Graduate Fellowship Award 2007/08  
(in recognition of outstanding research excellence and promise).

# List of Publications

I have classified various types of documents that I authored in the following manner:

- articles that are being submitted [1],
- research papers that are already published in premium, internationally reputed journals and conferences [2], [3], [4], [5], [6], [7], and [8].
- papers that are published in the proceedings of international workshops [9], [10], [11], and [12],
- reports that are available in public repository thesis written for my graduate studies [14] [15], [13], and,
- documents that in future may be resubmitted to journals and conferences [16] [17].

## Submission in Process

- [1] Balaji Raman and Sai. A. Vasista. On-Chip Buffer Reduction in Pipeline Architectures for Multimedia Embedded Systems with Stochastic Guarantees. 2018.

## Journals/Conferences

- [2] Ayoub Nouri, Balaji Raman, Marius Bozga, Axel Legay, and Saddek Bensalem. Faster Statistical Model Checking by Means of Abstraction and Learning. In *International Conference on Runtime Verification*, pages 340–355. Springer International Publishing, 2014.

- [3] Balaji Raman, Ayoub Nouri, Deepak Gangadharan, Marius Bozga, Ananda Basu, Mayur Maheshwari, Axel Legay, Saddek Bensalem, and Samarjit Chakraborty. Stochastic Modeling and Performance Analysis of Multimedia SoCs. In *Embedded Computer Systems: Architectures, Modeling, and Simulation (SAMOS XIII), 2013 International Conference on*, pages 145–154. IEEE, 2013.
- [4] Balaji Raman, Guillaume Quintin, Wei Tsang Ooi, Deepak Gangadharan, Jerome Milan, and Samarjit Chakraborty. On Buffering with Stochastic Guarantees in Resource-Constrained Media Players. In *Hardware/Software Codesign and System Synthesis (CODES+ ISSS), 2011 Proceedings of the 9th International Conference on*, pages 169–178. IEEE, 2011.
- [5] Balaji Raman and Samarjit Chakraborty. Application-specific Workload Shaping in Multimedia-enabled Personal Mobile Devices. *ACM Transactions on Embedded Computing Systems (TECS)*, 7(2):10, 2008.
- [6] Balaji Raman, Samarjit Chakraborty, Wei Tsang Ooi, and Santanu Dutta. Reducing Data-Memory Footprint of Multimedia Applications by Delay Redistribution. In *2007 44th ACM/IEEE Design Automation Conference*, pages 738–743. IEEE, 2007.
- [7] Balaji Raman and Samarjit Chakraborty. Application-Specific Workload Shaping in Multimedia-Enabled Personal Mobile Devices. In *International conference on Hardware/software codesign and system synthesis (CODES+ISSS)*, pages 4–9. ACM, 2006.
- [8] Balaji Raman, Samarjit Chakraborty, and Wei Tsang Ooi. Meeting CPU Constraints by Delaying Playout of Multimedia Tasks. In *Proceedings of the international workshop on Network and operating systems support for digital audio and video*, pages 165–170. ACM, 2005.

## Workshop Papers

- [9] Stefan Janssen, Loïc Paulevé, Yann Ponty, Balaji Raman, Matthias Zyt-nicki, et al. Can Probabilistic Model Checking Explore Ribo-Nucleic Acid

- Folding Space? In *IWBDA-4th International Workshop on Bio-Design Automation-2012*, 2012.
- [10] Stefan Janssen, Yann Ponty, Balaji Raman, Saad Sheikh, Jean-Marc Steyaert, Peter Clote, et al. Investigating the RFAM Paradox: The Pseudoknot Explanation. In *Fifth Indo-French Bioinformatics Meeting*, 2011.
- [11] Balaji Raman. Analytical Models of Communications for SoC Multimedia Design. In *In Proceedings of the International Workshop on Models of Computer and Communications*, 2008.
- [12] Paolo Jenne and Balaji Raman. Analytical Models of Communications of MPSoCs, 2008.

## Technical Reports and Thesis

- [13] Balaji Raman, Ayoub Nouri, Deepak Gangadharan, Marius Bozga, Ananda Basu, Mayur Maheshwari, Jerome Milan, Axel Legay, Saddek Bensalem, and Samarjit Chakraborty. A General Stochastic Framework for Low-Cost Design of Multimedia SoCs. Technical Report TR-2012-7, VERIMAG, Grenoble, France, 2012.
- [14] Balaji Raman. *Application-Specific Workload Shaping in Resource-Constrained Media Players*. PhD thesis, National University of Singapore, 2009.
- [15] Balaji Raman. Fast Design Space Exploration of Instruction Caches. Master's thesis, National University of Singapore, 2003.



# Manuscripts

- [16] Balaji Raman, Cecile Heyvaert, Matthias Zytnicki, Vinodh Mechery, Jean-Marc Steyaert, and Peter Clote. Ribopythia: TPP Riboswitch Search and Secondary Structure Prediction. 2011.
- [17] Balaji Raman and Tulika Mitra. Fast Instruction Cache Analysis for Embedded Systems using ILP Based Techniques. 2004.

# Awards and Grants

## Awarded

1. *President's Graduate Fellowship Award*, Singapore, SGD 700 top-up to research scholarship for one year, In recognition of outstanding research excellence and promise, 2007/2008.
2. *Best Paper Award Nomination*, Among top two papers, IEEE International Conference on Hardware/Software Codesign and System Synthesis (CODES+ISSS), 2006.

## Travel Grants

3. *USD 1200*, to attend the International Workshop on Bio-Design Automation (IWBDA), San Fransisco, California, USA, 2012.
4. *USD 1000*, to attend the Young Faculty Workshop and to attend the Design Automation Conference (DAC), San Fransisco, California, USA, 2012.
5. *USD 1000*, to attend the Summer School, to participate in the Young Student Support Program, and Speaker Travel Grant for the Design Automation Conference (DAC), San Fransisco, California, USA, 2006.

## Proposals

### Recently Submitted

Title: *Stochastic Real-Time Calculus for Embedded System Design*,

Principal Investigator: Balaji Raman,

Duration: 3 years, Submitted Date: April 10, 2018,

Funding Scheme: Mathematical Research Impact-Centric Support Scheme (MATRICS),

Funding Agency: Science and Engineering Research Board (SERB), Government of India.

# Consultancy Project

**Title of the project:** Automation of Unit Testing Process- for Power-Train  
**Sponsor:** Delphi, Technical Center India, Whitefield, Bangalore

**Principal Investigator:** Dr. Balaji Raman  
**Co-Investigator:** Dr. K. Ganesan  
**Team:** B.Tech and M.Tech students

**Value:** Potentially few lakhs (Money to be granted yet to be decided)

**Duration:** Started February 2017, First version of the software released in July 2017, expected second version release by May 2018.

**Synopsis:** We develop a software tool (written in Python) to automate the unit testing process, which is a part of the software testing process using RTRT at Delphi. Given a MATLAB/SIMULINK design of an unit and the testing strategy for blocks in the design, the software tool generates a file with tests for the unit.

**Challenges:** The scalability of the tool with respect to the blocks in the design is indeed a challenge. Since the beginning of the tool development, we are working on solutions to address scalability as we parse complex designs.

**Role:** I took initiative to work on this problem when the company gave a presentation at our research center; I architect, code, and guide students towards building this tool.

# Academic Activities

**Reviewer:** DAC, CODES+ISSS, DATE, TCAD, ESTI-Media, RTSS, RTCSA, ECRTS, ICPADS, ICESS, SAMOS, DAC-PhD Forum, ACM-SAC (Embedded Systems Track), NOSSDAV.

**Organizer:** LIX Bio-informatics seminar and AMIB Journal Club (several researchers from institutes in and around Paris were invited to visit Ecole Polytechnique to give talks).

**Aid in conference organization:** ACM-Multimedia 2005, Singapore Intelligent Systems for Molecular Biology (ISMB) 2009, Sweden, Stockholm Computational methods for RNA analysis 2009, Benasque, Huesca, Spain.

**Blogs:** 'RNA-OMICS', a running commentary of the post-doc projects 'PhD papers', progress update on extension of my PhD work.

# Service Roles



## Placement Chair and Other Roles

I am currently leading the placement executive team at the Indian Institute of Information Technology, Sri City, and part of the strategic team, which is led by the Director of the institute. My primary objective of this position is to find jobs for the current final year students, who are interested in placements; I want to find those jobs that students are genuinely interested, and jobs that can lift the institute's standing so that placements get better next year.

At my current institute, for B.Tech 2nd year, I am the Class Committee Chairman and Faculty Advisor.

## Supervision

### 2016-2018, VIT

- 2017-2018
  - Undergraduate Final Year Project, Abishek Aditya, Started November 2017, Title: Automatic Parallelization Analysis.
  - Undergraduate Research, Started February 2017, Sai Vasista, B.Tech, Final Year.
- 2016-2017
  - Fall/Winter 2017 Mini Project, B.Tech 3rd year/Final year
    - \* Abhishek Aditya, A Functional, Interpreted Language Implementation.
    - \* Agarwal Karan, Akansha Miharia, and Kunal Sharma, Moving Robot.
    - \* Ashish Garg, Karan Beriwal, and Ujwal Agarwal, Weather Monitoring System.
    - \* Shlok Tibrewal and Nehal Chaturved, Variable Air Volume Boards.
  - Fall/Winter 2017, M.Tech Automotive Infotronics
    - \* Saranya Ajay and Vinodhni H, FPGA implementation in Chaotic Communication Systems with Delay Differential Equations.
    - \* Ganta Satya Harsha, Automatic Counting of Parked Cars with Image Processing.
    - \* Praveen S M, Arnold Christopher Joyson A, and Naveen Kumar, Control Of Electric Coolant Pump.

## **Before 2016 (Research Projects)**

- Anuja Hariharan, BS in Computer Science, School of Computing, National University of Singapore.
- Akash Nemani, BS in Computer Science, School of Computing, National University of Singapore.
- Cecile Hevyaert, Masters in Computer Science, Ecole Polytechnique, Palaiseau, France.
- Ayoub Nouri, Ph.D., VERIMAG, Grenoble, France.

# Key Degree Certificates

# NATIONAL UNIVERSITY OF SINGAPORE



This is to certify that

*Raman Balaji*

having fulfilled the requirements prescribed  
by the University was conferred the degree of

**DOCTOR OF PHILOSOPHY**

on

30 June 2010

A handwritten signature in black ink, appearing to be 'H. H. H.', written in a cursive style.

*Chair, Board of Trustees*

A handwritten signature in black ink, appearing to be 'Tan Chuan-Jin', written in a cursive style.

*President*



## **Other Relevant Information**

## Teaching Experience 2016-Current

Currently, I am teaching B.Tech, 2nd year, *Operating Systems* at the Indian Institute of Information Technology, Sri City, Andhra Pradesh.

*Student's Feedback:* I started teaching from June 2016 at Vellore Institute of Technology, Vellore Campus. Following is a selected list of courses that I taught. This below list also includes average score <sup>2</sup> as a feedback <sup>3</sup> from the students, if available <sup>4</sup>.

1. B.Tech, Information Technology, Embedded Systems - Theory, Total Students: More than 250, Feedback 79% to 84%,
2. M.Tech, Automotive Electronics, Electric and Electronic Power System for Vehicles, and
3. M.Tech, Automotive Electronics, Alternative Drives, Traction, and Control (i.e. Hybrid Electric Vehicles and Electric Vehicles).

## Hackathon 2017

As a part of course-work requirement, I conducted a Hackathon in collaboration with another faculty for 125 students on 23rd April 2017 from 0800 to 2000. Students were required to work on any one of the five topics from the research thrust areas identified by Ministry of Electronics and Information Technology. For example, topics included assistive technologies and independent living aids, intelligent transport systems for Indian cities, and so on.

At the end of the event, three prizes were announced. Students participated in the event with lot of enthusiasm. Students also gave a very good feedback of the event; in particular, students were thrilled to get an experience building hardware studying with having an Information Technology background.

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<sup>2</sup>Not all students participate in giving feedback; The percentage of students giving feedback vary from 85% to 100%.

<sup>3</sup>Feedback is collected using a questionnaire from students during mid and end semester at VIT. The scores mentioned in this document are end semester scores.

<sup>4</sup>VIT some times delays in publishing feedback scores until the end of a year (i.e. December).