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## Dr. Parthasarathy's research profile

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### Executive summary <sup>2</sup>

Parthasarathy initiated his research activities, during his doctorate work at the INPG - Automatic Control Laboratory of Grenoble, Grenoble, France (INPG – LAG). This document presents a gist of the various research activities of Parthasarathy.

The L<sup>A</sup>T<sub>E</sub>X source of this document (research.tex) can be obtained by sending an e-mail to the author, at [drpartha@gmail.com](mailto:drpartha@gmail.com) . The rendered version is accessible on the w-w-web as a PDF file (see footnote).

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**A note from the author :** *It is my firm belief that (academic) research, should complement industry practice, and vice-versa. The activities reported here, were done concurrently with my responsibilities in an active, practising, industrial setup, where a lot of time and effort is spent on less glamorous, but, indispensable chores. Working most of the time in a developing country, has added the spirit of innovation to my research pursuits. I have thus tried to maintain an optimum combination of academic research and industrial pragmatism, while working under unbelievably difficult constraints, which only an “(eternally) developing” country like mine can impose. This document also conforms to my belief that research should not be measured just by the number of “publications” one has written. It should also reflect a total mix of activities which collectively contribute to the enhancement of knowledge. I will of course be happy to receive your comments, opinions and suggestions.*

S. Parthasarathy

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<sup>1</sup>All texts shown in **winered** color are clickable hyperlinks.

<sup>2</sup>This document is regularly updated. The latest version of this document is posted on the w-w-web at: <https://drpartha.org.in/publications/research.pdf>. You may also contact the author by email at “[drpartha@gmail.com](mailto:drpartha@gmail.com)”, if you have any queries, remarks, or suggestions.

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# Chapter 1

## Research activities

### 1.1 Research interests

- Software engineering related to automation and control.
- Safety-critical systems.
- Application of formal methods.
- Knowledge acquisition, mechanisms of teaching, and learning
- Teaching of mathematics

### 1.2 Research assignments

#### 1.2.1 Regular assignments

- Senior Guest Scientist, Institute for control and automation engineering (IfRA) Technical University of Braunschweig,

Germany. (Prof. E. Schnieder)

- Visiting Expert, United Nations - International Institute for Software Technology, Macau (Prof. D. Bjorner)
- Visiting Director of Research, French National Council for Scientific Research (CNRS), Grenoble, France.
- Associate Professor, School of Mines (EMSE), St. Etienne, France (Prof. P. Ladet)
- Group Leader, R & D Centre of CMC Limited, India. (13+ years)
- Post-doctoral Fellow, French National Institute of Informatics and Automation (INRIA), Rocquencourt, France. (Dr. Gerard Lelann)
- Doctoral Fellow, Automatic Control Laboratory, INPG, Grenoble, France. (Dr. P. Deschizeaux)

#### 1.2.2 Short visits

- AGH Univ. of Science and Technology, Krakow, Poland. (Prof. K. Cetnarowicz)
- Laboratory for Analysis and Architecture of Systems (LAAS), Toulouse, France. (Dr. J C Laprie)

- University of Zaragoza, Zaragoza, Spain (Prof. E Silva)
- Asian Institute of Technology, Bangkok, Thailand
- Cambridge University, Cambridge, UK
- Oxford University, Oxford, UK (Prof. Bernard Carre)
- Queensland University of Technology, Brisbane, Australia (Prof. Joseph Pieperzyk).
- Various institutions of higher learning, India.

## 1.3 Contributions to teaching, and learning

### 1.3.1 Non-traditional teaching

Dr. Partha is a firm believer and regular practitioner of **non-traditional teaching**. His non-traditional teaching initiatives are documented at :  
<http://drpartha.org.in/profpartha/nontrad.htm>.

A catalogue of CDROM based training material created by Dr. Partha is available at:  
<http://drpartha.org.in/profpartha/cdcatalog.htm>

All his tutorial publications are available at :  
<http://drpartha.org.in/publications/downloadables.htm>

All these publications are freely downloadable under a CC-BY-SA license.

### 1.3.2 Traditional teaching

Taught courses and delivered invited lectures at various institutions worldwide (details available on request).

## 1.4 Editorial responsibilities

### 1.4.1 Books, journals, conferences

In addition to creating his numerous publications (listed separately), and his numerous web and CD based educational material, Prof. Partha has contributed to various editorial responsibilities (at an international level) :

- Referee, Journal of the Nigerian Mathematical Society.
- Special Editor, PracTex Journal, Pub. Tex Users Group, USA
- Book Reviewer : Discrete Mathematics and its applications, Kenneth Rosen, 5th Edition, Pub.:Mc Graw-Hill.  
(This is a very reputed book on discrete maths, published by the world's largest publisher of scientific books.)
- Associate Editor: Engineering applications of artificial intelligence. Pub.: Elsevier/Pergamon U.K. (This is a very reputed, International Journal affiliated to IFAC).
- Several book reviews : Artificial Intelligence, Software engg., Control and automation.
- Technical translations : French to English. For details, consult this list of documentation and translation works
- Institute for Development and Research in Banking Technology, Hyderabad, India.
- FORMS/FORMAT 2007, Formal methods for automation and safety in railways and automotive systems, Braunschweig, Germany, Jan.. 2007.
- CISCON - 2006 , Control Instrumentation System Conference, Manipal Academy of Higher Education, Manipal, India, Nov. 2006.
- FORMS/FORMAT 2004 Formal methods for automation and safety in railways and automotive systems, Braunschweig, Germany, Dec.. 2004.
- ICECON03 – National Conference on Instrumentation and Control, National Institute of Technology, Tiruchirapalli (Trichy), India, Dec. 2003.
- AAS-2003 : Applied automatic systems Republic of Macedonia, Sept. 2003.
- IFAC World Congress 2002, Barcelona, Spain.
- Management and control of production and logistics (MCPL'2000) Organised

by: LAG (France) Location:  
Grenoble, France, 2000

- Control in Transportation Systems 2000 Organised by: IFAC, VDI/VDE , Technical Univ. of Braunschweig. Location: Braunschweig, Germany, 2000
- Entwicklung und Betrieb komplexer Automatisierungssysteme Development and operation of complex automation systems (EKA99). Organised by: IfRA, Tech. Univ. of Braunschweig, Braunschweig, Germany. Location: Braunschweig, Germany, 1999.
- Management and control of production and logistics (MCPL'97) Organised by: CTI (Brazil), BIBA (Germany), LAG (France) Location: Campinas, Brazil, 1997.
- Computer integrated manufacturing and automation technology (CIMAT'96) Organised by: LAG (France), CNRS (France), INPG (France) Location: Grenoble, France, 1996.
- Industrial automation and control Organised by: IEEE - IAS Location: Hyderabad, India, 1995

### 1.4.2 Web page designer, reviewer :

- IEEE (India Council) – design & coding, maintenance, Page-master, mailing-list Manager
- IEEE (Hyderabad Section) – design & coding, maintenance, Pagemaster, mailing-list Manager  
(The above two contributions were described as “excellent websites, and earned an international award from IEEE (USA) )
- Several companies and organisations – Page reviews, whole site reviews
- International award from IEEE (USA) for designing ”excellent web sites”.
- Creator of a very useful website for accessibility of buildings for mobility-impaired persons.
- Creator of a very useful website for learning mathematics through the web.
- Designer of the web site for IfRA, Technical University of Braunschweig, Germany.
- Designer of ALL web pages, and web sites of Prof. Parthasarathy  
<http://drpartha.org.in/>

## 1.5 Publications

The publications are listed in reverse chronological order. They have been grouped under different headings <sup>1</sup>:

1. Journals
2. Conferences
3. Technical reports
4. Proposed / Under consideration for publication
5. Web

The bibliography part can also be obtained separately, as a BibTeX file. Just send an e-mail to Dr. Partha

### 1.5.1 Journals

67. Two is better than one ! , Linux Gazette, October 2009.
66. "make" my day !, Linux For You, Aug. 2009.
65. How to build a fortress, Linux For You, Sept. 2008.
64. Checksums, your best friends for security, Linux For You, August 2008.
63. Treasure hunt with find, Linux For You, July 2008.
62. Getting your shell scripts right, Linux For You, June 2008.
61. A bash teaser, Linux For You, May 2008.
60. FOSS tools for mathematics, Linux For You, April 2008
59. Brevity is the soul of wit : How L<sup>A</sup>T<sub>E</sub>X can help. PracTeX Journal, Vol. 2007-4, Dec. 2007. Available for download (pdf format).
58. Demystifying L<sup>A</sup>T<sub>E</sub>X bibliographies PracTeX Journal, Vol. 2007, No. 2, May 2007. Available for download (pdf format)
57. The hacking-for-learning paradigm in L<sup>A</sup>T<sub>E</sub>X , PracTex Journal, Vol. 2007 No. 1, 2007. Available for download (pdf format)
56. Episode analysis – a practical approach for temporal reasoning in automated processes. Engg. Applications of Artificial Intelligence, Vol. 8, No. 1, 53-60, 1995.
55. Command and control software for railways - a case for use of formal methods, Jnl. of IRSTE, Hyderabad (India), Oct. 1994.

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<sup>1</sup>Publications marked as "Available for download", may be obtained from <https://drpartha.org.in/publications/downloadables.htm>, as pdf files. If you have any difficulties, please contact the author. You can also obtain the L<sup>A</sup>T<sub>E</sub>X source code of some of these publications.

54. A framework for knowledge representation in safety critical systems,  
Engg. Applications of Artificial Intelligence, Vol.7, No. 1, 59-66, 1994.
53. Building temporal constraints into knowledge bases for process control – addendum  
Engg. Applications of Artificial Intelligence, Vol.7, No. 1, 83-84, 1994.
52. Computer-controlled greenhouses,  
Indian Horticulture, Pub.:ICAR, New Delhi (India), 1993.
51. Why is it so difficult to teach (mathematics) ?  
Mathematical Education, 210-212 , Apl. 1993. Available for download from [algorithms.hostingzero.com/index.html](http://algorithms.hostingzero.com/index.html)
50. All that glitters  
Mathematical Education, 198-199, Jan. 1992.
49. Building temporal constraints into knowledge bases for process control  
Engg. Applications of Artificial Intelligence, Vol.3, No. 3, 204-209, 1991.
48. An experience in knowledge acquisition for expert control of industrial processes Intl. Jnl. of Man Machine Studies, Pub. Academic Press (UK), Vol. 34, 673-685, 1991.
47. Is there a relation between sequential control and continuous control ?  
Mathematical and Computer Modelling, Pub.: Pergamon Press (UK), Vol. 13, No. 1, 55-59, 1990.
46. Generalised process exceptions - a knowledge representation paradigm for expert control,  
Proc. AIENG'89, Pub.:Springer Verlag (UK), 241-256, 1989.
45. AUTO-SAFE: An expert controller for sequential and batch sequential processes,  
Engg. Applications of Artificial Intelligence, Vol.1, No. 4, 250-257, 1988.
44. The transition rules model for real time process control,  
Mathematical Modelling, Pub.:Vol. 7, No. 3, 163-171, 1986.
43. Design automation of real time systems - modelling difficulties,  
IEEE Simulation, Pub: IEEE Press (USA), No. 22, 18-20, May 1985.
42. Ergonomic considerations in the design of interactive languages for process control,  
Applied Ergonomics (UK), Vol. 13, No. 2, 129-131, 1982.
41. A logical model for remote control of power systems topology,  
Mathematics and Computers in

Simulation, Pub. North Holland Publ. Co., Amsterdam (The Netherlands), Vol. XXI, No. 2, 221-225, 1979.

### 1.5.2 Conferences

40. The futility of teaching mathematics to engineering students in an Indian University  
Pub.: National Seminar on Technical Manpower Planning and Training,  
JNT University, Hyderabad, India, Sep.2004  
Available for download (pdf format)
39. Notation, method, tool: A conceptual framework for the application of formal methods.  
IFAC Symp. Control in Transportation Systems 2000, Braunschweig, Germany, June 2000.
38. The explication problem: Achille's heel of formal methods. Entwicklung und Betrieb komplexer Automatisierungssysteme (EKA99), Braunschweig, Germany, May 1999.
37. The challenge of controlling greenhouses,  
IFAC Symp. Low-cost Automation, Vienna (Austria), Sep. 1992.
36. Temporal knowledge based episode analyser for safety-critical processes,  
IFAC Symp. Artificial Intelligence in Real Time Process Control, Delft (The Netherlands), Jun. 1992.
35. Ladder diagrams – is there a way out ?  
2nd IFAC Workshop on Artificial Intelligence in Real Time Control, Shenyang (PRC), Sep. 1989.
34. A real time simulator for the design and evaluation of control systems for electrical power networks,  
Natl. Conf. on Large Scale Power Systems, Annamalainagar (India), Jun. 1982.
33. The role of simulators in the design of man-machine interfaces for process control - a case study,  
CSI Symp. On-line computer systems, Jamshedpur (India), Jul. 1981.
32. A network description language for the remote control of power systems topology,  
IFAC Symp. Computer-aided design of control systems, Zurich (Switzerland), Aug. 1979.
31. Decentralised control in multi-enterprise power pools,  
IFAC Symp. Computer Applications in large-scale power systems, New Delhi (India), Aug. 1979.

30. A real time sequencer for the remote control of power systems topology, IFAC Symp. Computer Applications in large-scale power systems, New Delhi (India), Aug. 1979.
20. TR # 8/2012 Demo of BibTeX usage
19. TR # 7/2012 Counting with LaTeX counters
18. #6 / 2012 Maths can be fun, with FOSS tools , March 2012

### 1.5.3 Technical reports

All these reports can be freely downloaded (in pdf or L<sup>A</sup>T<sub>E</sub>X format) from:

<http://drpartha.org.in/algologic/reportsindex.htm>

29. TR # 02/2017 CAPTCMA – a simple CAPTCHA-like tool
28. TR # 01/2017 Modulo of a negative number
27. TR # 01/2016 The randomness of randomness
26. TR # 03/2013 Indian contributions to cryptography
25. TR # 02/2013 The Indian roots of cryptography
24. TR # 01/2013, Surreptitious forwarding, a subtle form of fraud
23. TR # 11/2012 Alice and Bob can go on a holiday
22. TR # 10/2012 Why is Ramanujan still jobless ?
21. TR # 9/2012 An interesting property of modular multiplicative inverse
17. #5/2012 Why I dislike Vedic Mathematics, March 2012
16. #4/2012 Group theoretic view of modulo arithmetic, Mar. 2012
15. #3/2012 LaTeX torture tests, Feb. 2012
14. #1/2012 Multiplicative inverse in modulo arithmetic, Feb. 2012
13. #2/2012 When grace meets beauty, LaTeX meets mathematics, Jan. 2012
12. Designing feedback forms for educational courses, Pub.: Algologic Technical Report, Dec. 2011
11. Negotiating public keys in asymmetric key cryptography, Pub.: Algologic Technical Report, Oct. 2010
10. Grace meets beauty, again. (a sequel to the technical report: “When grace meets beauty, LaTeX meets mathematics”). Pub.: Algologic Technical Report, Dec. 2009.

9. Two is better than one  
Pub.: Algologic Technical Report, Aug. 2009. Subsequently published in The Linux Gazette, October 2009. Available for download (pdf format).
8. Who says,  $\LaTeX$  is only for serious stuff ?  
Pub.: Algologic Technical Report, May 2008. Available for download (pdf format).
7. When grace meets beauty –  $\LaTeX$  meets mathematics.  
Pub.: Algologic Technical Report, April 2008. Available for download (pdf format).
6. Software conformance services,  
Pub.: Algologic Technical Report, May 2006. Available for download (pdf format).
5. The burden of proof  
Technical Report (on formal proof of program correctness),  
Pub.: Algologic Research & Solutions, Secunderabad, India, Sept. 2001.
4. Improving safety of railways in developing countries.  
Tech. Report, IfRA, Tech. Univ. Braunschweig, Braunschweig, Germany, Dec. 1998.
3. Several reports on: PRaCoSy (a research project related to automation in Chinese Railways).

Pub. United Nations University, International Instt. of Software Technology, Macau, 1993-94.

2. On the representation of Petri nets as state difference equations,  
INRIA Research report, No. 208, INRIA, Rocquencourt (France), May 1983.

1. **Doctoral thesis (in French):** Computerised tool for real time control of power systems networks,  
Automatic Control Laboratory, INPG, Grenoble (France), Feb. 1980.

This thesis was rated *très honorable et les félicitations du jury* (excellent, jury's special appreciation). An overview of his doctoral thesis can be found at <https://drpartha.org.in/publications/partha-thesis.pdf> (pdf file).

#### 1.5.4 ebooks

All my ebooks are freely downloadable from the Internet. All books are licensed under a Creative Commons Licence. Visit

<http://drpartha.org.in/publications/freebooks.html> for details.

1. **Let's Learn LaTeX** is a popular ebook, endorsed by the TeX Users Group. It is available with users in over 60 different countries, spread over 6 continents.

2. **Using LaTeX for mathematics** is a quick overview of the facilities available for typesetting mathematically-rich texts.
2. Several tutorial texts. These are listed at <http://drpartha.org.in/publications/downloadables.htm>
3. **Thesis in a hurry** gives important instructions on using L<sup>A</sup>T<sub>E</sub>X for writing theses and dissertations.

### 1.5.5 Tutorials

Authored a huge number of tutorial publications which are freely available from my website. Subjects covered : Linux, Latex, higher mathematics, Scilab, safety, formal methods.:

1. Several educational CDROMs. These are listed at <http://drpartha.org.in/profpartha/cdcatalog.htm>

### 1.5.6 Proposed / Under consideration for publication

- The hacking-for-learning paradigm in L<sup>A</sup>T<sub>E</sub>X — Part II
- Influence of orthogonality and non-functional specifications, in safety critical systems.
- Software Conformance - extending the meaning of I V & V
- Formal methods in railways automation – are we in the right train ?

### 1.5.7 Web

3. Prof. Partha's blog for educational and academic resources. <http://partha-the-prof.blogspot.in/> Frequently updated. Contains many pointers to useful academic resources on the w-w-web.
2. Prof. Partha's website for non-traditional teaching : <http://drpartha.org.in/profpartha/nontrad.htm>
1. Several educational CDROMs. Listed at <http://drpartha.org.in/profpartha/cdcatalog.htm> Subjects covered : Linux, Latex, higher mathematics, Scilab, safety, formal methods.

# Chapter 2

## Closing remarks

### 2.1 Contact address

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Algologic Research & Solutions  
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Bowenpally P.O.  
Secunderabad 500 011 – India

e-mail : [drpartha@gmail.com](mailto:drpartha@gmail.com)

### 2.2 Postscript

This is a  $\text{\LaTeX}$  document, prepared under openSuse Linux, using the Kile frontend. The document follows the standard layout and format of technical documents made at *algo<sup>logic</sup>*. The  $\text{\LaTeX}$  source of this document, as well as the BibTex formatted bibliography, can be obtained by sending an e-mail to the author, at [drpartha@gmail.com](mailto:drpartha@gmail.com)

## 2.3 About Dr. Partha



Figure 2.1: The pen-  
sive Professor

Dr. Partha brings with him, a very rich experience of about 30 years (since 1980) in the software industry, both as an employee of a large company, and as an independent entrepreneur. He holds an Engineering Doctorate (Docteur Ingenieur) from Grenoble, France, and was also a Post-Doctoral Scientist in Paris, France. He has visited and lectured at several institutions worldwide (France, China, Thailand, Indonesia, Germany, Spain, UK, Poland). He is the author of several research publications, popular articles, and educational CDROMs. He is an Editor of the international journal “Engineering Applications of Artificial Intelligence” , published from the UK by Pergamon/Elsevier Press. He is an aggressive supporter of the Free Libre Open Source Software (FLOSS) movement, and is a regular contributor to the international effort on Linux. His contributions are part of all major Linux distributions worldwide. One of his contributions has been translated (from English) into seven different languages !

Dr. Partha speaks French and English (and many other languages) fluently. He is a Senior Member of IEEE (USA) and a Fellow of IETE (India).

Dr. Partha’s web URL is : <http://drpartha.org.in/drpartha/drpartha.htm>

His email ID is : [drpartha@gmail.com](mailto:drpartha@gmail.com)

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<http://drpartha.org.in/publications/research.pdf>

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