Vivek Nigam

Personal Data

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Date of Birth:	24/07/1981 in João Pessoa, Brazil
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Academic Background

11/2010 - current	Alexander von Humboldt Postdoctoral Researcher
	Ludwig-Maximilians-Universität, München, Germany
11/2009 - 09/2010	Postdoctoral Researcher
	University of Pennsylvania, Philadelphia, USA
10/2006 - 09/2009	PhD – Computer Science
	(Graduated with *Distinction*)
	École Polytechnique, Paris, France
	Supervisor: Dale Miller
10/2004 - 09/2006	International Masters in Computational Logic
	(Graduated with *Distinction*)
	Technische Universität Dresden, Germany
	Universidade Nova de Lisboa, Portugal
	Supervisor: João Leite
01/1999 - 12/2003	Bachelor in Electronic Engineering
	Instituto Tecnológico de Aeronáutica
	São José dos Campos, Brazil

Professional Experience

02/2005 - 07/2005	Research Assistant
	Fraunhofer Institute, Dresden, Germany
01/2004 - 09/2004	Applications Engineer
	SMAR, Ribeirão Preto, Brazil
01/2003 - 12/2003	Intern of the Strategic Sourcing Practice
	A.T. Kearney, São Paulo, Brazil

Grants / Awards / Certificates

- 09/2010 – 11/2012: Alexander von Humboldt Research Fellowship for Postdoctoral Researchers

- 07/2009: First place in the IPv6 challenge organized by G6 and sponsored by SFR.

- 10/2006 - 09/2009: PhD scholarship – INRIA/Mobius

- 10/2004 - 09/2006: ALβAN scholarship – European Union Programme of High Level Scholarships for Latin America

- 2002: Java Programmer Certification – Sun Microsystems

Languages

Portuguese, English: Fluent;
French, German: Advanced; Hindi: Basic

References

- Dale Miller – PhD supervisor at École Polytechnique – `dale@lix.polytechnique.fr`

- Andre Scedrov – Postdoctoral supervisor at UPENN – `scedrov@math.upenn.edu`

- Carolyn Talcott – Collaborator at SRI International – `clt@csl.sri.com`

- Boon Thau Loo – Postdoctoral supervisor at UPENN – `boonloo@cis.upenn.edu`

- Martin Hofmann – Postdoctoral supervisor at LMU – `hofmann@ifi.lmu.de`

Projects and Research Interests

- Declarative Networking – Together with Boon Thau Loo's group at UPENN, we are seeking to use Network Datalog (NDlog), a distributed logic programing language, to specify safe Internet protocols, such that convergence is guaranteed. This challenge involves both building the theoretical foundations as well as tools to support the design of Internet protocols. For instance, in [6], we proposed an evaluation algorithm for NDlog in an asynchronous setting. We show that our evaluation algorithm is correct with respect to Datalog semantics. Moreover, in [3], we have used this result to construct a Toolkit that allows one to develop Internet protocols whose convergence is guaranteed.

- Protocol Security – Following the great success of formal methods in verifying how secure protocols are, we have been collaborating with a number of researchers, including Andre Scedrov at UPENN and Max Kanovich at Queen Mary's University, in the foundations of protocol security analysis. In [2,8], we proposed a model for protocols for which the secrecy problem is PSPACE-complete. Furthermore, we have shown that a number of protocol anomalies can be encoded in this fragment.

- Logics and Proof Certificate Formats – We are currently studying flexible ways of representing proofs, which can be used as proof certicates in proof carrying frameworks. This is an on-going program involving Dale Miller's group at the École Polytecnique. For instance, in [12] we have demonstrated how one can represent a class of proofs as a sequence of atomic formulas. We are also interested in expressive logics suitable for proof carrying frameworks. For instance, in [4] we propose a logic based on linear logic that allows one to specify a wide range of access control policies. Moreover, we propose a proof system for this logic that is suitable for proof search and therefore for constructing proof objects.

- Health Informatics – A recent on-going program involving Andre Scedrov's group in UPENN as well as Carolyn Talcott at SRI International is of applying principles from computer science and engineering in health informatics. In [5], we propose to build an assistant for helping the participants of clinical investigations to reduce policy violations that could lead to heavy penalties as well as compromise the health of subjects. Moreover, in [1], we propose a model that will provide the foundations for building such an assistant. We are currently implementing part of the system in the computational rewrite tool Maude.

- Contextual Equivalence of Programs – I have been recently part of the program lead by Martin Hofmann at LMU, and Nick Benton and Andrew Kennedy at Microsoft Research at Cambridge, which involves proving the equivalence of functional programs with mutable states. We expect to justify some compiler optimizations by formally showing the contextual equivalence of a program and its optimized version. In particular, we are currently investigating the use of state transition systems over abstract states specifying invariants in order to prove more equivalences among programs.

- Computational Logic – Proof theory has been successfully been used to specify and reason about computational systems. One of a proof theorist's main tasks is to develop suitable proof systems that have good properties, such as cut-elimination and proof search algorithms. Together with Elaine Pimentel, a professor at the UFMG, and Giselle Pimentel, a PhD student at TU-Wien, we are currently developing a general framework for specifying proof systems.

In [7,9] we proposed a general logical framework based on linear logic and show how one can specify a wide range of proof systems for different logics. We are currently investigating means to reason about such specifications, such as to automatically check whether an encoded system admits cut-elimination or whether an inference rule is invertible.

List of Publications

Preprints

1. M. Kanovich, T. Ban Kirigin, V. Nigam, A. Scedrov, C. Talcott, and R. Perovic. Timed Collaborative Systems. Submitted to a Conference.

2. M. Kanovich, T. Ban Kirigin, V. Nigam, and A. Scedrov. Bounded memory Dolev-Yao adversaries in collaborative systems (Extended Version). Submitted to a Journal.

3. A. Wang, L. Jia, W. Zhou, Y. Ren, B. T. Loo, J. Rexford, V. Nigam, A. Scedrov, and C. Talcott. FSR: Formal Analysis and Implementation Toolkit for Safe Inter-domain Routing. Submitted to a Journal.

4. V. Nigam. A Framework for Linear Authorization Logics. In preparation. Abstract presented at the SECRET workshop, which was part of the Dagstuhl Seminars.

Published/Accepted Papers

5. V. Nigam, T. Ban Kirigin, A. Scedrov, C. Talcott, M. Kanovich, and R. Perovic. Towards an automated assistant for Clinical Investigations. To appear in the 2nd ACM SIGHIT International Health Informatics Symposium (IHI), 2012.

6. V. Nigam, L. Jia, B. T. Loo, and A. Scedrov. Maintaining distributed logic programs incrementally. In 13th International ACM SIGPLAN Conference on Principles and Practice of Declarative Programming (PPDP), pages 125–136. ACM, 2011.

7. V. Nigam, E. Pimentel, and G. Reis. Specifying proof systems in linear logic with subexponentials. In the 5th Workshop on Logical and Semantic Frameworks with Applications (LSFA), 2010. Electronic Notes in Theoretical Computer Science, volume 269, pages 109–123, 2011.

8. M. Kanovich, T. Ban Kirigin, V. Nigam, and A. Scedrov. Bounded memory Dolev-Yao adversaries in collaborative systems. In P. Degano and S. Etalle and J. D. Guttman, editors, Formal Aspects of Security and Trust (FAST), volume 6561 of Lecture Notes in Computer Science, pages 18–33. Springer Verlag, 2010.

9. V. Nigam and D. Miller. A framework for proof systems. In A. Armando, P. Baumgartner, G. Dowek, editors, special edition of the Journal of Automated Reasoning (JAR) with invited papers from IJCAR 2008, volume 45(2), pages 157–188. Springer Verlag, 2010.

10. V. Nigam and D. Miller. Algorithmic specifications in linear logic with subexponentials. In Antonio Porto and Francisco Javier Lopez-Fraguas, editors, 11th International ACM SIGPLAN Conference on Principles and Practice of Declarative Programming (PPDP), pages 129–140. ACM, 2009.

11. V. Nigam and D. Miller. Focusing in Linear Meta-Logic. In A. Armando, P. Baumgartner, G. Dowek, editors, 4th International Joint Conference on Automated Reasoning (IJCAR), volume 5195 of Lecture Notes in Computer Science, pages 507–522. Springer Verlag, 2008.

12. D. Miller and V. Nigam. Incorporating tables into proofs. In R. Duparc, T. A. Henzinger, editors, 16th Conference on Computer Science and Logic (CSL), volume 4646 of Lecture Notes in Computer Science, pages 466-480. Springer Verlag, 2007.

13. V. Nigam and J. Leite. Adding Knowledge Updates to 3APL. In R. Bordini, M. Dastani, J. Dix, and A. El F. Seghrouchni, editors, 4th International Workshop on Programming Multi-Agent Systems (ProMAS), volume 4411 of Lecture Notes in Artificial Intelligence, pages 167–183. Springer Verlag, 2007.

14. V. Nigam and J. Leite. A Dynamic Logic Programming Based System for Agents with Declarative Goals. In M. Baldoni and U. Endriss, editors, Declarative Agent Languages and Technologies (DALT), volume 4327 of Lecture Notes in Artificial Intelligence, pages 174–190. Springer Verlag, 2006.

15. A. Kozlenkov, R. Penaloza, V. Nigam, L. Royer, G. Dawelbait, and M. Schroeder. Prova: Rule-based Java Scripting for Distributed Web Applications: A Case Study in Bioinformatics. In Sebastian Schaffert, editor, Reactivity on the Web at the International Conference on Extending Database Technology (EDBT), volume 4254 of Lecture Notes in Computer Science, pages 899–908, Springer Verlag, 2006.

16. V. Nigam. Bloco Flexível Matemático. Revista Controle e Instrumentação, Edition 94. July 2004. Valete Editora Técnica Comercial Ltda., São Paulo, SP. (In Portuguese)

Thesis

17. V. Nigam. Exploiting Non-Canonicity in the Sequent Calculus. PhD Thesis, 2009. École Polytechnique, France.

18. V. Nigam. Dynamic Logic Programming and 3APL. Master's thesis, Technische Universität Dresden, Germany, and Universidade Nova de Lisboa, Portugal, 2006.

Unpublished Papers/Others

19. V. Nigam, L. Jia, A. Wang, B. T. Loo, and A. Scedrov. An operational semantics for Network Datalog. In Logics, Agents, and Mobility (LAM) 2010. A worshop affilitated to LICS'10.

20. M. Kanovich, T. Ban Kirigin, V. Nigam, and A. Scedrov. Progressing collaborative systems. In FCS-PrivMod 2010. A worshop affilitated to CSF'10 and to LICS'10.

21. J. A. Cordero, U. Herberg and V. Nigam. Reach everything from anywhere. Obtained the first place in the IPv6 Challenge – *internet de demain*, organized by G6 and supported by SFR.

22. V. Nigam. Using Tables to Construct Non-Redundant Proofs. In A. Beckmann, C. Dimitracopoulos, and B. Loewe editors, CiE 2008: Abstracts and extended abstracts of unpublished papers, 2008.

23. V. Nigam, C.L. Nasciment Jr. and L. F. C. Nascimento. Estudo Comparativo da Aplicação de Técnicas de Inteligência Artificial para a Previsão da Faixa de Peso de Récem-Nascidos. IX Encontro de Iniciação Científica e Pós-Graduao do ITA, 2003. (In Portuguese)

Reviewing and Programme Committee Membership

- Journal Reviewing – Transactions of Computational Logic (ToCL), Journal of Functional Programming (JFP), and Computer Science and Information Systems (ComSIS);

- Conference/Workshop Reviewing – Asian Symposium on Programming Languages and Systems (APLAS), Computer Science Logic (CSL), Logic in Computer Science (LiCS), Logic for Programming Artificial Intelligence and Reasoning (LPAR), Workshop on Logical and Semantic Frameworks with Applications (LSFA), and International Conference on Logic Programming (ICLP);

- Member of Programme Committe: Workshop on Logical and Semantic Frameworks with Applications 2011 (LSFA'11).