Curriculum Vitáe

Vineeth K Paleri
Professor
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Personal

- Born on 19th May 1959, Calicut, Kerala, India. Citizen of India.

Education

- Doctor of Philosophy(Aug 1994 - July 1999), Department of Computer Science and Automation, Indian Institute of Science, Bangalore. Thesis title: An Environment for Automatic Generation of Code Optimizers.

- Master of Technology(Aug 1984 - Jan 1986), Department of Computer Science and Engineering, Indian Institute of Technology, Kanpur. Cumulative Performance Index: 8(Out of 10).

- Bachelor of Engineering(Electrical)(1976 - 1981), Department of Electrical Engineering, National Institute of Technology, Calicut(Formerly Regional Engineering College, Calicut). I Class(Honors).

Professional Appointments

- Professor(August 2005 - Present), Department of Computer Science and Engineering, National Institute of Technology, Calicut.

- Assistant Professor(April 1998 - July 2005), Department of Computer Engineering, National Institute of Technology, Calicut.

- Visiting Scientist(May-June 2005), Department of Computer Science and Automation, Indian Institute of Science, Bangalore.

- Visiting Assistant Professor(January 2003 - December 2004), Department of Computer Sciences, Purdue University, West Lafayette, USA.

- Visiting Assistant Professor(January 2002 - December 2002), Department of Computer and Information Science, Indiana University Purdue University, Indianapolis, USA.

- Lecturer/Senior Lecturer(May 1986 - March 1998), Department of Electrical Engineering, National Institute of Technology, Calicut.

- Software Engineer Trainee(Aug 1982 - July 1984), Computer Center, Indian Institute of Technology, Kanpur.

Research

Research Interests: General

- Program analysis and code transformation.

Research Interests: Specific

- Study of fundamental properties of different code transformations and associated program analyses to identify common features and to seek possibilities for improved algorithms.

Research Experience

- Compilers: Code Transformations(Aug 1994 - July 1999), Department of Computer Science and Automation, Indian Institute of Science, Bangalore.

- Formal Methods in Concurrent Computation(Jan 1989 - Aug 1990), Leningrad Electro Technical Institute(LETI), St.Petersburg, Russia(USSR Govt. Scholarship). Got introduced to formal models of concurrent computations such as Communicating Sequential Processes and Petri Nets.

Publications

- Nabizath Saleena and Vineeth Paleri. An Improved Algorithm for Redundancy Detection Using Global Value Numbering. Journal of Information Processing Systems 12,2(2016), 214-225.

- Nabizath Saleena and Vineeth Paleri. Global Value Numbering for Redundancy Detection: A Simple and Efficient Algorithm. In Proceedings of the 29th Annual ACM Symposium on Applied Computing, pages 1609-1611. ACM 2014.

- Saleena Nabeezath and Vineeth Paleri. A Simple Algorithm for Global Value Numbering, arXiv:1303.1880v1 [cs.PL], 2013.

- Vineeth Paleri, Y.N.Srikant, and Priti Shankar. Partial Redundancy Elimination: A Simple, Pragmatic, and Provably Correct Algorithm. *Science of Computer Programming* 48, 1(2003), 1-20.

- Vineeth Paleri. Automatic Generation of Code Optimizers from Formal Specifications. In Y.N.Srikant and Priti Shankar, Editors. *The Compiler Design Handbook: Optimizations and Machine Code Generation.* CRC Press, 2002.

- Vineeth Paleri, Y.N.Srikant, and Priti Shankar. A Simple Algorithm for Partial Redundancy Elimination. *ACM SIGPLAN Notices* 33, 12(1998), 35-43.

PhD Students

- Nabizath Saeena. Thesis Title - Detection of Redundant Expressions: Efficient Algorithms with Improved Precision, April 2016.

- Rekha Pai. Thesis Title - Detection on Redundant Expressions: Complete and Efficient algorithms in SSA, September 2017.

Abstracts of Important Research Contributions

- Nabizath Saleena and Vineeth Paleri. Global Value Numbering for Redundancy Detection: A Simple and Efficient Algorithm. In Proceedings of the 29th Annual ACM Symposium on Applied Computing, pages 1609-1611. ACM 2014.

  Abstract: Global Value Numbering (GVN) is a method for detecting equivalence among program expressions. Here we consider the problem of GVN in the context of redundancy detection and present a simple, polynomial time algorithm for the same. The basic idea is to use the concept of value expression - an abstraction of a set of expressions - enabling a representation of the equivalence information which is compact and simple to manipulate. The algorithm detects expression equivalences that are required for identifying value based redundancies. In addition, it achieves completeness in detecting equivalence among variables.

- Vineeth Paleri, Y.N.Srikant, and Priti Shankar. A Simple Algorithm for Partial Redundancy Elimination. *ACM SIGPLAN Notices*, 33, 12(1998), pp. 35-43.

  Abstract: The paper proposes a new algorithm for partial redundancy elimination based on the new concepts of *safe partial availability* and *safe partial anticipability*. These new concepts are derived by the integration of the notion of *safety* into the definitions of partial availability and partial anticipability. It is both computationally and lifetime optimal and requires four unidirectional analyses. The most important feature of the algorithm is its simplicity; the algorithm evolves naturally from the new concept of safe partial availability.

- Vineeth Paleri. Automatic Generation of Code Optimizers from Formal Specifications. In Y.N.Srikant and Priti Shankar, Editors. The Compiler Design Handbook: Optimizations and Machine Code Generation. CRC Press, 2002.

  Abstract: Code optimization or code transformation is a complex function of a compiler involving analyses and modifications with the entire program as its scope. In spite of its complexity, hardly any tools exist to support this function of the compiler. This article presents the development of a code transformation system, specifically for scalar transformations, which can be used either as a tool to assist the generation of code transformers or as an environment for experimentation with code transformations. The system is unique of its kind, providing a complete environment in which one can specify a transformation using dependence relations - in the specification language we have designed, generate code for a transformer from its specification, and experiment with the generated transformers on real-world programs.

Teaching

- **Graduate Level**

  Compiler Design: National Institute of Technology Calicut, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014 and 2015.
  The course covers advanced topics in Code Optimizations and Machine Code Generation. The topics included Intermediate Representation, Control Flow Analysis, Data Flow Analysis, Code Optimization, Static Single Assignment Form, Register Allocation, and Machine Code Generation.

Programming Languages: Indiana University Purdue University Indianapolis, 2002; National Institute of Technology Calicut, 2004, 2005, 2006, 2007, 2016
The course when offered last time covered formal semantics and type systems. The contents included untyped and typed lambda calculus, extensions of lambda calculus with additional features, and type safety.

- **Undergraduate Level**

  Foundations of Programming: National Institute of Technology Calicut, 2011, 2012, 2013, 2014, 2015, 2016, and 2017.
  The goal of the course is set as, "to learn the techniques used to control the intellectual complexity of programs - specifically procedural abstraction, data abstraction, and modular design - to build reliable programs. These techniques are consolidated through an associated laboratory by writing programs using Scheme language as the vehicle. Students spent major part of their time in specification and design.

  Principles of Programming Languages: Indiana University Purdue University Indianapolis, 2002 and National Institute of Technology Calicut, 2004, 2005, 2006, 2007, 2008, 2009, 2010, and 2011.
  The course covered the underlying *concepts* and *constructs* of programming languages in a formal setting - with formal semantics and type systems. The contents included untyped and typed lambda calculus and its extensions - Let bindings, Records, Variants, and References. Operational semantics was used as the vehicle for specifying semantics.

  Principles of Compilers: National Institute of Technology Calicut, 2004, 2005, 2006, 2007, 2013, 2014, and 2015.
  The course covered lexical analysis, syntax analysis, semantic analysis, and intermediate code generation in detail, and gave an introduction to code optimization and machine code generation. The course included a semester project to develop a compiler for a simple high-level procedural language designed for the purpose. The project expected the students to translate the source program to an intermediate language and then interpret the code in the intermediate language.

  Software Engineering: Purdue University, 2003 and Indiana University Purdue University Indianapolis, 2002.
  The course at Purdue University covered all aspects of software development including requirements, specification, design, implementation, integration, documentation, and maintenance. The course included a team project to develop a Generic Document System with *plug-in* facility to add features, as needed. The project stressed the software development *process* with deliverables at the end of each phase in the development process. The deliverables included: prototype, requirements document, specification, project management plan, architectural design, detailed design, code, test cases, peer review reports, and user manuals. (The coverage of the course at Indiana University Purdue University Indianapolis was similar to the coverage given at Purdue University except for the fact that the project was to develop an Interactive Messaging System.)

Program Development

- An environment for automatic generation of code optimizers(1999) - Part of PhD work at Indian Institute of Science, Bangalore: A tool for generating C code for optimizers from their formal specifications. Built on top of Stanford University Intermediate Format(SUIF), in C language, under UNIX environment.

- A database for Alumni Association, National Institute of Technology, Calicut(1988): Code in DBASE III, under DOS environment. Extensively used by Alumni Association, National Institute of Technology, Calicut.

- An integrated environment for Pascal(1986) - Project work of Master of Technology at Indian Institute of Technology, Kanpur: A tool for providing an integrated environment for Pascal programmers on DEC-1090 system. In Pascal/Assembly language under TOPS-10 environment. Used in the programming laboratory for undergraduate students at Indian Institute of Technology, Kanpur.

Other Academic Activities

- Lecture: Programming Methodology. Arbitron India Ltd., Info Park Kochi, March 30, 2012.

- Lecture: Programming Methodology. Live lecture on VYAS Channel and on EDUSAT Network, Consortium for Educational Communication, University Grants Commission, June 6, 2011.

- Lecture: Certifying Compilers: Aspects of Correctness of Individual Compilations. R&D Laboratory, General Motors, Bangalore, 2005.

- Seminar: Automatic generation of code optimizers. Department of Computer and Information Science, Indiana University Purdue University Indianapolis, US, 2002.

Service

- Secretary, Technology Business Incubator, National Institute of Technology Calicut, September 2009 - Present.

- Member, Board of Governors, National Institute of Technology Calicut, March 2013 - March 2015.

- Head, Department of Computer Science and Engineering, National Institute of Technology Calicut, July 2008 - July 2010.

- Member, Core Committee for preparation of specification for software development of centralized counseling of AIEEE 2004.

- Member, Curriculum Committee for Under Graduate Programme in Computer Engineering/Information Technology, University of Calicut, 2000.

- Faculty-in-Charge, Main Computer Center, National Institute of technology, Calicut, Jan 1993 - June 1994 and Aug 1999 - Dec 2001.

- Secretary, Alumni Association, National Institute of Technology, Calicut, Apr 1987 - Nov 1988.