

# Robert Ambrosius Tairas

Associate Professor of the Practice of Computer Science  
Department of Computer Science  
Vanderbilt University

PMB 351824  
Nashville, TN 37235  
robert.tairas@vanderbilt.edu

## Education

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Ph.D. in Computer Science, August 2010

University of Alabama at Birmingham (UAB), Birmingham, AL  
Thesis title: "Representation, Analysis, and Refactoring Techniques to Support Code Clone Maintenance"  
Advisors: Dr. Jeff Gray and Dr. Barrett Bryant

M.Sc. in Computer Science, December 2005

University of Alabama at Birmingham (UAB), Birmingham, AL  
Specialization in Software Engineering

B.Sc. in Computer Science and Mathematics, *summa cum laude*, May 1997

Samford University, Birmingham, AL

## Teaching Experience

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Courses taught at Vanderbilt University

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| CS 1101      | Programming and Problem Solving (Spring 2015 – Fall 2016), Summer (2017 – 2019), Fall 2021, Fall 2022, Spring 2023 |
| CS 1103      | Programming for Engineers and Scientists (Fall 2013 – Fall 2019)   |
| CS 1104      | Programming and Problem Solving with Python (Spring 2020 – Spring 2021), Spring 2022                               |
| CS 1151      | Computers and Ethics (Fall 2013, Summer 2014)  |
| CS 2201      | Program Design and Data Structures (Fall 2014, Fall 2016, Spring 2017)   |
| CS 2212      | Discrete Structures (Spring 2024)  |
| CS 2231      | Computer Organization (Spring 2014, Fall 2014, Fall 2015)  |
| CS 3270/5270 | Programming Languages (Spring 2017 – Spring 2024)  |
| MOOC         | Introduction to Programming with MATLAB (on Coursera)  |

Courses taught at the University of Alabama at Birmingham

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| CS 101     | Fluency in Information Technology (Fall 2006) |
| CS 620/720 | Advanced Software Engineering (Summer 2010)   |

## Research Projects

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### CeDAR: Clone Detection, Analysis, and Refactoring

The aim of this project is to unify the processes of clone detection, analysis, and refactoring. The work includes an evaluation of clone-related refactorings in open source software artifacts and the centralizing of clone group representation and maintenance.

### An Information Retrieval Process to Aid in the Analysis of Code Clones

Latent Semantic Indexing (LSI) is used to cluster clone classes that have been identified initially by a clone detection tool with a goal to detect associations among the clustered clone classes and determine if they provide further comprehension to assist in the maintenance of clones.

### CoCloRep: A DSL for Code Clones

A representation of code clones in a domain-specific language for analysis purposes that is developed in the AMMA platform (ATLAS Model Management Architecture).

### Visualization of Clone Detection Results

An alternative approach of visualizing detected clones (found by the CloneDR™ clone detection tool) by extending the AspectJ Development Tools Visualiser plugin.

### Clone Detection with Microsoft Phoenix

An investigation into an automatic clone detection technique developed as a plug-in for Microsoft's Phoenix framework that finds exact matching function level clones in a program using abstract syntax trees and suffix trees.

## Publications

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### Refereed Journals

Robert Tairas and Jordi Cabot, "Corpus-based Analysis of Domain-Specific Languages," *Software and Systems Modeling*, Vol. 14, No. 2, May 2015, pp. 889-904.

Jeremy Pate, Robert Tairas, and Nicholas Kraft, "Clone Evolution: A Systematic Review," *Journal of Software Maintenance And Evolution: Research And Practice*, Vol. 25, No. 3, March 2013, pp.261-283.

Robert Tairas and Jeff Gray, "Increasing Clone Maintenance Support by Unifying Clone Detection and Refactoring Activities," *Information and Software Technology*, Vol. 54, No. 12, December 2012, pp. 1297-1307.

Robert Tairas and Jeff Gray, "An Information Retrieval Process to Aid in the Analysis of Code Clones," *Empirical Software Engineering* (Special Issue on Information Retrieval for Program Comprehension), Vol. 14, No. 1, February 2009, pp. 33-56.

Jing Zhang, Yuehua Lin, Jeff Gray, and Robert Tairas, "Aspect Mining from a Modeling Perspective," *International Journal of Computer Applications in Technology* (Special Issue on Concern-Oriented Software), Vol. 31, No. 1/2, 2008, pp. 74-82.

## Refereed Conferences and Workshops

Robert Tairas and Jordi Cabot, “Cloning in DSLs: Experiments with OCL,” *International Conference on Software Language Engineering (SLE)*, Springer-Verlag LNCS 6940, Braga, Portugal, July 2011, pp. 60-76.

Robert Tairas, Ferosh Jacob, and Jeff Gray, “Representing Clones in a Localized Manner,” *International Workshop on Software Clones (IWSC)*, *International Conference on Software Engineering (ICSE)*, Waikiki, HI, May 2011, pp. 54-60.

Robert Tairas and Jeff Gray, “Sub-clones: Considering the Part Rather than the Whole,” *International Conference on Software Engineering, Research, and Practice (SERP)*, Las Vegas, NV, July 2010, pp. 284-290.

Ferosh Jacob and Robert Tairas, “Code Template Inference Using Language Models,” *ACM Southeast Conference*, Oxford, MS, April 2010.

Robert Tairas and Jeff Gray, “Sub-clone Refactoring in Open Source Software Artifacts,” *Symposium on Applied Computing (SAC)*, Sierre, Switzerland, March 2010, pp. 2364-2365.

Robert Tairas, “Centralizing Clone Group Representation and Maintenance,” *Student Research Competition, International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, Orlando, FL, October 2009, pp. 781-782.

Robert Tairas, Marjan Mernik, and Jeff Gray, “Using Ontologies in the Domain Analysis of Domain-Specific Languages,” *Workshop on Transformation and Weaving Ontologies in Model-Driven Engineering (TWOMDE)*, *International Conference on Model Driven Engineering, Languages, and Systems (MoDELS)*, Springer-Verlag LNCS 5421, Toulouse, France, September 2008, pp. 332-342. (Best Paper Award)

Yu Sun, Zekai Demirezen, Frédéric Jouault, Robert Tairas, and Jeff Gray, “Tool Interoperability through Model Transformations,” *International Conference on Software Language Engineering (SLE)*, Springer-Verlag LNCS 5452, Toulouse, France, September 2008, pp. 178-187.

Robert Tairas, Shi-Hsi Liu, Frédéric Jouault, and Jeff Gray, “CoCloRep: A DSL for Code Clones,” *International Workshop on Software Language Engineering (ATEM)*, *International Conference on Model Driven Engineering, Languages, and Systems (MoDELS)*, Nashville, TN, October 2007, pp. 91-99.

Robert Tairas, Jeff Gray, and Ira Baxter, “Visualization of Clone Detection Results,” *Eclipse Technology Exchange Workshop (ETX)*, *International Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA)*, Portland, OR, October 2006, pp. 50-54.

Robert Tairas and Jeff Gray, “Phoenix-Based Clone Detection using Suffix Trees,” *ACM Southeast Conference*, Melbourne, FL, March 2006, pp. 679-684.

## Ph.D. Dissertation

“Representation, Analysis, and Refactoring Techniques to Support Code Clone Maintenance,” *University of Alabama at Birmingham*, Birmingham, AL, June 15, 2010.

## Doctoral Symposia

Robert Tairas, “Clone Maintenance through Analysis and Refactoring,” *Doctoral Symposium, International Symposium on the Foundations of Software Engineering (FSE)*, Atlanta, GA, November 2008, pp. 29-32.

Robert Tairas, “Clone Detection and Refactoring,” *Doctoral Symposium, International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, Portland, OR, October 2006, pp. 780-781.

## Posters

Robert Tairas and Jeff Gray, “Sub-clone Refactoring in Open Source Software Artifacts,” *Symposium on Applied Computing (SAC)*, Sierre, Switzerland, March 2010.

Robert Tairas, “Centralizing Clone Group Representation and Maintenance,” *Student Research Competition, International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, Orlando, FL, October 2009.

Robert Tairas and Jeff Gray, “Maintaining Clones through Eclipse Refactoring Extensions,” *Workshop on Refactoring Tools, International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, Orlando, FL, October 2009.

Robert Tairas, “Techniques in Code Clone Analysis,” *Student Research Forum, International Symposium on the Foundations of Software Engineering (FSE)*, Atlanta, GA, November 2008.

Robert Tairas, Jeff Gray, and Ira Baxter, “Visualizing Clone Detection Results,” *Tool Demonstration, International Conference on Automated Software Engineering (ASE)*, Atlanta, GA, November 2007.

Robert Tairas, Jeff Gray, and Ira Baxter, “Visualization of Clone Detection Results,” *Eclipse Technology Exchange Workshop (ETX), International Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA)*, Portland, OR, October 2006.

## Tool Demonstrations

Robert Tairas and Jeff Gray, “Get to Know Your Clones with CeDAR,” *International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, Orlando, FL, October 2009, pp. 817-818.

Robert Tairas, Jeff Gray, and Ira Baxter, “Visualizing Clone Detection Results,” *International Conference on Automated Software Engineering (ASE)*, Atlanta, GA, November 2007, pp. 549-550.

## Invited Talks

“Maintaining Cloned Software,” *Research Colloquium Series, University of Alabama*, Tuscaloosa, AL, February 13, 2009.

“Introduction to Robocode and its use in CS201 – Introduction to Object-Oriented Programming labs,” *State-wide Workshop for K-12 Computer Science Teachers*, Birmingham, AL, July 31, 2006.

## Abstracts

Robert Tairas, “Sub-clones: Considering the Part rather than the Whole,” *UAB Graduate Student Research Days*, Birmingham, AL, February 2010.

Robert Tairas, “CeDAR: Unifying Clone Maintenance Processes,” *ACM Mid-Southeast Conference*, Gatlinburg, TN, November 2009, p. 65.

Robert Tairas, “Information Retrieval-based Clone Analysis,” *UAB Graduate Student Research Days*, Birmingham, AL, February 2009.

Robert Tairas, “Techniques in Code Clone Analysis,” *Student Research Forum, International Symposium on the Foundations of Software Engineering (FSE)*, Atlanta, GA, November 2008.

Robert Tairas, “Applying Model-Driven Engineering Techniques to Represent Code Clones,” *UAB Graduate Student Research Days*, Birmingham, AL, February 2008.

Robert Tairas, “Visualization of Clone Detection Results,” *UAB Graduate Student Research Days*, Birmingham, AL, March 2007, p. 86. (Third Place: Session 12 – Mathematics and Computer & Information Sciences)

Robert Tairas, “Clone Detection with Microsoft Phoenix,” *Alabama Academy of Sciences*, Troy, AL, March 2006.

Robert Tairas, “Searching for Code Clones using Suffix Trees in the Phoenix Framework,” *UAB Graduate Student Research Days*, Birmingham, AL, March 2006, p. 77. (First Place: Session 6 – Mathematics and Computer & Information Sciences)

Robert Tairas, “Phoenix-Based Clone Detection using Suffix Trees,” *ACM Mid-Southeast Conference*, Gatlinburg, TN, November 2005, p. 53. (First Place: Master’s Division)

## Professional Activities

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### Conferences / Workshops / Meetings Attended

- AAS Alabama Academy of Science (2006)
  - ACM Mid-Southeast Conference (2005, 2009)
- ACM-SE ACM Southeast Conference (2006)
- SAC Symposium on Applied Computing (2010)
- ASE International Conference on Automated Software Engineering (2007)
- ETX Eclipse Technology Exchange Workshop
- FSE International Symposium on the Foundations of Software Engineering (2008)
- OOPSLA International Conference on Object-Oriented Programming, Systems, Languages, and Applications (2006, 2008, 2009)
- WRT Workshop on Refactoring Tools (2008, 2009)
- SERP International Conference on Software Engineering Research and Practice (2010)
- SIGCSE ACM Special Interest Group on Computer Science Education Technical Symposium (2014, 2016)
- SLE International Conference on Software Language Engineering (2011)
- ATEM International Workshop on Software Language Engineering (2007)

### Committees

- ACM-SE *Program Committee*, ACM Southeast Conference (2010)
- AOSD *Organizing Committee (Web Chair)*, International Conference on Aspect-Oriented Software Development (2009)
- ECMFA *Program Committee*, European Conference on Modelling Foundations and Applications (2014)
- LDTA *Program Committee*, International Workshop on Language Descriptions, Tools, and Applications (2012)
- MODELS *Organizing Committee (Web Chair)*, International Conference on Model Driven Languages and Systems (2013)
- MtATL *Program Committee*, International Workshop on Model Transformation with ATL (2009)

- IWSC *Program Committee*, International Workshop on Software Clones (2012 – 2019)  
 SAC *Program Committee*, ACM Symposium on Applied Computing – Software Engineering Track (2011 – 2018)

## Reviewer – Journals

- AEI *Acta Electrotechnica et Informatica* (2011)  
 – *Advances in Software Engineering* (2010, 2012, 2015)  
 AUSE *Automated Software Engineering* (2011, 2012)  
 – *Carpathian Journal of Mathematics* (2009)  
 COMLAN *Computer Languages, Systems, and Structures* (2015, 2017, 2018)  
 – *International Journal of Computers and Applications* (2011)  
 JOT *Journal of Object Technology* (2005)  
 SCP *Science of Computer Programming* (2008, 2013)  
 – *IET Software* (2007)  
 – *Journal of Software: Evolution and Process* (2013)  
 SoSym *Software and Systems Modeling* (2013, 2014)  
 TOSEM *ACM Transactions on Software Engineering and Methodology* (2008)  
 JVLC *Journal of Visual Languages and Computing* (2018)

## External Reviewer – Conferences and Workshops

- ACM-SE *ACM Southeast Conference* (2006)  
 CAiSE *International Conference on Advanced Information Systems Engineering* (2012)  
 AOSD *International Conference on Aspect-Oriented Software Development* (2008, 2010, 2011)  
 DOA *International Symposium on Distributed Objects and Applications* (2006)  
 DSL *IFIP Working Conference on Domain Specific Languages* (2009)  
 ICEME *International Conference on Engineering and Meta-Engineering* (2011)  
 GPCE *International Conference on Generative Programming and Component Engineering* (2006, 2010)  
 – *International Workshop on Models@run.time* (2009)  
 ME *Models and Evolution Workshop* (2011)  
 ECMDA *European Conference on Model-Driven Architecture* (2008)  
 MODELS *International Conference on Model Driven Engineering Languages and Systems* (2009, 2011, 2014)  
 Onward! *ACM Conference on New Ideas in Programming and Reflections on Software* (2010)  
 TOOLS *International Conference on Objects, Models, Components, and Patterns* (2007, 2009)  
 OOPSLA *International Conference on Object-Oriented Programming, Systems, Languages, and Applications* (2008, 2011)  
 ICSOC *International Conference on Service-Oriented Computing* (2009)  
 WWW *International World Wide Web Conference* (2012)  
 ATEM *International Workshop on Software Language Engineering* (2007)  
 SIGCSE *ACM Special Interest Group on Computer Science Education Technical Symposium* (2015 – 2023)

## Professional, Research, and Teaching Experience

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Associate Professor of the Practice – Vanderbilt University  
Nashville, Tennessee (2020 – present)

Perform instructional duties at the Department of Computer Science.

Assistant Professor of the Practice – Vanderbilt University  
Nashville, Tennessee (2013 – 2020)

Perform instructional duties at the Department of Electrical Engineering and Computer Science.

Postdoctoral Research Fellow – Institut National de Recherche en Informatique et en Automatique  
Nantes, France (2010 – 2012)

Developed a Model-Driven Engineering (MDE) based clone detection technique to detect and analyze clones in UMLs Object Constraint Language (OCL). The technique utilizes model transformations written in the popular ATL language within the MDE community.

Investigated techniques to evaluate domain-specific languages (DSLs) based on an available corpus consisting of instances of a DSL.

Research Assistant – University of Alabama at Birmingham  
Birmingham, Alabama (2007 – 2010)

Performed research in the Department of Computer and Information Sciences (CIS) that was supported by a National Science Foundation (NSF) grant entitled “A Transformational Approach to Clone Refactoring.” The results of my work include:

- A code clone detection technique using suffix trees structures on the abstract syntax trees of C programs to find duplicate functions. The technique was written in C# within Microsofts Phoenix compiler framework.
- A code clone analysis technique using an information retrieval approach called Latent Semantic Indexing, which incorporated tools such as Cluto (for clustering), Matlab, ApacheDB, and Java. The technique was used to analyze the Microsoft NT research kernel source code.
- Code clone visualization and maintenance techniques within the Eclipse integrated development environment (IDE) for clones in Java programs.

Graduate Assistant – University of Alabama at Birmingham  
Birmingham, Alabama (2006 – 2007)

Performed instructional duties for undergraduate and graduate courses in the CIS department as either a teaching assistant or the primary instructor.

Programmer Analyst – Georgia State University  
Atlanta, Georgia (2003 – 2004)

Enhanced the University Library’s web site with the design and development of features including a content management system for various parts of the web site.

Designed and developed various projects including the web display of XML documents based on the Encoded Archival Description (EAD) standard using XSL stylesheets and an interface on a handheld for selection of collections for specialized display on the web site.

Systems Analyst – SpryData Internet Solutions, Inc.  
Birmingham, Alabama (1998 – 2003)

Designed and developed content management and e-commerce systems in both the Windows and Unix/Linux environment.

Communicated with clients throughout the life cycle of projects regarding project status, resolution of problems, client review of project, and post-development support.

Research and Information Coordinator – Samford University  
Birmingham, Alabama (1997 – 1998)

Designed and developed customized functions in ESRI's ArcView to enable access of GIS data on Sun SPARC stations at the university's in the Global Center exhibit area.

Assisted in the deployment and maintenance of a Virtual Research Center system obtained from an educational sharing agreement with NASA's Marshall Flight Center in Huntsville, Alabama. The system was maintained at the Global Center and was utilized by various academic departments at Samford University.