## Christian Newman

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## Education

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|---|---|---|
| B.S. Computer Science | Kent State University | 2010 |
| M.S. Computer Science | Kent State University | 2013 |
| PhD. Computer Science | Kent State University | 2017-18 (expected) |

## Academic Experience

**Graduate Research Assistantship**, Department of Computer Science, Kent State University, Kent, Ohio. 07/10, Funded by the National Science Foundation MRI-R2 CNS 09-59924

**Teaching Assistantship**, Department of Computer Science, Kent State University, Kent, Ohio. (2012-2015)

## Non Academic Experience

Kent State University IS as a Student Technician from Aug. 2008 - Jun 2010
ABB Engineering and Research intern from Aug 17th 2015 – Feb 17th 2016

## Advisor:

Dr. Jonathan I. Maletic (2010 – Present)

## Research Interests, work, & Statement

Software engineering, program transformation, program comprehension, slicing, software traceability, software visualization, static analysis, software evolution

**Program Transformation**

Program transformation is concerned with methods for specifying sections of code to apply some change to, how to apply the change, then automatically changing specified code to the desired form safely (in many cases, behavior must be preserved. Not in all cases, however). I have developed Normalizing-Refactorings as a technique for easing the creation of program transformation scripts and am currently developing a small programming language to support transformation tasks in srcML.

**Program Comprehension**

My work in this area has focused on the use of natural language processing combined with the use of method stereotypes in order to re-document srcML archives with parts of speech. The result of this work will be a framework (currently in development) for identifying and marking parts of speech in code, and tools to support the use of parts of speech for program comprehension and documentation generation tasks.

**Program Slicing**

I have been heavily involved in re-writing the srcSlice tool for the srcML framework in order to make it easier for general use and to increase its performance. Currently, its speed from the original incarnation has nearly doubled.

**Software Visualization**

Software visualization is concerned with visualizing different aspects of software packages whether they be metrics related to those packages or other sorts of metadata. I was part of the team that developed Mosaicode; a program used for identifying characteristics of a large code base. Example include identifying areas of high code churn.

**Static Analysis**
As a srcML developer, I've worked on and supported a number of tools to support static analysis. As a result, I've become familiar with the development and support of tools using the srcML framework as well as research and techniques related to static analysis and its applications both inside and outside of my own research.

## Awards, Funding, and Other Support

**Stem Scholarship –** Undergrad scholarship for science, technology, engineering and mathematics (5000$)
**NSF REU -** Research Experience for Undergraduates(5000$)
**NSF Grant -** Travel support to ICSM '11 (750$)
**ABB Stipend** – Travel support to ICSME 2015 (~1600$)

## Publications And Scholarly Work

**Research Publications:**

Maletic, J.I., Mosora, D.J., Newman, C.D., Collard, M.L., Sutton, A., Robinson, B.P., (2011), "MosaiCode: Visualizing Large Scale Software: A Tool Demonstration", in the Proceedings of the IEEE International Workshop on Visualizing Software for Understanding and Analysis (VISSOFT'11), Williamsburg, VA, USA, Sept 31 – Oct 1, pp. (6 pages to appear)

Alali, A., Bartman, B., Newman, C.D., Maletic, J.I., "A Preliminary Investigation of Using Age and Distance Measures in the Detection of Evolutionary Couplings" in the Proceedings of the ACM International Working Conference on Mining Software Repositories (MSR'13), San Francisco, California, May 18-19, 2013, pp. 169-172.

R. S. Alsuhaibani, C. D. Newman, M. L. Collard and J. I. Maletic, "Heuristic-based part-of-speech tagging of source code identifiers and comments," *Mining Unstructured Data (MUD), 2015 IEEE 5th Workshop on*, Bremen, 2015, pp. 1-6.

Christian D. Newman, Tessandra Sage, Michael L. Collard, Hakam W. Alomari, and Jonathan I. Maletic. 2016. srcSlice: a tool for efficient static forward slicing. In *Proceedings of the 38th International Conference on Software Engineering Companion* (ICSE '16). ACM, New York, NY, USA, 621-624.

Christian D. Newman, Michael L. Collard, and Jonathan I. Maletic. 2016. srcType: A Tool for Efficient Static Type Resolution. In *Proceedings of the 32nd International Conference on Software Maintenance and Evolution* (ICSME '16). IEEE, Raleigh, NC, USA.
Christian D. Newman, Alsuhaibani, R., Collard, M.L., Maletic, J.I., "Lexical Categories for Source Code Identifiers", *in the Proceedings of the 24th IEEE International Conference on Software Analysis, Evolution, and Reengineering* (SANER'17), Klagenfurt, Austria, Feb. 20-24, 2017, 12 pages (to appear)

Newman, C., Bartman, B., Collard, M.L., Maletic, J.I., "Simplifying the Construction of Source Code Transformations via Automatic Syntactic Restructurings", *Journal of Software Evolution and Process*, Vol. ?, No. ?, Accepted Sept. 6, 2016, 28 pages, (to appear)

**Other Publications**
C.D Newman., M.J.Decker. Feb. 12th, 2013. srcML (Wikipedia Page) [Online]. http://en.wikipedia.org/wiki/SrcML

## Institutional and Professional Activities

## Teaching

I am interested in teaching students about the basics of programming logic that computer scientists must obtain to be able to advance in the field. My teaching philosophy dictates that students must be directed to think critically about a topic, lead gently in the right direction when the need arises, and then asked to reflect on the processes used to come to their solution. All of these are important parts of a science-based education.

As the Computer Science 2 Laboratory instructor, my responsibilities were to maintain the course website which included all assignment and class policy pages, give a small 10 – 30 minute lecture at the beginning of each class relating material back to what they'd learned in lecture and how it applies to their assignment, and answer. questions both in person and through a website I helped administrate called segfault (it's very much like stack overflow's Q&A format). The language the course is taught in is C++.

| Course Title/Duties | Terms/Dates | Institution |
|---|---|---|
| **Computer Science 2 (data structures) Laboratory instructor** | Fall 2012 – Spring 2015 | Kent State University |
| **Intro to Databases Grader** | Spring 2014 | Kent State University |

## Conferences Attended

ICSM 2011, VISSOFT 2011, ICSME 2015, MUD 2015, ICSME 2016, SANER 2017

## Programming Experience:

- Primary languages include C++, C, C#, and Python. I have some experience with Javascript, Haskell, ASP, and Java. I find I generally learn new languages fairly quickly.
- I've written a number of research tools including a slicer (https://github.com/srcML/srcSlice), a domain-specific language, two static analysis tools; one for type resolution (https://github.com/srcML/srcType) and another for parts of speech tagging in source. This was all written using the srcML framework, for which I'm one of the developers.
- For ABB, I wrote a wrapper around the srcML framework in C# as well as a web-based query builder for communicating between arbitrary database REST APIs and a UI. I also wrote a wrapper around srcML's c++ library to adapt srcML for us in C# for use at ABB. The project can be found here: https://github.com/abb-iss/SrcML.NET