Semih Okur

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Education

2011 - 2016 **University of Illinois at Urbana-Champaign (UIUC)** **Urbana, IL**
Ph.D. student in Computer Science
Area of Study: *Software Engineering* & *Parallel Computing*
Danny Dig, advisor

2014 **University of Illinois at Urbana-Champaign (UIUC)** **Urbana, IL**
M.Sc. in Computer Science

2006 - 2011 **Koc University** **Istanbul, Turkey**
B.S. in Computer Engineering, graduated with Highest Honors
Serdar Tasiran, advisor

Research Interests

I enjoy doing research in Software Engineering and Parallel Programming. I am specifically interested in **program transformations**, static analyses, **compilers**, parallel libraries, and **mobile programming**.

A common thread in my research is understanding how programmers use parallelism in their code. Based on this understanding, my goal is to develop refactorings, bug-fixing, and profiler tools that (i) improve performance and responsiveness of general-purpose applications, (ii) increase programmer productivity, and (iii) make parallel programming accessible to all programmers including mobile developers.

Grants

2013 Grant writing, researcher, "Understanding Parallelism and Automating Refactoring for Readability and Performance", Software Engineering Innovation Foundation (SEIF) grant, from Microsoft, $25K.

Publications

ASE 15 [5] **Study and Refactoring of Android Asynchronous Programming**
Yu Lin, **Semih Okur**, Danny Dig
30th International Conference on Automated Software Engineering (Research Track), USA, November 2015.

ICSE 14 [4] **A Study and Toolkit for Asynchronous Programming in C#**
Semih Okur, David Hartveld, Danny Dig, Arie van Deursen
36th International Conference on Software Engineering (Research Track), India, June 2014.
Acceptance ratio: 20% (99/495). ***Listed as one of the top 5 most downloaded articles.***
Received ACM SIGSOFT Distinguished Paper Award.

ECOOP 14 [3] **Converting Parallel Code from Low-Level Abstractions to Higher-Level Abstractions**
Semih Okur, Cansu Erdogan, Danny Dig
28th European Conference on Object-Oriented Programming (Research Track), Sweden, July 2014.
Acceptance ratio: 27% (27/101).

FSE 13 [2] **How do Developers Use Parallel Libraries?**
Semih Okur, Danny Dig
20th Conference on Foundations of Software Engineering (Research Track), NC, USA, November 2012.
Acceptance ratio: 17% (35/201).

WoDet-3 [1] **KUDA: GPU Accelerated Split Race Checker**
Can Bekar, Tayfun Elmas, **Semih Okur**, Serdar Tasiran
3rd Workshop on Determinism and Correctness in Parallel Programming, England, UK, March 2012.

Research Experience

05/15 - 08/15 **Research Intern** **Microsoft**, Redmond, WA
As a member of Tools for Software Engineers (TSE), built a highly performant parallel interpreter for a new build language.
Worked with Nikolai Tillmann and Wolfram Schulte.

Sep 2015 **Consulting Researcher** **WebMD**, Portland, OR
Analyzed their codebase in terms of parallel and asynchronous programming usage and gave detailed feedback to the team.

2011 - present **Research Assistant** **University of Illinois**
Working on understanding how programmers use parallelism in their code. Based on this understanding, I try to develop methods and software tools that improve parallel programmer productivity.

Selected Research Projects

2015 **Detecting Asynchronous Anti-patterns** **University of Illinois**
Worked on building static analyses and profilers to detect performance anti-patterns, which are caused by misusing asynchronous constructs.

2014 **Migrating from Low-Level Parallel Abstractions to Higher-Level [3]** **University of Illinois**
Presented two automated migration tools, Taskifier and Simplifier that work for C# code. The first tool transforms old style Thread and ThreadPool abstractions to Task abstractions. The second tool transforms code with Task abstractions into higher-level design patterns. Our empirical evaluation shows that the tools (i) are highly applicable, (ii) reduce the code bloat, (iii) are much safer than manual transformations.

2013 **A Study and Toolkit for Asynchronous Programming in C# [4]** **University of Illinois**
Answered 2 research questions about use and misuse of asynchronous constructs. Inspired by our findings, we developed (i) Asyncifier, an automated refactoring tool that converts callback-based asynchronous code to the new async/await; (ii) Corrector, a tool that finds and corrects common misuses of async/await. Developers accepted 314 patches generated by our tools. - *LearnAsync.NET*

2013 **Croder: Bringing the Knowledge of the Crowds into the IDE** **University of Illinois**
Proposed a new way of doing code reviews. Since they require a great amount of time and coordination, we suggest using the crowds to fulfill this task. By integrating the IDE with the review platform we hope to make it easier for developers to review code and have code reviews. - *semihokur.com/docs/okur2013-croder.pdf*

2012 **Hadoop+Aparapi: Making heterogenous MapReduce programming easier** **University of Illinois**
Combined Hadoop, a widely-used MapReduce framework, with Aparapi, a new Java-to-OpenCL conversion tool from AMD. I proposed an easy-to-use API which allows easy implementation of MapReduce algorithms that make use of the GPU. Got special interest from AMD. - *semihokur.com/docs/okur2012-hadoop-aparapi.pdf*

2012 **Inclusion-based Pointer Analysis Using Actors** **University of Illinois**
Expressed a context-sensitive inclusion-based pointer analysis with on-the-fly call graph construction as an actor system. I co-implemented the algorithm in Scala as a drop-in replacement of the WALA pointer analysis. It was a term project of a class given by Gul Agha. - *semihokur.com/docs/okur2012-apa.pdf*

2012 **Loop2GPU: Transforming Loops to OpenCL Kernels as a LLVM Pass** **University of Illinois**
Implemented a compiler pass that converts pre-selected loops to OpenCL kernel code in LLVM-IR form. It was a term project of a compiler class given by Vikram Adve. - *semihokur.com/docs/okur2012-loop2gpu.pdf*

2011 - 2012 **Large-scale Empirical Study of Usage of Microsoft Parallel Libraries [2]** **University of Illinois**
Mined and analyzed 655 C# projects that use .NET parallel libraries in order to answer several research questions related to the usage of parallel libraries. I analyzed qualitatively and quantitatively the usage of parallelism-related constructs. Using this data, I uncover very interesting facts. - *LearnParallelism.NET*

2010 - 2012 **KUDA: Ramping Runtime Verification with GPU Computing [1]** **Koc University**
As an undergraduate researcher, I co-implemented Kuda, which is a Goldilocks algorithm-based race detection system for C/C++ by using the PIN binary instrumentation tool and GPU libraries. Kuda is a framework for GPU accelerated dynamic program analyses. It proposes a novel approach for runtime verification with modern graphical processing units (GPU). - *msrc.ku.edu.tr/projects/kuda/*

Industry Experience

05/14 - 08/14 **Software Development Engineer Intern** **Microsoft**, Redmond, WA
Implemented the 'nameof(...)' construct in the C# compiler. Shipped it with Visual Studio 2015.
Completed the prototype implementation of a breakthrough C# feature: "pattern matching".
Worked with Manish Jayaswal and Dr. Neal Gafter.

05/11 - 07/13 **Entrepreneur, Co-Founder** **Yapanzi.com**, Istanbul, Turkey
Co-founded a web-based marketplace that facilitates buying and selling of services from other users. Companies also use it for outsourcing. Yapanzi reached more than 20k registered users and 50 transactions per day.

06/09 - 02/10 **Part Time Software Developer** **IBM**, Istanbul, Turkey
Implemented several desktop and web applications to increase the employee productivity.

Research Impact

2013 - present Empirical studies [2, 4] on usage of concurrent libraries and programming constructs (async & await) have influenced the development of the official libraries and programming languages.

2013 - present Maintaining a website, **LearnAsync.NET**, where developers can find hundreds of real-world examples of all asynchronous idioms and inspect real-world misuse examples of async/await keywords. I provide my Asyncifier and Corrector tools here for developers. Received very good feedback for both tools and the website from developers (e.g. "I'm very impressed at your work in analyzing the problems empirically and providing tooling to help!" Don Syme - main architect of the F#).

2012 - present Maintaining a website, **LearnParallelism.NET** as an tremendous education resource for C# programmers. It shows all usage examples of each parallel construct as real code snippets and allow the visitors to browse these code snippets in the corresponding source file through Github. The visitors examine the usage of parallel constructs in real code rather than in tutorials and toy applications. It has received more than 100k visitors.

Teaching Experience

Fall 2015 **Teaching Assistant** / Software Engineering **University of Illinois**
Designed and graded homework, supervised student class projects, and held office hours for the SE courses.

Summer 2012 **Teaching Assistant** / I2PC Summer School on Multicore Programming **University of Illinois**
Helped students with course topics and programming assignments in the lab sessions.

Fall 2010 **Teaching Assistant** / Software Engineering Course **Koc University**
Graded and gave feedback for student projects and weekly presentations of students.

Awards and Scholarships

2015 Feng Chen Memorial Award, University of Illinois.

2015 **Microsoft Most Valuable Professional (MVP) award for community work in .NET.**

2014 **ACM SIGSOFT Distinguished Paper Award at the ICSE 2014.**

2014 ACM CAPS Travel Award for the ICSE conference.

2013 NSF Travel Grant for the ESEM conference.

2012 Graduate College Conference Travel Grant, University of Illinois.

2011 Highest Honors. Awarded to top 1% of students based on GPA, Koc University.

2006 - 2011 Koc University Faculty of Engineering Undergraduate Fellowship

2009 Extracurricular Activities Award from Koc University.

2006 Top 100 scorer in the "University Entrance Exam" taken by more than 2 million students.

Talks

07/2015 Understanding, Refactoring, and Fixing Concurrency in C#, **Microsoft**. Redmond, WA, USA

08/2014 Pattern Matching for C#, **Microsoft**. Redmond, WA, USA

07/2014 Converting Parallel Code from Low-Level Abstractions to Higher-Level Abstractions, **ECOOP 2014 Conference**. Uppsala, Sweden

06/2014 A Study and Toolkit for Asynchronous Programming in C#, **ICSE 2014 Conference**. Hyderabad, India

11/2012 How do Developers Use Parallel Libraries?, **ACM SIGSOFT FSE-20 Conference**. Cary, NC, USA

10/2012 How do Developers Use Parallel Libraries?, **I2PC Seminar**. Host: Megan Osfar, University of Illinois, USA

Service

2015 **Invited reviewer for IEEE Software journal.**

2015 **Invited reviewer for Empirical Software Engineering (EMSE) journal.**

2011 - present Co-reviewer for ASE'15, ECOOP'15, ASE'14, ICSM'13, OOPSLA'13, ECOOP'13, IPDPS'13, ICSM'12, CSMR'12, and PADTAD'11 conferences.

Professional and Volunteer Activities

2012 University of Illinois, Computer Science Grad Ambassador.

2009 - present ACM Student Member.

2009 - 2010 Student Council Board Member (one of 10 students who are selected in a university-wide election).

2008 - 2011 Koc University Ski Team Captain.

2007 - 2008 Board Member, Koc University Debate Club.

2007 European Debating Championship Organization Committee Member.