

# Handan Gül Çalıkılı

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Computing and Communications Faculty of Maths, Computing and Technology The Open University Walton Hall, Milton Keynes MK7 6AA, United Kingdom	<i>Phone</i> +44 (0) 1908-659378 <i>E-mail</i> gul.calikli@open.ac.uk <i>Url</i> <a href="http://www.gulcalikli.com">http://www.gulcalikli.com</a>
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## RESEARCH INTERESTS

software engineering for privacy-aware adaptive systems, empirical software engineering, human aspects in software engineering, mining software repositories, applications of Artificial Intelligence (AI) on building recommendation systems for software engineering .

## EDUCATION

**Boğaziçi University**, Istanbul, Turkey September 2005 – May 2012  
Ph.D., Computer Science and Engineering  
Advisor: Professor Ayşe Bener and Professor Oğuz Tosun  
Thesis: “Improving Performance of Defect Predictors Using Confirmation Bias Metrics”

**Boğaziçi University**, Istanbul, Turkey September 2002 – September 2004  
M.S., Computer Engineering  
Advisor: Professor Ufuk Çağlayan  
Thesis: “A Policy Specification Language for an 802.11 WLAN with Enhanced Security Network”

**Boğaziçi University**, Istanbul, Turkey September 1996 – July 2000  
B.S., Mechanical Engineering

## RESEARCH EXPERIENCE

**The Open University**, Milton Keynes, United Kingdom October 2013 – present  
**Post Doctorate Fellow in EPSRC funded “Privacy Dynamics” Project:**

- Collaboration with social psychologists from Exeter University and machine learning experts from Imperial College London;
- Responsible for the overall design and proper functioning of the field studies conducted to investigate the relationship between user’s privacy preferences and group dynamics;
- Part of the design team for technical infrastructure in field studies;
- Designing privacy-aware adaptive software solutions that guide Online Social Network (OSN) users.

### **Empirical Software Engineering Research Study:**

- Mining software repositories (e.g., Samba, Mozilla Firefox, RedHat, FreeBSD);
- Designing and conducting questionnaires and interviews to gather qualitative data from developers.

### **Coordinator of Research Seminars:**

- Coordinating and organizing bi-weekly meetings for researchers who are interested in Empirical Studies in Software Development and Human Computer Interaction (HCI);
- Coordinating, chairing and webcasting *C&C Research Seminars* (research seminars of Computing and Communications Department) at the Open University.

Ryerson University, Toronto, Canada

September 2012 – September 2013

**MAC Post Doctorate Fellow at Data Science Laboratory (DSL):**

- Conducted research in tackling big data in software engineering;
- Gained invaluable experience by working on real-life problems in collaboration with software companies;
- Built models by using machine learning techniques to guide software project managers in task assignment issues;
- Modelled developers' cognitive aspects and social interactions among them to understand their impact on software quality and to predict defect prone parts of software before testing phase;
- Took active part in the preparation of a research project proposal to collaborate with *Microsoft, Redmond*.

Boğaziçi University, Istanbul, Turkey

January 2009 – July 2012

**Researcher in the Software Engineering Research Laboratory (SOFTLAB):** Worked in the following projects in collaboration with industrial partners:

- **IBM Canada Human Aspects in Test Driven Development Project, January 2009 – July 2010**
  - Set up a metrics data program to quantify thought processes of software engineers, who are responsible from the development of DB2 software product;
  - Investigated the effect of confirmation bias on testing strategies of software engineers;
  - Analysed the effect of Test Driven Development (TDD) on the confirmation bias levels of software engineers.
- **Turkcell Project for Metrics Collection and Effective Allocation of Testing Resources, January 2009–July 2011**
  - Empirically investigated how testing strategies of developers and testers are affected by their thought processes;
  - Built models using machine learning techniques to guide project managers in effective allocation of testing resources by using product (static code), process (churn) and people (confirmation bias) metrics.
- **IBTech Project for Metrics Collection and Analysis of Testing Strategies in Agile Computing, May 2009–January 2010**
  - Replicated the metrics data program, which was concurrently held in IBM Canada;
  - Analysed the effect of agile software development on the confirmation bias levels of software engineers.

Boğaziçi University, Istanbul, Turkey

September 2002 – December 2008

**Research Assistant at Computer Networks Research Laboratory:**

- Worked in the performance evaluation of static and adaptive routing algorithms and contention resolution techniques in LEO satellite networks.
- Developed a formal security language for the detection of security flaws in 802.11 WLANs due to inconsistencies among the policies of administrative domains.
- Implemented a semi-automated security flaw detection system by Isabelle, which is generic automated theorem proof assistant.

- Worked as an R&D engineer for the modification of burner fans in order to increase efficiency.
- Modal analysis of submersible pump shafts resulted in a publication in the Proceedings of the 4th National Congress on Pumps.

## TEACHING EXPERIENCE

**Ryerson University**, Toronto, Canada

Fall 2012

*Instructor/Guest Lecturer*, The Chang School and Ted Rogers School of ITM

Attended LTO Workshops (The Managing Classroom Behaviour Workshop, Best Practices for Classroom Management Workshop, Workshop on Assessment and Grading) that focussed on active learning, organized by the Learning and Teaching Office (LTO) of Ryerson University, September 2012.

- *MT8103 – Applied Research Methods* (Guest Lecturer, Ted Rogers School of ITM)  
Guest lectured on various topics such as data collection methods in field studies (e.g., analysis of electronic databases of work performed, interviews, questionnaires, shadowing and observation synchronized shadowing, participant observation, think aloud protocols, etc.), statistical modeling and analysis techniques, qualitative measures and construct validity.
- *CITM102 – Business Information Systems 1* (Instructor, The Chang School)  
Responsibilities included lecturing, holding office hours to assist students with lecture material and projects, grading examinations and projects, preparation of projects and assignments and conducting laboratory sessions.

**Boğaziçi University**, Istanbul, Turkey

Fall 2005 – Spring 2012

*Teaching Assistant*, Department of Computer Engineering

- *CMPE150-Introduction To Computing (Java)*, Spring 2012, (Assistant Prof. Arzucan Özgür)  
Responsibilities included conducting laboratory sessions, preparing projects and holding office hours to assist students with lecture material and projects.
- *CMPE150-Introduction To Computing (C)*, Fall 2005, Spring 2006, Fall 2008, Spring 2006-2009, (Associate Prof. Tuna Tuğcu and Dr. Suzan Üsküdarlı)  
Responsibilities included lecturing some of the classes, conducting laboratory sessions, holding office hours to assist students with lecture material and projects, helping in preparation of examinations and projects, helping in grading examinations and projects.
- *CMPE 160 – Introduction to Object Oriented Computing*, Spring 2012 (Associate Prof. Tuna Tuğcu)  
Responsibilities included conducting problem sessions, guest lecturing, preparing projects, holding office hours to assist students with lecture material and projects, helping in the preparation and grading of examinations.
- *CMPE 300 – Analysis of Algorithms*, Spring 2006 (Prof. Fatih Alagöz)  
Responsibilities included conducting problem sessions, preparing and grading projects, holding office hours to assist students with lecture material and projects, helping in the preparation and grading of examinations.
- *CMPE 322 - Operating Systems*, Fall 2006-2008, Summer 2007-2008 (Prof. Ufuk Çağlayan)  
Responsibilities included guest lecturing on topics about Linux Kernel Development such as system calls, process management at kernel space, process scheduling, memory management and virtual file system. Responsibilities also included preparing and grading projects, helping in preparation and grading of examinations.
- *CMPE 344 - Computer Organization/Architecture*, Fall 2011 (Prof. Oğuz Tosun)  
Responsibilities included conducting laboratory sessions and helping in grading examinations.

- *CMPE 352 - Fundamentals of Software Engineering*, Spring 2010 (Prof. Ayşe Bener)  
Responsibilities included helping in the design of the course content and format as well as guest lecturing on various topics, such as the fundamentals of Unified Modeling Language (UML), requirements engineering, software reusability, and software testing. Responsibilities also included grading projects and examinations, lecturing discussion sessions, and holding office hours to assist students with lecture material and projects.
- *CMPE 450 - Software Engineering*, Fall 2005-2007, Fall 2009 (Prof. Ayşe Bener)  
Responsibilities included supervising student team projects, helping in grading examinations, helping project set-up and grading, organizing demo/tutorial sessions to give students insight about software development tools/systems (e.g., IBM Rational Software Modeler, SVN, Bugzilla, GitHub, etc.). Guest lecturing on the fundamentals of UML (Unified Modeling Language), code reviews, unit testing as well as preparing and conducting hands-on exercises regarding these topics to facilitate students' comprehension.
- *CMPE451 - Project Development in Software Engineering*, Fall 2010 (Prof. Fikret Gürgen), Fall 2011 (Dr. Suzan Üsküdarlı)  
Responsibilities included helping in preparation of the software project topics, supervision of student project teams, monitoring performance of individual team members, helping in grading of the software project and examinations, and conducting hands-on tutorials/demo sessions to facilitate students' comprehension of software engineering practices (e.g., UML design, code review, issue management, unit testing, etc.).
- *CMPE475 - Computer Networks*, Summer2007-2008 (Prof. Ufuk Çağlayan)  
Responsibilities included grading term projects and helping in grading of examinations.
- *CMPE476 - Distributed Systems*, Spring 2007 (Prof. Ufuk Çağlayan)  
Responsibilities included grading term projects and helping in grading of examinations.
- *CMPE 58M - Software Engineering Economics and Risk Management*, Spring 2010 (Prof. Ayşe Bener)  
Responsibilities included preparing and grading projects.
- *CMPE 589 - Software Quality Modeling*, Spring 2009–2010 (Prof. Ayşe Bener)  
Responsibilities included preparing and grading projects.

## PROFESSIONAL ACTIVITIES

- Reviewer for IEEE Internet of Things Journal, Special Issue on Privacy Issues in the Internet of Things, 2016.
- Reviewer for Empirical Software Engineering Journal, 2016.
- Reviewer for IEEE Software, Special Issue on Green Software, 2014.
- Reviewer for the International Conference on Software Engineering (ICSE), 2011, 2012.
- Reviewer for the International Symposium on Empirical Software Engineering and Measurement (ESEM), 2010, 2011, 2012, 2013.
- Reviewer for the International Conference on Predictive Models in Software Engineering (PROMISE), 2010, 2011, 2012, 2013.
- Reviewer for the EUROMICRO Conference on Software Engineering and Applications (SEAA), 2013.
- Reviewer for the International Conference on Software Maintenance (ICSM), 2013.
- Reviewer for the IEEE Transactions on Reliability, 2012.

## AWARDS

- Best Industry Experience Award, ESEM 2013 (The ACM / IEEE International Symposium on Empirical Software Engineering and Measurement)
- MAC Post Doctoral Fellowship, Ryerson University, September 2012 - August 2013 (contract extension till August 2014 was offered)
- Graduate Scholarship by Turkcell Academy, December 2010 - July 2011
- TUBITAK (The Scientific and Technologic Research Council of Turkey) International Conference Travel Fellowship, 2010.

## SKILLS

### Programming Languages and Environments

Programming: Python, Java, C/C++, Perl, Prolog

Tools: MATLAB, Weka data Mining Toolkit, PostGreSQL, Isabelle, SPSS, R

Mac OS, Linux/Unix, and Windows environments

### Languages

Turkish (native), English (advanced)

## PUBLICATIONS

### International Journal Papers

- [1] Gül Çalıklı and Ayşe Bener. "Empirical Analysis of Factors Affecting Confirmation Bias Levels of Software Engineers.", *Software Quality Journal*, (23)4:695-722, 2015 (electronic access published on September 2014).
- [2] Gül Çalıklı and Ayşe Bener. "Influence of Confirmation Biases of Developers on Software Quality: An Empirical Study", *Software Quality Journal*, (21)2:377-416, 2013 (electronic access published on July 2012).

### Book Chapters

- [1] Ayşe Bener, Ayşe Tosun-Mısırlı, Bora Çağlayan, Ekrem Kocagüneli and Gül Çalıklı. "Lessons Learned From Software Analytics in Practice", in "The Art and Science of Analyzing Software Data", Tim Menzies, Christian Bird and Thomas Zimmerman (Eds.), Elsevier 2015.
- [2] Ayşe Tosun-Mısırlı, Ayşe Bener, Bora Çağlayan, Gül Çalıklı and Burak Turhan. "Part II. Evaluation: Field Studies", in "Recommendation Systems in Software Engineering", Martin P. Robillard, Walid Maalej, Robert W. Walker and Thomas Zimmerman (Eds.), Springer 2014.

### International Conference Papers

- [1] Gül Çalıklı, Mark Law, Arosha K. Bandara, Alessandra Russo, Luke Dickens, Blaine A. Price, Avelie Stuart, Mark Levine and Bashar Nuseibeh. "Privacy Dynamics: Learning Privacy Norms for Social Software", *International Symposium on Software Engineering for Adaptive and Self-Managing Systems*, Austin, Texas, USA, May 16-17, 2016 (accepted).

- [2] Gül Çalıklı, Mads Schaarup Andersen, Blaine A. Price, Arosha K. Bandara and Bashar Nu-seibeh. "Personal Informatics for Non-Geeks: Lessons Learned from Ordinary People.", Ubi-comp Adjunct 2014, Seattle, Washington, USA, September 13-17, 2014).
- [3] Gül Çalıklı, Ayşe Bener, Turgay Aytaç and Övünç Bozcan. "Towards a Metric Suite Proposal to Quantify Confirmation Biases of Developers", Proceedings of the 7th International Symposium on Empirical Software Engineering and Measurement (ESEM 2013), Industry Track, Baltimore, Maryland, USA, October 10-11, 2013 (**Best Paper Award**).
- [4] Gül Çalıklı and Ayşe Bener. "Analyzing the Effects of Confirmation Bias on Software Development Team Performance: A Field Study during a Hackathon", Proceedings of the 39th Euromicro Conference on Software Engineering and Advanced Applications (SEAA 2013), Santander, Spain, September 4-6, 2013.
- [5] Gül Çalıklı and Ayşe Bener. "An Algorithmic Approach to Missing Data Problem in Modeling Human Aspects in Software Development", Proceedings of the 9th International Conference on Predictive Models in Software Engineering (PROMISE 2013), Baltimore, Maryland, USA, October 9, 2013.
- [6] Bora Çağlayan, Gül Çalıklı, Ayşe Bener, Ayşe Tosun-Mısırlı, Burak Turhan and Turgay Aytaç. "Evaluating Dione: A Decision Support Tool for Software Development", 2nd Workshop on User Evaluations for Software Engineering Researchers (USER: ICSE 2013 Workshop) (non-archival paper), San Francisco, USA, May 26, 2013.
- [7] Gül Çalıklı and Ayşe Bener. "The Impact of Confirmation Bias on the Release-based Defect Prediction of Developer Groups", Proceedings of the 25th International Conference on Software Engineering and Knowledge Engineering (SEKE 2013), Boston, USA, June, 2013.
- [8] Gül Çalıklı, Bora Çağlayan, Ayşe Tosun-Mısırlı and Ayşe Bener. "Modeling Human Aspects to Enhance Software Quality Management", Proceedings of the 2012 International Conference on Information Systems (ICIS 2012), Orlando, Florida, USA, December 16-19, 2012.
- [9] Bora Çağlayan, Ayşe Tosun-Mısırlı, Gül Çalıklı, Turgay Aytaç, Ayşe Bener and Burak Turhan. "Dione: An Integrated Measurement and Defect Prediction Solution", Proceedings of the 20th International Symposium on Foundations of Software Engineering (FSE 2012), Cary, North Carolina, USA, November 11-16, 2012.
- [10] Gül Çalıklı and Ayşe Bener. "Empirical Analyses of the Factors Affecting Confirmation Bias and the Effects of Confirmation Bias on Software Developer/Tester Performance", Proceedings of the 6th International Conference on Predictive Models in Software Engineering (PROMISE 2010), Tmisoara, Romania, September 12-13, 2010.
- [11] Gül Çalıklı, Berna Arslan and Ayşe Bener. "Confirmation Bias in Software Development and Testing: An Analysis of the Effects of Company Size, Experience and Reasoning Skills", 22nd Annual Psychology of Programming Interest Group Workshop (PPIG 2010), Leganes, Madrid, Spain, September 19-21, 2010.
- [12] Gül Çalıklı, Ayşe Bener and Berna Arslan. "An Analysis of the Effects of Company Culture, Education and Experience on Confirmation Bias Levels of Software Developers and Testers", Proceedings of the 32nd International Conference on Software Engineering (ICSE 2010), Cape Town, South Africa, May 2-8, 2010.

- [13] Gül Çalıklı and Ayşe Bener. “Preliminary Analysis of the Effects of Confirmation Bias on Software Defect Density”, Proceedings of the 4th International Symposium on Empirical Software Engineering and Measurement (ESEM 2010), Bozen, Italy, September, 16-17, 2010.
- [14] Gül Çalıklı, Ayşe Tosun, Ayşe Bener, Melih Çelik. “The Effect of Granularity Level on Software Defect Prediction”, Proceedings of the 24th International Symposium on Computer and Information Sciences (ISCIS 2009), Northern Cyprus, September 14-16, 2009.
- [15] Ömer Korçak, Gül Çalıklı, İlhan Kaya and Fatih Alagöz. “Performance Evaluation of Adaptive and Static Routing Algorithms and Contention Resolution Techniques in LEO Satellite Constellations”, Proceedings of the 2nd IEEE Recent Advances in Space Technologies (RAST 2005), Istanbul, Turkey, June 9-11, 2005.
- [16] Gül Çalıklı and M. Ufuk Çağlayan. “A Formal Policy Specification Language for an 802.11 WLAN with Enhanced Security Network”, Proceedings of the 20th International Symposium on Computer and Information Sciences (ISCIS 2005), Istanbul, Turkey, October 26-28, 2005.

## Thesis

- Gül Çalıklı . “Improving Performance of Defect Predictors Using Confirmation Bias Metrics”, Ph.D. Thesis, Department of Computer Engineering, Boğaziçi University, Istanbul, Turkey, May 2012 (PhD defence: December 2011) Thesis Advisor: Ayşe Bener.
- Gül Çalıklı. “A Policy Specification Language for an 802.11 WLAN with Enhanced Security Network”, M.S. Thesis, Computer Engineering, Boğaziçi University, Istanbul, Turkey, July 2004. Thesis Advisor: Ufuk Çağlayan.

## SOFTWARE

### **Dione: A Web-based Software Analytics Tool (first version)**

I took part in the design and development of the first version of Dione. Dione is a web-based integrated software intelligence tool implemented in Java. It is comprised of measurement, analysis, prediction and reporting components for four fundamental modules: 1) Prediction of pre-release defects prior to testing phase for effective allocation of testing resources, 2) software effort estimation prior to a project, 3) software reliability prediction prior to release decision (i.e., Should we further test the software or release it to the market?), and 4) cognitive analysis of software development team (e.g., Who should test/develop the most critical parts of software? Who should fix the bugs in the most problematic parts of the software? Who should/should not develop/maintain the same source files?).

Pre-release defect prediction, software cost estimation and reliability prediction modules employ machine learning algorithms (e.g. Naive Bayes, Bayesian Networks, Decision Tree, Logistic Regression, Neural Networks, Cascading classifiers). The system learns from data belonging to previous versions to make a prediction about defect proneness and/or cost of the current version of a software product. Dione utilizes all advantages of cloud computing and it uses smart client technology to connect to software artifacts, such as source code repositories, version control systems (CVS, SVN, Git, Mercurial, Clearcase) and issue management systems (Bugzilla, Jira) in order to collect data and extract metrics. The metrics gathered by smart clients are stored in a Relational Database Management System (RDMS), which can be any of the popular Database Management Systems (DBMS), such as Oracle, DB2, MS SQL Server, MySQL, PostGreSQL.

## TALKS AND PRESENTATIONS

- **Istanbul Bilgi University**, Department of Computing Engineering, “Privacy Dynamics: Learning Privacy Norms for Social Software”, February 3, 2016, Istanbul, Turkey.
- **Bournemouth University**, Department of Computing and Informatics, “Elicitation of Privacy Requirements by Using Personas”, February 23, 2014, Poole, Dorset, UK.
- **Microsoft Research Redmond**, “Confirmation Bias as a Human Aspect in Software Engineering”, January 16, 2013, Redmond, WA, USA. (Video of the talk is available online at Microsoft Research website: <http://research.microsoft.com/apps/video/default.aspx?id=180163>)
- **York University**, Department of Computer Science, “Confirmation Bias in Software Engineering: Task Assignment and Handling Missing Data”, March 26, 2013, Toronto, ON, Canada.
- **Ryerson University**, DSL (Data Science Laboratory) Seminars, “Handling Missing Data Problem in Modeling Human Aspects in Software Engineering”, April 16, 2013, Toronto, ON, Canada.

## REFERENCES

**Bashar Nuseibeh**, Ph.D.

Professor, Department of Computing and Communications  
The Open University  
Walton Hall, Milton Keynes, MK7 6AA  
United Kingdom (U.K.)  
+44 (0) 1908-655185  
B.Nuseibeh@open.ac.uk

**Arosha Bandara**, Ph.D.

Senior Lecturer, Department of Computing and Communications  
The Open University  
Walton Hall, Milton Keynes, MK7 6AA  
United Kingdom (U.K.)  
+44 (0) 1908 653 545  
arosha.bandara@open.ac.uk

**Ayşe Bener**, Ph.D.

Professor, Mechanical and Industrial Engineering, Ryerson University  
350 Victoria Street, EPH-412  
Toronto, Canada, M5B 2K3  
+1 416 979 5000; X-3155  
ayse.bener@ryerson.ca

**Burak Turhan**, Ph.D.

Professor, Dept. of Information Science'  
University of Oulu, POB.3000  
90014, Oulu, Finland  
Burak.Turhan@oulu.fi

**Levent Akin**, Ph.D.

Professor, Dept. of Computer Engineering,  
Boğaziçi University  
34342, Bebek, Istanbul, Turkey  
+90 (212) 359 6769  
akin@boun.edu.tr