

Baris Aksanli

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Department of Electrical and Computer Engineering, San Diego State University, 5500 Campanile Drive San Diego, CA 92182

Profile

Research Interests Energy efficient large-scale cyber physical and embedded systems, real-time embedded systems, human behavior modeling in the Internet of Things, big data for energy efficient large-scale systems. Cost and energy aware automation of residential houses. Learning techniques to enhance user behavior modeling and context extraction. House/building/data center and electric grid interaction.

Work Experience

San Diego State University, Electrical and Computer Engineering Department, San Diego, CA

August 2016 - Current

Assistant Professor

- ✓ Working on various domains such as embedded systems, Internet of Things, Cyber-physical Systems
- ✓ Sample projects include 1) Real-time human activity detection with ambient wireless sensors, 2) Real-time embedded learning, 3) Animal activity detection in the wild with wearable sensors, 4) Acceleration in processors with approximate computing, 5) Real-time traffic classification and protection for edge networks.
- ✓ Teaching embedded system classes, such as Embedded Computing, Embedded Programming, Real Time and Embedded Operating Systems

UC San Diego, Computer Science and Engineering Department, La Jolla, CA

June 2015 – June 2016

Postdoctoral Researcher

- ✓ At System Energy Efficiency Lab, working on Internet of Things and energy efficient systems
- ✓ Learning techniques to improve user behavior modeling and context extraction in residential houses
- ✓ Cost and energy aware automation of residential houses
- ✓ Sustainable energy management and coordination between residential neighborhoods and the smart grid

UC San Diego, Computer Science and Engineering Department, La Jolla, CA

September, 2010 – June 2015

Graduate Student Researcher

- ✓ Advisor: Tajana Simunic Rosing
- ✓ Large scale data analysis and simulation of large scale SLA/power/thermal changes in a data center.
- ✓ Efficient usage of renewable energy (wind, solar) in data centers by scheduling and prediction.
- ✓ Using batteries to, shave peak power and minimize the total energy cost in data centers.
- ✓ Distributed control mechanisms to manage state-of-health of distributed batteries to maximize battery lifetime.
- ✓ Energy management in a smart-home equipped with a fuel cell, a solar panel and multiple batteries.

Intel Corporation, Hillsboro, OR

June to August 2012

Server Fabrics Engineer Intern

- ✓ Supervisor: Ram Huggahalli
- ✓ Workload modeling for network fabric simulation to test different topologies, routing algorithms, hardware, etc.
- ✓ Modeling the packet level interaction between nodes (servers) and connectors (routers and switches).
- ✓ Classifying applications that are used in a data centers and/or large scale clusters.
- ✓ Implementing the workload model designed in C++ and embedding it into the Asim fabric simulator.
- ✓ Verifying the design against MPI Random Access benchmark results, i.e. forming its template description and compare the GUPS (Giga Updates Per Second) metric measured and simulated.

Lawrence Berkeley National Laboratory, Berkeley, CA

June to August, 2011

Summer Intern

- ✓ Supervisor: Inder Monga
- ✓ Research: Effect of high speed network on energy efficiency of geographically separated data centers when some nodes in the network have green energy access. A paper is published in DATE 2012.
- ✓ Web Interface Development: I used Django and Dygraphs to implement MAVEN (Monitoring and Visualization of Energy consumed by Networks), which dynamically monitors power consumption of networking. The queries can be given based on networking element type, location and over the path between two endpoints.
- ✓ MAVEN won the Internet2 IDEA Award in October 2011.

Education

- 2010 - 2015** **UC - San Diego, La Jolla, CA**
PhD, Computer Science **GPA: 3.88**
PhD Thesis: Energy and Cost-Efficient Data Centers
- 2010 to 2012** **UC - San Diego, La Jolla, CA**
Master of Science, Computer Science
- 2005 to 2010** **Bogazici University, Istanbul, Turkey**
Bachelor of Science, Computer Engineering **GPA: 3.91**
Bachelor Thesis: Parallelization of Design Automation Algorithms with GPGPUs
- 2005 to 2010** **Bogazici University, Istanbul, Turkey**
Bachelor of Science, Mathematics **GPA: 3.91**
- 2009** **University of Paderborn, Paderborn, Germany**
Erasmus Student, Computer Science

Teaching Experience

San Diego State University, Electrical and Computer Engineering Department, San Diego, CA **Sp 17, Sp 18, Fa 18, Sp 19**

Instructor

- ✓ Instructing the junior level course “Embedded Systems Programming” (COMPE375).
- ✓ The class teaches programming in multiple microcontrollers, learning how to write and debug code in different software development platforms, using topics such as serial/general purpose I/O, timers, interrupts, ADC, DAC, and memory programming.

San Diego State University, Electrical and Computer Engineering Department, San Diego, CA **Fa 16, Fa 17, Fa 18**

Instructor

- ✓ Instructing the graduate level course “Embedded Operating Systems” (COMPE571).
- ✓ The class teaches real-time kernel development, basic kernel services, threading and synchronization, preemptive multithreading, mutexes, spin locks, critical sections, priority scheduling, interrupts, RTOS implementation, memory management, task management, inter-task communications, along with examples of embedded, real-time operating systems.

UC San Diego, Computer Science and Engineering Department, La Jolla, CA **Sp 16**

Instructor

- ✓ Instructed the undergraduate level course “Embedded Computing” (CSE190G).
- ✓ The class teaches the basics of formal embedded system modeling, hardware/software co-design, real-time scheduling, embedded processor and memory architectures.

UC San Diego, Computer Science and Engineering Department, La Jolla, CA **Winter 2016**

Instructor

- ✓ Instructed the graduate level course “Internet of Things”.

UC San Diego, Computer Science and Engineering Department, La Jolla, CA **Winter 2013**

Teaching Assistant

- ✓ Assisted the graduate course “Introduction to Embedded Computing”.

Bogazici University Mathematics Department, Istanbul, Turkey **January, 2010 – June, 2010**

Teaching Assistant

- ✓ Gave lectures in problem sessions of the course 'Differential Equations'.

Bogazici University Computer Engineering Department, Istanbul, Turkey **February, 2008 to March, 2009**

Student Assistant

- ✓ Gave lectures in discussion sessions of the course 'Introduction to Computing' and graded student projects.

Key Skills

Proficient or familiar with a vast array of programming languages, concepts and technologies, including:

Programming Language Knowledge:
C/ C ++, Java
Perl, Scheme, Prolog,
Assembly, Python

Web Development:
JSP, Java Servlets,
Django, HTML

Database Knowledge:
SQL, MySQL,
Sqlite, IBM DB2

Operating Systems:
Windows XP, Vista,
7, Server 2003,
2008, Ubuntu, Red
Hat, CentOS, MacOS

Embedded System Development:
Ex. SW: Atmel Studio, Keil,
IAR EWARM, etc.
Ex. HW: AVR, ARM Cortex
series, STM Nucleo,
Cypress hardware, etc.

Qualifications and Honors

- Best paper award, IEEE Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON), November 2018
- Best paper nominee, ASME Power & Energy Conference, June 2018
- 3rd place in General Electric Digital CSU Challenge 2018 with SDSU team, April 2018
- San Diego State University, University Grants Program Award, December 2016
- San Diego State University, Presidential Leadership Award, December 2016
- San Diego State University, Grants and Research Enterprise Writing Fellow, October 2016
- UC San Diego Campus Sustainability Award, Outstanding Individual, April 2016
- Excellent Poster Presentation Award in UCSD CSE 25th year celebration event, October 2013
- Best Student Paper Award, International Symposium on Computers and Communications (ISCC), July 2013
- Spontaneous Recognition Award from Intel, for the summer internship, September 2012
- Internet2 IDEA Award Winner, October 2011
- Best paper award, Workshop on Power Aware Computing and Systems (HotPower), July 2011
- UC San Diego Graduate Fellowship, 2010
- Bogazici University High Honor Degree, 2010:
 - Faculty of Engineering, Computer Engineering
 - Faculty of Art and Sciences, Mathematics
- Bogazici University Computer Engineering, ranked 2nd in graduation, June 2010
- Bogazici University Mathematics, ranked 1st in graduation, June 2010

Publications

- Mohsen Imani, Alice Sokolova , Ricardo Garcia, Andrew Huang, Fan Wu, **Baris Aksanli**, Tajana Rosing. ApproxLP: Approximate Multiplication with Linearization and Iterative Error Control. *IEEE/ACM Design Automation Conference (DAC)*, 2019.
- Anthony Thomas, Yunhui Guo, Yeseong Kim, **Baris Aksanli**, Arun Kumar, and Tajana Rosing. Hierarchical and Distributed Machine Learning Inference Beyond the Edge. *IEEE International Conference on Networking, Sensing and Control*. 2019.
- Sagar Shelke and **Baris Aksanli**. Static and Dynamic Activity Detection with Ambient Sensors in Smart Spaces. *MDPI Sensors*. 2019.
- Alice Sokolova and **Baris Aksanli**. Demographical Energy Usage Analysis of Residential Buildings. *ASME Journal of Energy Resources Technology*. 2019.
- Aniruddha Patel, Chinmay Prabhudesai, **Baris Aksanli**. Non-Intrusive Activity Detection and Prediction in Smart Residential Spaces. *IEEE Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)*. 2018. **(Best paper award)**
- Neha Avinash Belapurkar, Sagar Shelke, **Baris Aksanli**. The Case for Ambient Sensing for Human Activity Detection. *International Workshop on Human-in-the-loop Internet of Things Systems (Hil-IoT) in conjunction with the International Conference on the Internet of Things (IoT)*. 2018.
- Neha Avinash Belapurkar and **Baris Aksanli**. Energy-Efficient Human Activity Detection in Smart Spaces. *16th ACM International Symposium on Mobility Management and Wireless Access (MobiWac)* 2018.
- Christine S. Chan, Alper Sinan Akyurek, **Baris Aksanli**, and Tajana Rosing. Optimal Performance-Aware Cooling on Enterprise Servers. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*. 2018.
- Neha Avinash Belapurkar, Jacob Harbour, Sagar Shelke, **Baris Aksanli**. Building Data-Aware and Energy-Efficient Smart Spaces. *IEEE Internet of Things Journal Special Issue on Internet of Things for Smart & Sensing Systems: Issues, trends and applications*. 2018.
- Sagar Shelke, Jacob Harbour, **Baris Aksanli**. Building an Intelligent and Efficient Smart Space to Detect Human Behavior in Common Areas. *IEEE International Symposium on Networks, Computers and Communications (ISNCC)*.

2018.

- Alice Sokolova and **Baris Aksanli**. Demographical Energy Usage Analysis of Residential Buildings. *ASME Power & Energy Conference*. 2018. **(Best paper nominee)**
- **Baris Aksanli**. Accurate and Data-Limited Prediction for Smart Home Energy Management. *ASME Power & Energy Conference*. 2018.
- Jagannathan Venkatesh, **Baris Aksanli**, Christine S. Chan, Alper Sinan Akyurek, Tajana Simunic Rosing. Modular and Personalized Smart Health Application Design in a Smart City Environment. *IEEE Internet of Things Journal Special Issue on Internet of Things for Smart Cities*. 2017.
- **Baris Aksanli**. Datacenter Peak Power Management with Energy Storage Devices. *IEEE Internet Computing Special Issue on Energy Efficient Data Centers*. 2017.
- **Baris Aksanli** and Tajana S. Rosing. Human Behavior Aware Energy Management in Residential Cyber-Physical Systems. *IEEE Transactions on Emerging Topics in Computing Special Issue on Cyber-Physical Social Systems: Integrating Human into Computing*. 2017.
- **Baris Aksanli**, Jagannathan Venkatesh, Christine Chan, Alper S. Akyurek, Tajana S. Rosing. Context-Aware and User-Centric Residential Energy Management. *International Workshop on Mobile and Pervasive Internet of Things'17 – in conjunction with IEEE International Conference on Pervasive Computing and Communication*, 2017.
- Nima Mousavi, **Baris Aksanli**, Alper S. Akyurek, Tajana S. Rosing. Accuracy-Resource Tradeoff for Edge Devices in Internet of Things. *International Workshop on Smart Edge Computing and Networking (SmartEdge'17) – in conjunction with IEEE International Conference on Pervasive Computing and Communication*, 2017.
- Jagannathan Venkatesh, **Baris Aksanli**, Christine Chan, Alper S. Akyurek and Tajana Rosing. Scalable Application Design for the Internet of Things. *IEEE Software Special Issue on Software Engineering for the Internet of Things*, 2017.
- Akanksha Maurya, Alper Sinan Akyurek, **Baris Aksanli** and Tajana Rosing. Time-Series Clustering for Data Analysis in Smart Grid. *International Conference on Smart Grid Communications (SmartGridComm)*, 2016.
- **Baris Aksanli**, Alper Sinan Akyurek and Tajana Rosing. User Behavior Modeling for Estimating Residential Energy Consumption. *EAI International Conference on Smart Grids for Smart Cities*, 2015.
- **Baris Aksanli**, Alper Sinan Akyurek and Tajana Rosing. Minimizing the Effects of Data Centers on Grid Instability. *International Green and Sustainable Computing Conference (IGSC)*, 2015.
- Alper Sinan Akyurek, **Baris Aksanli** and Tajana Rosing. S²Sim: Smart Grid Swarm Simulator. *International Green and Sustainable Computing Conference (IGSC)*, 2015.
- **Baris Aksanli**, Jagannathan Venkatesh, Tajana Rosing, and Inder Monga. Renewable Energy Prediction for Improved Utilization and Efficiency in Datacenters and Backbone Networks. *Computational Sustainability, Springer*. 2015 (book chapter).
- **Baris Aksanli**, Alper Sinan Akyurek, Madhur Behl, Meghan Clark, Alexandre Donze, Prabal Dutta, Patrick Lazik, Mehdi Maasoumy, Rahul Mangharam, Truong X. Nghiem, Vasumathi Raman, Anthony Rowe, Alberto Sangiovanni-Vincentelli, Sanjit A. Seshia, Tajana Simunic Rosing, Jagannathan Venkatesh. Distributed Control of a Swarm of Buildings Connected to a Smart Grid. *1st ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys)*, 2014 (Demo paper).
- **Baris Aksanli** and Tajana Rosing. Energy Management and Cost Analysis in Residential Houses using Batteries. *SRC TECHCON*, 2014.
- **Baris Aksanli** and Tajana Rosing. Providing Regulation Services and Managing Data Center Peak Power Budgets. *Design, Automation and Test in Europe (DATE)*. 2014.
- **Baris Aksanli** and Tajana Rosing. Optimal Battery Configuration in a Residential Home with Time-of-Use Pricing. *International Conference on Smart Grid Communications (SmartGridComm)*, 2013.
- **Baris Aksanli**, Eddie Pettis, and Tajana Rosing. Architecting Efficient Peak Power Shaving Using Batteries in Data Centers. *International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS)*, 2013.
- **Baris Aksanli**, Eddie Pettis, and Tajana Rosing. Distributed Battery Control for Peak Power Shaving in Data Centers. *International Green Computing Conference (IGCC)* 2013.
- **Baris Aksanli**, Jagannathan Venkatesh, Tajana Rosing, and Inder Monga. A Comprehensive Approach to Reduce the Energy Cost of Network of Datacenters. *International Symposium on Computers and Communications (ISCC)*, 2013. **(Best Student Paper)**
- Jagannathan Venkatesh, **Baris Aksanli**, Tajana Rosing, Jean-Claude Junqua, and Philippe Morin. HomeSim: Comprehensive, Smart, Residential Energy Simulation and Scheduling. *International Green Computing Conference (IGCC)*, 2013.
- Jagannathan Venkatesh, **Baris Aksanli**, and Tajana Rosing. Residential Energy Simulation and Scheduling: A Case Study Approach. *International Symposium on Computers and Communications (ISCC)*, 2013.
- **Baris Aksanli**, Jagannathan Venkatesh, and Tajana Rosing. Datacenter Modeling and Simulation with Focus on Energy Efficiency and Green Energy Integration. *IEEE Computer Special Issue on Modeling and Simulation of Smart and Green Computing Systems*, 2012.
- Vasileios Kontorinis, Liuyi Zhang, **Baris Aksanli**, Jack Sampson, Houman Homayoun, Dean Tullsen, Tajana Rosing, Eddie Pettis. Managing Distributed UPS Energy for Effective Power Capping in Data Centers. *International*

Symposium on Computer Architecture (ISCA). 2012.

- **Baris Aksanli**, Tajana Rosing, and Inder Monga. Benefits of Green Energy and Proportionality in High Speed Wide Area Networks Connecting Data Centers. *Design, Automation and Test in Europe (DATE)*. 2012.
- **Baris Aksanli**, Jagannathan Venkatesh, Liuyi Zhang, and Tajana Rosing. Utilizing Green Energy Prediction to Schedule Mixed Batch and Service Jobs in Data Centers. *Workshop on Power Aware Computing and Systems (HotPower)*, 2011. (**Best of HotPower**)
- Alper Sen, **Baris Aksanli**, and Murat Bozkurt. Speeding up Cycle- Based Logic Simulation using Graphics Units. *International Journal of Parallel Programming (IJPP)*, 2011.
- Alper Sen, **Baris Aksanli**, and Murat Bozkurt. Using Graphics Processing Units for Logic Simulation of Electronic Designs. International Workshop on Microprocessor Test and Verification (MTV), 2010.
- Alper Sen, **Baris Aksanli**, Murat Bozkurt, and Melih Mert. Parallel Cycle Base Logic Simulation using Graphics Processing Units. *International Symposium on Parallel and Distributed Computing (ISPD)*, 2010.

Academic Service

- **Journal Reviews**

- IEEE Computer
 - IEEE Transactions on Parallel and Distributed Systems
 - IEEE Transactions on Computers
 - IEEE Transactions on Computer Aided Design of Integrated Circuits and Systems
 - IEEE Journal on Selected Areas in Communication - Series on "Green Communications and Networking"
 - IEEE Communication Letters
 - IEEE Internet of Things Journal
 - IEEE Cloud Computing
 - IEEE/ACM Transactions on Networking
 - IEEE Transactions on Network and Service Management
 - IEEE Transactions on Automation Science and Engineering
 - IEEE Wireless Communications Magazine
 - MDPI Sensors
 - MDPI Electronics
 - MDPI Energies
 - MDPI Applied Sciences
 - MDPI Sustainability
 - MDPI Symmetry
 - Elsevier Journal of Network and Computer Applications
 - Elsevier Parallel Computing
 - Elsevier Journal of Cleaner Production
 - Elsevier Simulation, Modeling, Practice and Theory
 - Elsevier Future Generation of Computer Systems
 - Elsevier Applied Energy
 - Springer Journal of Ambient Intelligence and Humanized Computing
 - PLOS ONE
 - Journal of Computer Science and Technology
- **Technical Committee Member** – DATE 2017, ICCCN 2017, PerIoT 2018, IARIA Energy 2018, IARIA DBKDA 2018, IEEE MCSoc 2018, IARIA ACCSE 2018, IEEE MCSoc 2018, IEEE StITC 2019, IEEE BHI 2019
 - **Local Organizing Committee** – IEEE ICRERA 2017
 - **Committee Chair** – DATE 2018 (Co-chair of A1 Track), DATE 2019 (Co-chair of A1 Track), ISNCC 2019 (Co-chair of IoE, Data Analytics and Smart Cities Track)
 - **Organizer** – 1st Workshop on Human-in-the-loop Internet of Things Systems 2018 (Hil-IoT 2018)
 - **External Reviewer** – EuroSys'14, HPCA'14, ASPLOS'13, IGCC'12, DATE'13, ISLPED'12, ICCAD'12, SECON'13, IGCC'14, DATE'15, ISCA'15, ICDCS'15, ISCC'15, IEEE LCN'15, ICDCS'16.
 - NSF Panelist 2018.
 - Graduate Student Researcher in Multi Scale Systems Center (MuSyC), 2010-2012
 - Graduate Student Researcher/Postdoctoral Researcher in TerraSwarm Research Center, 2012-2016
 - UCSD CSE Department Master Admissions Committee Member, 2015 and 2016