

Dr. Alper Sinan Akyürek

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Education

Ph.D. Electrical and Computer Engineering, University of California, San Diego, 2017.

M.Sc. Electrical and Electronics Engineering, Middle East Technical University, 2011.

B.Sc. Electrical and Electronics Engineering, Middle East Technical University, 2008.

Experience

Postdoctoral Researcher - UCSD 2017 - Present I am working as a Postdoctoral Researcher with Prof. Tajana Rosing on energy efficient, reliability-aware, distributed, optimal control algorithms in the Internet of Things. My current topics are in the Smart Grid, communication and health ecosystems of the IoT.

Graduate Student Researcher - UCSD 2012 - 2017 I worked as a Ph.D. student on the area of distributed control and optimization in energy efficiency, with smart grid as the application field. My current focus is on the integration of renewable energy resources and the optimal usage of batteries or battery arrays in every scale ranging from homes to neighborhoods or microgrids. My research deals with negligible model nonlinearities that cause significant control errors due to cumulative effects in time. My main research was on the distributed optimal control of batteries within the grid to maintain stability and maximize overall welfare.

Internship - Texas Instruments 2014 I worked with the Smart Net team on Wireless Sensor Networks, specifically the MAC and Network layers. My responsibility involved developing novel algorithms to optimize performance on IEEE 802.15.4 and IP levels, and then implementing them on embedded platforms using C++. My novel work resulted in 3 patent applications in 3 months.

Senior R&D Engineer - Aselsan Inc. 2007-2012. I worked as a Software Development and Communication System Design Engineer for 5 years. I was part of the R&D team for communication system and protocol design of different kinds of systems with different requirements and environments. These systems include Wireless Ad-Hoc Networks and Satellite Communications. I developed/participated in the development of novel algorithms for Medium Access Control, Switching Problem, Resource Allocation, Routing Solutions (unicast and multicast), Flow Control and Upper-Layer Coding. I have also worked on the embedded software design and implementation team, using both C and C++ languages to implement the novel algorithms developed in the R&D phase. My work included both practical and theoretical design and I published 3 academic papers on my work during this time.

Internship - Netas/Nortel 2007 My main internship topic was on Bridging protocols and standards.

Internship - Aselsan 2006 My main internship topic was on project management, system level engineering management and testing.

Research Interests

Reliability-aware Control in the Internet of Things
User Behavior Modeling in the Internet of Things
Optimal Distributed Control in Smart Grid
Optimal Distributed Nonlinear Battery Control
Integration and forecasting of Renewable Resources
In-network Packet Aggregation, Resource Allocation
Mobile Ad Hoc Wireless Networks, Wireless Sensor Networks
Multicast Routing, Medium Access Control, Satellite Communication Protocols

Technical Skills

C/C++/MATLAB Programming Languages for programming and simulations
OpenDSS for Grid Simulations
Latex/Microsoft Office/Microsoft Visio Productivity Tools
Wireshark Analysis Tool
SDL/Rhapsody Software Development Tools
Visual Studio/Borland C++ Builder/CodeGear C++ Builder RAD Tools I developed many small/medium sized simulation applications and software tools for analysis and automatic code generation.
ns2/ns3 Network Simulation Tools I used, especially ns3 for network protocol simulations. I have implemented some protocols (MAC and Routing protocols) in ns3 to simulate their performances, thus I have detailed information about how to use the simulation suite.

Awards and Other Experiences

Qualcomm Fellow-Mentor-Advisor (FMA) Fellowship I received a one year fellowship award from Qualcomm, where we developed a neighborhood energy simulation tool to study the stability effects of distributed control algorithms.

Summer Advising for Undergraduate Student I was the mentor for a California Louis Stokes Alliance for Minority Participation (CAMP) in Science, Engineering and Mathematics undergraduate student. We tackled a real-life research problem on applying clustering algorithms in a hierarchical fashion to reduce complexity.

TerraSwarm Research Center I have conducted research under the TerraSwarm research center for 3 years on distributed control. TerraSwarm is a multi-university research center working on the pervasive integration of smart, networked sensors and actuators into our connected world.

Language Skills

Turkish, Fluent (Mother Tongue)
English, Fluent
German, Intermediate

Publications

Journal Articles

- A. Sinan Akyurek and Tajana Simunic Rosing, "Optimal Packet Aggregation in Wireless Networks", IEEE Transactions on Mobile Computing (under review)
- A. Sinan Akyurek and Tajana Simunic Rosing, "Optimal Distributed Nonlinear Battery Control", IEEE Journal of Emerging and Selected Topics in Power Engineering, 2016
- Jinseok Yang, A. Sinan Akyurek, Sameer Tilak and Tajana S. Rosing, "Design of transmission manager in heterogeneous WSNs", IEEE Transactions on Emerging Topics in Computing 2016
- Jagannathan Venkatesh, Baris Aksanli, Christine Chan, A. Sinan Akyurek, Tajana S. Rosing, "Scalable IoT Application Design for Automated Learning", IEEE Software 2016
- A. Sinan Akyurek and Elif Uysal-Biyikoglu, "A Depth-Optimal Low Complexity Distributed Wireless Multicast Algorithm", The Computer Journal 2011

Conference Papers

- Baris Aksanli, Jagannathan Venkatesh, Christine Chan, Alper S. Akyurek, Tajana S. Rosing, "Context-Aware and User-Centric Residential Energy Management", Percom 2017
- Nima Mousavi, Baris Aksanli, Alper S. Akyurek, Tajana S. Rosing, "Accuracy-Resource tradeoff for Edge Devices in Internet of Things", SmartEdge 2017
- Akanksha Maurya, Alper S. Akyurek, Tajana S. Rosing, "Time-Series Clustering for Data Analysis in Smart Grid", IEEE SmartGridComm 2016
- A. Sinan Akyurek, Tajana S. Rosing, "Optimal In-Network Packet Aggregation Policy for Maximum Information Freshness", European Conference on Networks and Communications (EuCNC) 2016
- Jagannathan Venkatesh, Christine Chan, Alper S. Akyurek, Tajana S. Rosing, "A Modular Approach to Context-Aware IoT Applications", IEEE International Conference on Internet-of-Things Design and Implementation (IoTDI) 2016
- A. Sinan Akyurek, Baris Aksanli, Tajana S. Rosing, "S2Sim: Smart Grid Swarm Simulator", International Green and Sustainable Computing Conference (IGSC) 2015
- Jagannathan Venkatesh, Christine Chan, Alper S. Akyurek, Tajana S. Rosing, "A Context-Driven IoT Middleware Architecture", TechCon 2015
- Christine Chan, Alper S. Akyurek, Kalyan Vaidyanathan, Kenny Gross, Tajana S. Rosing, "Optimization of Energy, Cooling and IO Performance for Data-intensive Applications on Enterprise Servers", TechCon 2015
- Baris Aksanli, Alper S. Akyurek, Tajana S. Rosing, "User Behavior Modeling for Estimating Residential Energy Consumption", EAI International Conference on Smart Grids for Smart Cities 2015
- Baris Aksanli, Alper S. Akyurek, Tajana S. Rosing, "Minimizing the Effects of Data Centers on Microgrid Instability", International Green and Sustainable Computing Conference (IGSC) 2015
- Henrique Rodrigues, Richard Strong, A. Sinan Akyurek, Tajana S. Rosing, "Dynamic Optical Switching for Latency", ACM/IEEE International Symposium on Architectures for Networking and Communication Systems (ANCS) 2015
- B. Ozge Akyurek, A. Sinan Akyurek, Jan Kleissl, Tajana S. Rosing, "TESLA: Taylor Expanded Solar Analog Forecasting", IEEE SmartGridComm 2014
- Baris Aksanli, Alper S. Akyurek, et. al, "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

A. Sinan Akyurek, Bill Torre, Tajana S. Rosing, "ECO-DAC: Energy Control Over Divide And Control", IEEE SmartGridComm 2013

A. Sinan Akyurek and Elif Uysal-Biyikoglu, "A Low Complexity Distributed Algorithm for Computing Minimum-Depth Multicast Trees in Wireless Networks", MILCOM 2010

A. Sinan Akyurek and Elif Uysal-Biyikoglu, "Kablosuz Aglarda Cogagonderim icin Yeni bir Yol Atama Algoritmasi", IEEE SIU 2008

Patents

Alper S. Akyurek, Ariton Xhafa, Jianwei Zhou, Ramanuja Vedantham, "System and method for distributed scheduling of resources", US Patent App. 15/054,508

Alper S. Akyurek, Ariton Xhafa, Jianwei Zhou, Ramanuja Vedantham, "Address Generation for Networks", US Patent 20,160,087,936

Alper S. Akyurek, Ariton Xhafa, Jianwei Zhou, Ramanuja Vedantham, "Compression of Internet Protocol Version 6 Addresses in Wireless Sensor Networks", US Patent 20,160,088,517

Program Committees and Reviewer Duties

International Conference on Computer Communication and Networks (PC Member)

Renewable and Sustainable Energy

IEEE Communications Magazine

IEEE Transactions on Wireless Communications

IEEE Transactions on Smart Grid

IEEE International Conference on Distributed Computing Systems

Design Automation and Test in Europe

ACM International Conference on Systems for Energy-Efficient Built Environments

Personal Interests

I love basketball, SciFi Novels, Digital Photography, Musical Composing, Ice-skating and bowling. I play the piano, guitar, flute, ney and violin. I am proud to be an Argentine Tango dancer.