SAAD AHMED

Curriculum Vitae

Technology Square Research Building
School of Interactive Computing, Atlanta, GA
(+1) 7738238029
sahmed@gatech.edu
https://www.saadahmedch.com
Github *Linkedin*

Research Interest

I work towards building a sustainable future for computing by providing system support for battery-less embedded devices. My research revolves around developing compiler and run-time techniques to enable long-running and computationally complex applications on embedded devices powered by harvested energy. I apply my work to mobile health as well as to enable novices and hobbyists in designing applications for energy harvesting devices. My research interests also include wearable computing, low-power wireless sensors, and computer architecture.

I have published in 8 A*/A conferences (according to CORE rankings) such as UbiComp(2x), SenSys, IPSN, EuroSys, EWSN, LCTES (2x), and top computing journal such a TECS and TCPS. My work has been covered by top media outlets such as Scientific American, TechCrunch, Gizmodo, Forbes and the ACM Tech News.

Education

2016–2020 **PhD, Computer Science**, *LUMS School of Science and Engineering*, Pakistan.
Advisor: Dr. Muhammad Hamad Alizai
Dissertation: *Fast and Energy-efficient Intermittent Computing*

2014–2016 **MS, Computer Science**, *LUMS School of Science and Engineering*, Pakistan.
Advisor: Dr. Asim Karim

2009–2013 **BS, Computer Science**, *National University of Computer and Emerging Sciences*, Pakistan.
Advisor: Dr. Fakhar-ul-Islam Lodhi
Project: *PL/SQL to MySQL Conversion*
Bronze Medal: Among top 2% in a batch of 200 students

Selected Five Publications

EuroSys'23 **Efficient and Safe I/O Operations for Intermittent Systems**.
Eren Yildiz, Saad Ahmed, Bashima Islam, Josiah Hester, Kasim Sinan Yildirim
To appear in European Conference on Computer Systems (EuroSys'23)
Acceptance rate = 14%

SenSys'22 **Protean: Adaptive Battery-free Computing Platform**.
Abu Bakar, Rishabh Goel, Jasper de Winkel, Jason Huang, Saad Ahmed, Bashima Islam, Przemysław Pawełczak, Kasım Sinan Yıldırım, Josiah Hester
InACM Conference on Embedded Networked Sensor Systems (SenSys'22)
ACM SIGMOBILE Research highlight

UbiComp'22 **Battery-free MakeCode: Accessible Programming for Intermittent Computing**.
Chris Kraemer, Amy Guo, Saad Ahmed, Josiah Hester
ACM Conference on Pervasive and Ubiquitous Computing (UbiComp'22)
Published in PACM IMWUT, Volume 5, Issue 4
Covered by ACM Tech News

UbiComp'22 **FaceBit: Smart Facemask Platform**.
Alexander Curtiss, Blaine Rothrock, Abu Bakar, Nivedita Arora, Jason Huang, Zachary Englehardt, Aaron-Patrick Empedrado, Chixiang Wang, Saad Ahmed, Yang Zhang, Nabil Alshurafa, Josiah Hester
ACM Conference on Pervasive and Ubiquitous Computing (UbiComp'22)
Published in PACM IMWUT, Volume 5, Issue 4
Fast Company's Innovation by Design Award Finalist
Covered by Top media outlets including Scientific American, TechCrunch, Forbes, Gizmodo and many more.

EWSN'20 **Intermittent Computing with Dynamic Voltage and Frequency Scaling**.
Saad Ahmed, Qurat-u-Ain, Junaid Haroon Siddiqui, Luca Mottola, Muhammad Hamad Alizai
International Conference on Embedded Wireless Systems and Networks (EWSN'20)
Best Paper Nominee

ACM TCPS **ASHRAY: Enhancing Water-usage Comfort in Developing Regions using Data-driven IoT Retrofits**.
Samar Abbas, Ahmed Ehsan, Saad Ahmed, Sheraz Ali Khan, Tariq Muhammad Jadoon, Muhammad Hamad Alizai
ACM Transactions on Cyber-Physical Systems (ACM TCPS)

Academic Achievements & Recognitions

2023 Nomination for the College of Computing Postdoctoral Researcher Award
2022 SuperSensor got selected for the **ACM SIGMOBILE Research Highlight**
2022 FaceBit was the **Fast Company's Innovation by Design Award Finalist**
2021 Selection for the prestigious **Alexandar Von Humboldt** postdoctoral fellowship, Germany.
2020 D^2VFS nominated for **Best Paper Award** nominated at EWSN
2017 **First position** in Intermittent Computing Hackathon at IDEA League Doctoral School
2013 **Bronze Medal**, Faculty of Computing, NUCES, Pakistan
2010-12 **Dean's Honor List**, Faculty of Computing, NUCES, Pakistan
2013 Final Year Project among **top 10%**, Faculty of Computing, NUCES
2010 Merit Based Selection for visiting UK's & EU's Top Universities, Govt. Of Punjab, Pakistan
2009-13 National Talent Scholarship, Govt. Of Punjab, Pakistan
2009 Academic Roll of Honour, Govt. College University Lahore, Pakistan
2009 **Gold Medal**, Higher Secondary School Exam, Pakistan

Research Impact

8 peer-reviewed conference papers (all of them are A or A* conferences as per CORE 2018 Conference Ranking)

3 peer-reviewed papers in ACM Transactions journals **2** refereed poster abstracts

Professional Experience

Georgia Institute of Technology, USA

Oct 2022 – Present
Postdoctoral Scholar
Mentor: Dr. Josiah Hester.

Northwestern University, USA

Dec 2020 – Sep 2022
Postdoctoral Scholar
Mentor: Dr. Josiah Hester.

Techlogix Inc., Pakistan

May 2013 – Nov 2014
Software Engineer.

Research Experience

LUMS School of Science and Engineering, Pakistan

May 2020 – Nov 2020
Research Associate
Advisor: Dr. Muhammad Hamad Alizai.

May 2016 – Nov 2020
Graduate Research Assistant
Advisor: Dr. Muhammad Hamad Alizai.

RWTH Aachen, Germany

July 2016, Aug 2017
Visiting Researcher
Host: Dr. Klause Wehrle.

LUMS School of Science and Engineering, Pakistan

Jan 2016 - Aug 2016
Research Assistant
Advisor: Dr. Muhammad Hamad Alizai.

Community Service

Peer Review

Feb. 2023
Ad Hoc Networks

Oct. 2022 Journal of Systems Architecture
March. 2021 Ad Hoc Networks
Oct. 2020 IEEE Transactions on Mobile Computing
July 2020 ACM Transactions on Sensor Networks
Oct. 2019 International Journal of Computer and Telecommunications Networking
Sept. 2019 IEEE International Conference on Parallel and Distributed Systems (ICPADS)

Undergraduate Research

July 2022 Judge for the undergraduate research expo, Northwestern University

Talks

Nov-2020 Fast and Energy-efficient Intermittent Computing,
University of Southampton, UK

Nov-2020 Fast and Energy-efficient Intermittent Computing,
KTH Royal Institute of Technology, Stockholm, Sweden

Feb-2020 Intermittent Computing with Dynamic Voltage and Frequency Scaling,
EWSN, Lyon, France

June-2019 Differential Checkpointing for Intermittent Programs,
LCTES, Phoenix AZ, USA

June-2019 Finding the Missing Joules of Transiently-powered Computers,
LCTES, Phoenix AZ, USA

Aug-2016 Incremental Checkpoints for Interruptible Computations,
RWTH Aachen, Aachen, Germany

Fellowships & Grants

2021 Alexander Von Humboldt Research Fellowship (Selection), Germany
2020 National Data Center Travel Grant to attend EWSN, LUMS
2019 Student Travel Grant worth to attend LCTES, LUMS
2018 CPS Week Travel Grant to attend IPSN, CPS Week
2017 Travel Grant to attend Doctoral Colloquium at RWTH Aachen, DAAD
2016 Travel Grant to attend Doctoral Colloquium at RWTH Aachen, DAAD

Publications

In Preparation

P2 **Batteryless Health Sensing powered by Intra-body Power Transfer**.
Saad Ahmed, Eren Yildiz, Bashima Islam, Kasim Sinan Yildirim, Josiah Hester

P1 **Data Cache for Intermittent Computing Systems with Non-Volatile Main Memory**.
Vito Kortbeek, Sourav Mohapatra, Saad Ahmed, Przemysław Pawełczak

In Conference Proceedings

C8 **Efficient and Safe I/O Operations for Intermittent Systems**.
Eren Yildiz, Saad Ahmed, Bashima Islam, Josiah Hester, Kasim Sinan Yildirim
To appear in European Conference on Computer Systems (EuroSys'23)
Acceptance rate = 14%

C7 **Protean: Adaptive Battery-free Computing Platform**.
Abu Bakar, Rishabh Goel, Jasper de Winkel, Jason Huang, Saad Ahmed, Bashima Islam, Przemysław Pawełczak, Kasım Sinan Yıldırım, Josiah Hester
In ACM Conference on Embedded Networked Sensor Systems (SenSys'22)
ACM SIGMOBILE Research highlight

C6 **Battery-free MakeCode: Accessible Programming for Intermittent Computing**.
Chris Kraemer, Amy Guo, Saad Ahmed, Josiah Hester
ACM Conference on Pervasive and Ubiquitous Computing (UbiComp'22)
Published in PACM IMWUT, Volume 5, Issue 4
Covered by ACM Tech News

C5 **FaceBit: Smart Facemask Platform**.
Alexander Curtiss, Blaine Rothrock, Abu Bakar, Nivedita Arora, Jason Huang, Zachary Englehardt, Aaron-Patrick Empedrado, Chixiang Wang, Saad Ahmed, Yang Zhang, Nabil Alshurafa, Josiah Hester
ACM Conference on Pervasive and Ubiquitous Computing (UbiComp'22)
Published in PACM IMWUT, Volume 5, Issue 4
Fast Company's Innovation by Design Award Finalist
Covered by Top media outlets including Scientific American, TechCrunch, Forbes, Gizmodo and many more.

C4 **No-frills Water Comfort for Developing Regions**.
Samar Abbas, Ahmed Ehsan, Saad Ahmed, Sheraz Ali Khan, Tariq Muhammad Jadoon, Muhammad Hamad Alizai
International Conference on Information Processing in Sensor Networks (IPSN'20)

C3 **Intermittent Computing with Dynamic Voltage and Frequency Scaling**.
Saad Ahmed, Qurat-u-Ain, Junaid Haroon Siddiqui, Luca Mottola, Muhammad Hamad Alizai
International Conference on Embedded Wireless Systems and Networks (EWSN'20)
🏆 **Best Paper Nominee**

C2 **The betrayal of constant power× time: Finding the missing joules of transiently-powered computers**.
Saad Ahmed, Abu Bakar, Naveed Anwar Bhatti, Muhammad Hamad Alizai, Junaid Haroon Siddiqui, Luca Mottola
Proceedings of the 20th ACM SIGPLAN/SIGBED International Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES'19)

C1 **Efficient intermittent computing with differential checkpointing**.
Saad Ahmed, Naveed Anwar Bhatti, Muhammad Hamad Alizai, Junaid Haroon Siddiqui, Luca Mottola
Proceedings of the 20th ACM SIGPLAN/SIGBED International Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES'19)

Journal Articles

J3 **ASHRAY: Enhancing Water-usage Comfort in Developing Regions using Data-driven IoT Retrofits**.
Samar Abbas, Ahmed Ehsan, Saad Ahmed, Sheraz Ali Khan, Tariq Muhammad Jadoon, Muhammad Hamad Alizai
ACM Transactions on Cyber-Physical Systems (TCPS)

J2 **Fast and Energy-efficient State Checkpointing for Intermittent Computing**.
Saad Ahmed, Naveed Anwar Bhatti, Muhammad Hamad Alizai, Junaid Haroon Siddiqui, Luca Mottola
ACM Transactions on Embedded Computing Systems (TECS)

J1 **Demystifying Energy Consumption Dynamics in Transiently-powered Computers**.
Saad Ahmed, Muhammad Nawaz, Abu Bakar, Naveed Anwar Bhatti, Muhammad Hamad Alizai, Junaid Haroon Siddiqui, Luca Mottola
ACM Transactions on Embedded Computing Systems (TECS)

Workshops, Posters & Demos

W3 **Towards smaller checkpoints for better intermittent computing**.
Saad Ahmed, Muhammad Hamad Alizai, Junaid Haroon Siddiqui, Naveed Anwar Bhatti, Luca Mottola
17th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN'18)

W2 **Incremental Checkpointing Techniques for Transiently Powered Computers**.
Saad Ahmed
Doctoral School on Transiently Powered Computing-Collocated with SenSys'17

W1 **Incremental checkpointing for interruptible computations**.
Saad Ahmed, Muhammad Hamad Alizai, Junaid Haroon Siddiqui, Naveed Anwar Bhatti, Luca Mottola
Proceedings of the 14th ACM Conference on Embedded Network Sensor Systems (SenSys'16)

Teaching Experience

Spring, 2022 : **Internet-of-things**, *Co-Instructor*, Northwestern University.
Fall, 2020 : **Introduction to Internet of Things**, *Co-Instructor*, LUMS.
Fall, 2018 : **Internet of Things**, *Teaching Assistant*, LUMS.
Fall, 2014 : **Operating Systems**, *Teaching Assistant*, NUCES.
Spring, 2014 : **Operating Systems**, *Lab Instructor*, NUCES.
Operating Systems, *Teaching Assistant*, NUCES.
Fall, 2013 : **Operating Systems**, *Teaching Assistant*, NUCES.
Fall, 2013 : **Operating Systems**, *Teaching Assistant*, NUCES.
Operating Systems, *Lab Instructor*, NUCES.

Student Mentorship

2022-2023 **Eren Yildiz**, *Kamoamoa's Visiting Student*, **Ege University Turkey** .
2019-2020 **Qurat-ul-Ain**, *MS-Thesis*, LUMS.
2018-2019 **Muhamamd Nawaz**, *Research Assistant*, LUMS, Software Engineer-**SIEMENS**.
2017-2018 **Abu Bakar**, *Research Assistant*, LUMS, **PhD candidate at Georgia Institue of Technology**.
2016-2017 **Hassan Ali Khan**, *MS-Thesis*, LUMS, **PhD student at NC State University**.
2016-2017 **Ans Fida**, *UG*, LUMS, Senior MTS-**SalesForce**.
2016-2017 **Kamran Khalil**, *UG*, LUMS, **Ph.D. Purdue University**.
2016-2017 **Natasha Khan**, *MS-Thesis*, LUMS, Software Engineer-**CERN**.

Referees

Dr. Muhammad Hamad Alizai
Associate Professor,
Department of Computer Science
LUMS, Pakistan
✉ hamad.alizai@lums.edu.pk

Dr. Junaid Haroon Siddiqui
Associate Professor,
Department of Computer Science
LUMS, Pakistan
✉ junaid.siddiqui@lums.edu.pk

Dr. Luca Mottola
Associate Professor,
Dipartimento di Elettronica,
Politecnico di Milano, Italy
✉ luca.mottola@polimi.it

Dr. Bashima Islam
Assistant Professor,
School of Science and Engineering
Worcester Polytechnic Institute
✉ bislam@wpi.edu

Dr. Kasim Sinan
Associate Professor,
Department of Computer Science
University of Trento, Italy
✉ kasimsinan.yildirim@unitn.it

Dr. Josiah Hester
Associate Professor,
School of Interactive Computing
Georgia Institute of Technology, Atlanta, USA
✉ josiah@gatech.edu

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