

Research Interest

I work towards providing system support for battery-less embedded devices which will serve as a basic block in building a sustainable future for computing. I am broadly interested in wearable computing, low-power wireless sensors, and mobile health. My research revolves around compiler and run-time support to enable long-running and computationally complex application on embedded devices powered by harvested energy. I am also interested in enabling novices and hobbyists to play a crucial role in designing applications for energy harvesting devices. I am also interested in mobile health applications

I have published in 6 A*/A conferences (according to CORE rankings) such as Ubi-Comp(2x), IPSN, LCTES (2x), EWSN and top computing journal such as TECS and TCPS. My work has been covered by top media outlets such as Scientific American, TechCrunch, Gizmodo, Popular Science and the Makers Magazine.

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

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 Popular Science and the Makers Magazine

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

Covered by Top media outlets including Scientific American, TechCrunch, Gizmodo and more reaching more than million people

IPSN'20 **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)

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

2020 Paper nominated for Best Paper Award at EWSN

2017 First position in Intermittent Computing Hackathon at IDEA League Doctoral School

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

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

6 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

Northwestern University, USA

Dec 2020 – **Postdoctoral Scholar**

Present **Mentor: Dr. Josiah Hester.**

working on three different direction. building system support enabling novices and finding exciting application in mobile health.

Techlogix Inc., Pakistan

May 2013 – **Software Engineer.**

Nov 2014 Leading the development of system support and tools for intermittent computing

Research Experience

LUMS School of Science and Engineering, Pakistan

May 2020 – **Research Associate**

Nov 2020 **Advisor: Dr. Muhammad Hamad Alizai.**

Responsible for conducting teaching and guiding new PhD students.

May 2016 – **Graduate Research Assistant**

Nov 2020 **Advisor: Dr. Muhammad Hamad Alizai.**

Leading the development of system support and tools for intermittent computing

RWTH Aachen, Germany

July 2016, **Visiting Researcher**

Aug 2017 **Host: Dr. Klaus Wehrle.**

Incremental Checkpointing for interruptible computations

LUMS School of Science and Engineering, Pakistan

Jan 2016 - **Research Assistant**

Aug 2016 **Advisor: Dr. Muhammad Hamad Alizai.**

Compiler Support for code instrumentation for energy harvesting devices.

Community Service

Peer Review

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)

Talks

- 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-2020 Differential Checkpointing for Intermittent Programs,
LCTES, Phoenix AZ, USA.
- June-2020 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

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| 2021 | Alexander Von Humboldt Research Fellowship (Selection), Germany | \$72000 |
| 2020 | National Data Center Travel Grant to attend EWSN, LUMS | \$300 |
| 2019 | Student Travel Grant worth to attend LCTES, LUMS | \$1900 |
| 2018 | CPS Week Travel Grant to attend IPSN, CPS Week | \$1000 |
| 2017 | Travel Grant to attend Doctoral Colloquium at RWTH Aachen, DAAD | \$1700 |
| 2016 | Travel Grant to attend Doctoral Colloquium at RWTH Aachen, DAAD | \$1700 |

Publications

In Conference Proceedings

- 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 Popular Science and the Makers Magazine
- 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
Covered by Top media outlets including Scientific American, TechCrunch, Gizmodo and more reaching more than million people
- 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

- 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.

Referees

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Bioingegneria,
Politecnico di Milano, Italy*
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