Curriculum vitæ

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Areas of specialization

Improving the energy efficiency and sustainability of large-scale computing systems, e.g., edge, cloud, datacenters, and cyber-physical systems, e.g., electric grid.

Education

08/2016–02/2022	PhD in Computer Engineering, University of Massachusetts Amherst
09/2013–03/2016	MS Energy Systems Engineering, NUST, Islamabad, Pakistan
09/2009–05/2013	BS Electrical Engineering, UET, Lahore, Pakistan

Employment

02/2022–present	Postdoctoral Research Fellow at the **Laboratory for Advanced System Software (LASS)**, UMass Amherst, advised by Prashant Shenoy
09/2016–02/2022	Graduate Research Assistant, **Sustainable Computing Lab**, UMass Amherst, advised by David Irwin.
05/2021–08/2021	Student researcher at **VMware Research Group**. Hosted by Ben Pfaff and Victor Firoiu.
05/2020–11/2020	Student researcher on the **SysInfra/Borg team** at **Google**. Hosted by Nan Deng and Krzysztof Rzadca.
05/2015–06/2016	Research associate, **Advanced Communication Lab**, LUMS, Pakistan, advised by Naveed-ul-Hassan.
09/2013–05/2015	Research engineer, **Systems and Networks Lab**, NUCES, Pakistan, advised by Affan A. Syed.

Publications

Vision papers

[1] **Noman Bashir**, David Irwin, Prashant Shenoy, Abel Souza. *Sustainable Computing - Without the Hot Air*, The Inaugural Workshop on Sustainable Computer Systems Design and Implementation (**HotCarbon**), 2022.

[2] **Noman Bashir**, Tian Guo, Mohammad Hajiesmaili, David Irwin, Prashant Shenoy, Ramesh Sitaraman, Abel Souza, Adam Wierman. *Enabling Sustainable Clouds: The Case for Virtualizing the Energy System*, ACM Symposium on Cloud Computing (**SoCC**), 2021.

Conference papers

[3] **Noman Bashir**, Yasra Chandio, David Irwin, and Fatima M. Anwar, Jeremy Gummeson, Prashant Shenoy. *Jointly Managing Electrical and Thermal Energy in Solar- and Battery-powered Computer Systems*, ACM International Conference on Future Energy Systems (**e-Energy**), 2023.

[4] Adam Lechowicz, **Noman Bashir**, Mohammad Hajiesmaili, Prashant Shenoy. *Equitable Network-Aware Decarbonization of Residential Heating at City Scale*, ACM International Conference on Future Energy Systems (**e-Energy**), 2023.

[5] Priyanka Mary Mammen, **Noman Bashir**, Ramachandra Kolluri, Eun Kung Lee, Prashant Shenoy. *CUFF: A Configurable Uncertainty-driven Forecasting Framework for Green AI Clusters*, ACM International Conference on Future Energy Systems (**e-Energy**), 2023.

[6] Abel Souza, **Noman Bashir**, Jorge Murillo, Walid Hanafy, Qianlin Liang, David Irwin, Prashant Shenoy. *Ecovisor: A Virtual Energy System for Carbon-Efficient Applications*, The International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**), 2023.

[7] Qianlin Liang, **Noman Bashir**, Walid A. Hanafy, Ahmed Ali-Eldin, David Irwin, and Prashant Shenoy. *Dělen: Enabling Flexible and Adaptive Model-serving for Multi-tenant Edge AI*, IEEE/ACM Eighth International Conference on Internet-of-Things Design and Implementation (**IoTDI**), 2023.

[8] Talha Mehboob, **Noman Bashir**, Michael Zink, and David E. Irwin. *Is Sharing Caring? Analyzing the Incentives for Shared Cloud Clusters*, IEEE/SPEC International Conference on Performance Engineering (**ICPE**), 2023.

[9] John Wamburu, **Noman Bashir**, Emma Grazier, David Irwin, Christine Crago, Prashant Shenoy. *Equity-aware Decarbonization of Residential Heating Systems*, SIGEnergy Energy Informatics Review (**EIR**), 2023.

[10] John Wamburu, **Noman Bashir**, David Irwin, Prashant Shenoy. *Data-driven Decarbonization of Residential Heating Systems*, ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (**BuildSys**), 2022.

[11] Pradeep Ambati, **Noman Bashir**, David Irwin, Prashant Shenoy. *Good Things Come to Those Who Wait: Optimizing Job Waiting in the Cloud*, ACM Symposium on Cloud Computing (**SoCC**), 2021.

[12] **Noman Bashir**, Nan Deng, Krzysztof Rzadca, David Irwin, Sree Kodak, Rohit Jnagal. *Take it to the Limit: Prediction-Driven Resource Overcommitment in Datacenters*, ACM European Conference on Computer Systems (**EuroSys**), 2021, **Artifact Badges:** *Available*, *Functional*, and *Results Reproduced*.

[13] Pradeep Ambati, **Noman Bashir**, David Irwin, Prashant Shenoy. *Waiting Game: Optimally Provisioning Fixed Resources for Cloud-enabled Schedulers*, Supercomputing (**SC**) 2020, Best Paper Award Finalist and Best Student Paper Award Finalist.

[14] **Noman Bashir**, David Irwin, Prashant Shenoy. *DeepSnow: Modeling the Impact of Snow on Solar Generation*, ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (**BuildSys**), 2020.

[15] **Noman Bashir**, David Irwin, Prashant Shenoy. *A Probabilistic Approach to Committing Solar Energy in Day-ahead Electricity Markets*, International Green and Sustainable Computing Conference (**IGSC**), 2020.

[16] Santiago Correa, **Noman Bashir**, Andrew Tran, David Irwin, Jay Taneja. *Extend: A Framework for Increasing Energy Access by Interconnecting Solar Home Systems*, ACM SIGCAS Conference on Computing and Sustainable Societies (**COMPASS**), 2020.

[17] Menghong Feng, **Noman Bashir**, Prashant Shenoy, David Irwin, Dragoljub Kosanovic. *SunDown: Model-driven Per-Panel Solar Anomaly Detection for Residential Arrays*, ACM SIGCAS Conference on Computing and Sustainable Societies (**COMPASS**), 2020.

[18] Pradeep Ambati, **Noman Bashir**, Mohammad Hajiesmaili, David Irwin, Prashant Shenoy. *Hedge Your Bets: Optimizing Long-term Cloud Costs by Mixing VM Purchasing Options*, IEEE International Conference on Cloud Engineering (**IC2E**), 2020.

[19] **Noman Bashir**, Dong Chen, David Irwin, Prashant Shenoy. *Solar-TK: A Data-driven Toolkit for Solar PV Performance Modeling and Forecasting*, IEEE International Conference on Mobile Ad-Hoc and Smart Systems (**MASS**), 2019.

[20] Santiago Correa, **Noman Bashir**, Jesus Omana Iglesias, Candace Saffery, Jay Taneja. *Like a Good Neighbor, Solar is There*, The International Conference on Future Energy Systems (**e-Energy**), 2019.

[21] **Noman Bashir**, David Irwin, Prashant Shenoy. *Helios: A Programmable Software-defined Solar Module*, ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (**BuildSys**), 2018.

[22] **Noman Bashir**, David Irwin, Prashant Shenoy, Jay Taneja. *Enforcing Fair Grid Energy Access for Controllable Distributed Solar Capacity*, ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (**BuildSys**), 2017.

[23] **Noman Bashir**, Hira Shahzad Sardar, Mashood Nasir, Naveed Ul Hassan, Hassan A. Khan. *Lifetime Maximization of Lead-acid Batteries in Small Scale UPS and Distributed Generation Systems*, IEEE **PowerTech**, 2017.

[24] Aneeq Ur Rehman, **Noman Bashir**, Naveed Ul Hassan, Chau Yuen. *Impact of Home Appliances on the Performance of Narrow-band Power Line Communications for Smart Grid Applications*, IEEE Region Ten International Conference (**TenCon**), 2016.

[25] **Noman Bashir**, Zohaib Sharani, Khushboo Qayyum, and Affan A. Syed. *Delivering Smart Load-shedding for Highly-stressed Grids*, IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids (**SmartGridComm**), 2015.

Journal articles

[26] Pradeep Ambati, **Noman Bashir**, David Irwin, Prashant Shenoy. *Modeling and Analyzing Waiting Policies for Cloud-Enabled Schedulers*, IEEE Transactions on Parallel and Distributed Systems (**TPDS**), 2021.

[27] Menghong Feng, **Noman Bashir**, Prashant Shenoy, David Irwin, Dragoljub Kosanovic. *Model-driven Per-Panel Solar Anomaly Detection for Residential Arrays*, ACM Transactions on Cyber-Physical Systems (**TCPS**), 2021.

[28] **Noman Bashir**, David Irwin, Prashant Shenoy, Jay Taneja. *Mechanisms and Policies for Controlling Distributed Solar Capacity*, The ACM Transactions on Sensor Networks (**TOSN**), 2018.

Under-review

[29] Walid Hanafy, Qianlin Liang, **Noman Bashir**, David Irwin, Prashant Shenoy. *CarbonScale: Leveraging Scalability to Reduce Carbon Footprint*, under-review at ACM Special Interest Group on Measurement and Evaluation (**SIGMETRICS**), 2024.

[30] Adam Lechowicz, Nicolas Christianson, Jinhang Zuo, **Noman Bashir**, Mohammad Hajiesmaili, Adam Wierman, Prashant Shenoy. *The Online Pause and Resume Problem: Optimal Algorithms and An Application to Carbon-Aware Load Shifting*, under-review at ACM Special Interest Group on Measurement and Evaluation (**SIGMETRICS**), 2024.

[31] Thanathorn Sukprasert, Abel Souza, **Noman Bashir**, and David Irwin, Prashant Shenoy. *Quantifying the Benefits of Carbon-Aware Temporal and Spatial Workload Shifting in the Cloud*, under-review at The ACM Internet Measurement Conference (**IMC**), 2023.

[32] **Noman Bashir**, David Irwin, Prashant Shenoy. *On the Promise and Pitfalls of Optimizing Embodied Carbon*, under-review at The Workshop on Sustainable Computer Systems (**HotCarbon**), 2023.

[33] Walid Hanafy, Roozbeh Bostandoost, **Noman Bashir**, David Irwin, Mohammad Hajiesmaili, Prashant Shenoy. *The War of the Efficiencies: Understanding the Tension between Carbon and Energy Optimization*, under-review at The Workshop on Sustainable Computer Systems (**HotCarbon**), 2023.

[34] Xiaoding Guan, **Noman Bashir**, David Irwin, Prashant Shenoy. *Balance of Power: Non-Intrusive Energy Monitoring in Datacenters*, under-review at The International Symposium on Computer Performance, Modeling, Measurements and Evaluation (**Performance**), 2023.

[35] Yasra Chandio, **Noman Bashir**, Fatima Anwar. *Exploring Stealthy Multi-modal Attacks in Mixed Reality*, under-review at IEEE International Symposium on Mixed and Augmented Reality (**ISMAR**), 2023.

[36] Yasra Chandio, **Noman Bashir**, Fatima Anwar, Victoria Interrante. *Investigating the Correlation Between Presence and Reaction Time in Mixed Reality*, under-review at IEEE Transactions on Visualization and Computer Graphics (**TVCG**), 2023.

Workshop papers

[37] Yasra Chandio, **Noman Bashir**, Fatima Anwar. *HoloSet - A Dataset for Visual Inertial Odometry in Extended Reality*, The Data: Acquisition To Analysis (**DATA**), 2022.

Posters/demos (peer-reviewed)

[38] Santiago Correa, **Noman Bashir**, Jesus Omana Iglesias, Candace Saffery, Jay Taneja. *EXTEND: A Framework for Increasing Energy Access in Communities with Solar Home Systems*, ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS), 2019.

[39] **Noman Bashir**, Dong Chen, David Irwin, Prashant Shenoy. *Solar-TK: Solar Performance Modeling and Forecasting Toolkit*, ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys), 2019.

[40] Zohaib Sharani, **Noman Bashir**, Khushboo Qayyum, and Affan A. Syed. *Enabling Practical Demand Response in Highly-Stressed Grids using Aashiyana*, The International Conference on Future Energy Systems (e-Energy), 2015.

[41] Zohaib Sharani, Khushboo Qayyum, **Noman Bashir**, and Affan A. Syed. *SoftUPS: Eliminating the Need and Cost of Battery Backups*, The International Conference on Future Energy Systems (e-Energy), 2014.

Book chapters

[42] **Noman Bashir**, Naveed Ul Hassan, Chau Yuen, Wayes Tushar. *Smart-grid Communications and Standard*, in *IET Communication, Control and Security Challenges for the Smart Grid*, 2017.

Thesis

[43] **Noman Bashir**. *Improving the Programmability of Networked Energy Systems*, PhD thesis, University of Massachusetts Amherst, 2022.

[44] **Noman Bashir**. *Using Stressed Grids as a Storage Medium for Renewable Energy*, MSc thesis, National University of Science and Technology, Islamabad, 2016.

Academic honors

2023	Nominated for SIGEnergy Doctoral Dissertation Award.
2023	Best paper finalist at ACM/SPEC ICPE.
2020	Best student paper and best paper finalist at ACM/IEEE Supercomputing (SC).
2017	Best paper nomination at ACM BuildSys.

Invited talks

03/2023	IBM Research, *Ecovisor: A Virtual Energy System for Carbon-Efficient Applications.*
02/2023	Workshop on NetZero Carbon Computing (NetZero), co-located with HPCA, *Benefits and Limitations of Carbon Accounting Paradigms.*
11/2022	Low Carbon and Sustainable Computing (LOCOS) seminar at University of Glasgow *Enabling Sustainable Clouds: The Case for Virtualizing the Energy System.*
04/2021	Information Technology University (ITU), Pakistan, (virtual), *Leveraging Machine Learning to Design Energy Efficient and Sustainable Systems.*
11/2020	Energy Data Analytics Symposium, Duke University, *Solar-TK: A Data-driven Toolkit for Solar PV Performance Modeling and Forecasting.*

Service to the profession

Co-chair ACM SIGEnergy Workshop on Societal Decarbonization (SoDec'23), formerly WeCan'22.
PhD Sympsium Chair at ACM BuildSys'23, IEEE IC2E'23.
PC member at ACM e-Energy'23, ACM BuildSys'23, and ACM SoCC'23.
PC member at ACM SoCC'22, ACM ENSYS'22.
Reviewer for Climate Change AI Innovation Grants Program (2023)
Reviewer for Journal of Systems Research, Serverless Systems Track (2023)
PC member at Workshop on Tackling Climate Change with Machine Learning at ICLR23, NeurIPS'22.
Co-organizer SIGEnergy Graduate Student Talk Series (starting 2022).
Organizer ACM e-Energy Hybrid Hub at UMass Amherst 2022.
Co-organizer UMass Summer Turing Program (2022, 2023).
Shadow PC member at ACM EuroSys 2022 and ACM SenSys 2022.
Reviewer for IEEE Transactions on Parallel and Distributed Systems (TPDS), Elsevier Sustainable Computing (SUSCOM), and Elsevier Applied Energy journals.