# Ali Ghahramani

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## ACADEMIC DEGREES

**University of Southern California, Viterbi School of Engineering** — Los Angeles, CA

Ph.D. in Civil Engineering (Informatics for Intelligent Built Environments) — 2017

M.Sc. in Computer Science (Data Science) — 2016

M.Sc. in Industrial and Systems Engineering (Systems Architecting and Engineering) — 2016

M.Sc. in Civil Engineering (Construction Engineering) — 2013

**Shiraz University** — Shiraz, Iran

B.Sc. in Civil and Environmental Engineering — 2007 – 2011

## EMPLOYMENT

**National University of Singapore, Department of the Built Environment** — Singapore

Assistant Professor (Presidential Young Professor) — 2020 – Present

**University of California, Berkeley** — Berkeley, CA

Postdoctoral Scholar – Center for the Built Environment — 2017 – 2020

Lecturer – Data Informatics and Analytics for the Built Environment — Fall 2018

Lecturer – Data Science for the Built Environment — Fall 2017

**University of Southern California, Viterbi School of Engineering** — Los Angeles, CA

Research and Teaching Assistant — 2012 – 2017

## RESEARCH INTERESTS

- Sensing Human Health and Comfort
- Infrared Thermography
- Building Robotics
- Human-centered AI
- Smart Buildings
- Resilient Cooling

## AWARDS AND HONORS

- **Presidential Young Professor**, National University of Singapore — 2020
- **Researcher of the Year** (2015-2016) Award, CEE Department — 2016
- **APSIH Outstanding Achievement** in Doctoral Education in CEE — 2016
- **MEPC Finalist,** Maseeh Entrepreneurship Competition Finalist and Awarded $2.5 k — 2016
- Viterbi **Graduate Mentorship** Program Award — 2015
- **Provost's Ph.D. Fellowship,** USC — 2013
- Ranked **17th** in 16th National Civil Engineering Olympiad for University Students, Iran — 2011
- **First** Class Honors Award (2nd highest GPA) — 2011

## RESEARCH GRANTS

1. Enhancing personal comfort and well-being through human-centric built environments, Agency: Reimagine Singapore, Funds: SG$ 660,000, Role: PI, Share of funds: 60%, Duration: 2022-2024

2. Improving building energy efficiency and occupant comfort via intelligent and human-centered systems, Agency: Singapore Ministry of Education, Funds: SG$ 1,250,000, PI, Share of funds: 100%, Duration: 2020-2025

## INDUSTRY-RELATED RESEARCH

1. Micro-user Virtual Power Plants, Company: Trane Technologies, Funds: SG$ 350,000, PI, Share of funds: 100%, Duration: 2023-2024
2. Novel Vertical Greenery Systems for Resilient Cooling, Company: Greenology, Funds: SG$ 30,000, Role: PI, Share of funds: 100%, Duration: 2021-2022
3. Smart robotic systems to disinfect air and surfaces in the built environment, Company: Trane Technologies, Funds: SG$ 125,000, Role: PI, Share of funds: 100%, Duration: 2020-2022

## PATENTS

1. Arens, E.A., **Ghahramani, A.**, Peffer, T., Raftery, P., Zhang, H. and Anderson, M.P., 2022. Ultrasonic anemometers systems for sensing air flows in rooms and ducts. U.S. Patent Application 17/496,239
2. Becerik-Gerber, B., Castro, G. and **Ghahramani, A.**, University of Southern California USC, 2017. IGlass: infrared thermography for learning thermoregulation performance. U.S. Patent Application 15/403,599.
3. Karimi, F.J., Becerik-Gerber, B., Orosz, M.D., Kichkaylo, T. and **Ghahramani, A.**, University of Southern California USC, 2014. Human-building interaction framework for personalized comfort driven system operations in buildings. U.S. Patent Application 14/213,475.

## SERVICES

**Reviewer**

Applied Energy, Energy and Buildings, Building and Environment, IEEE Transactions on Industrial Informatics, Infrared Physics and Technology, Journal of Thermal Biology, Sustainable Cities and Society, Buildings, Sensors, Journal of Building Engineering, Energy Research and Social Science, Journal of Computing in Civil Engineering, Advances in Building Energy Research, ACM Interactive, Mobile, Wearable and Ubiquitous Technologies

**Science Research Program - Enrichment (SRP-Enrichment)** 2022

Leading the mentorship for four Junior Collage year 1 students on an independent scientific research study through weekly tutorials

## MENTORSHIP

**Ph.D. students**

Kai Chen (2022 – present), Iqbal Shah (2022 – present), Connor Aucremanne (2023 – present)

**M.Sc. students**

Yap Yien Li (2021), Andy Wang (2018), Xinran Yu (2016), Kenan Zhang (2015), Kanu Dutta (2015), Chao Tang (2014)

## PUBLICATIONS

### Peer-Reviewed Journal Publications

1. He, Y., Zhang, H., Arens, E., Merritt, A., Huizenga, C., Levinson, R., Wang, A., **Ghahramani, A.** and Alvarez-Suarez, A., 2023. *"Smart detection of indoor occupant thermal state via infrared thermography, computer vision, and machine learning. Building and Environment,"* 228, p.109811.
2. Shah, I., Soh, B., Lim, C., Lau, S.K. and **Ghahramani, A.**, 2023. *"Thermal transfer and temperature reductions from shading systems on opaque facades: Quantifying the impacts of influential factors."* Energy and Buildings, 278, p.112604."
3. Becerik-Gerber, B., Lucas, G., Aryal, A., Awada, M., Bergés, M., Billington, S., Boric-Lubecke, O., **Ghahramani, A.**, Heydarian, A., Höelscher, C. and Jazizadeh, F., 2022. *"The field of human building interaction for convergent research and innovation for intelligent built environments."* Scientific Reports, 12(1), p.22092.
4. Chen, K., Xu, Q., Leow, B. and **Ghahramani, A.**, 2022. *"Personal thermal comfort models based on physiological measurements–A design of experiments based review."* Building and Environment, p.109919.
5. Becerik-Gerber, B., Lucas, G., Aryal, A., Awada, M., Bergés, M., Billington, S.L., Boric-Lubecke, O., **Ghahramani, A.**, Heydarian, A., Jazizadeh, F. and Liu, R., 2022. *"Ten questions concerning human-building interaction research for improving the quality of life."* Building and Environment, 226, p.109681.
6. Cureau, R.J., Pigliautile, I., Pisello, A.L., Bavaresco, M., Berger, C., Chinazzo, G., Belafi, Z.D., **Ghahramani, A.**, Heydarian, A., Kastner, D. and Kong, M., 2022. *"Bridging the gap from test rooms to field-tests for human indoor comfort studies: A critical review of the sustainability potential of living laboratories."* Energy Research & Social Science, 92, p.102778.
7. Ghahramani, A., Xu, Q., Min, S., Wang, A., Zhang, H., He, Y., Merritt, A. and Levinson, R., 2022. *"Infrared-Fused Vision-Based Thermoregulation Performance Estimation for Personal Thermal Comfort-Driven HVAC System Controls."* Buildings, 12(8), p.1241.
8. Xu, Q., Goh, H.C., Mousavi, E., Nabizadeh Rafsanjani, H., Varghese, Z., Pandit, Y. and **Ghahramani, A.**, 2022. *"Towards Personalization of Indoor Air Quality: Review of Sensing Requirements and Field Deployments."* Sensors, 22(9), p.3444.
9. Bhattacharya, A., **Ghahramani, A.** and Mousavi, E., 2021. "*The effect of door opening on air-mixing in a positively pressurized room: implications for operating room air management during the COVID outbreak.*" Journal of Building Engineering, p.102900.
10. Pisello, A.L., Pigliautile, I., Andargie, M., Berger, C., Bluyssen, P.M., Carlucci, S., Chinazzo, G., Belafi, Z.D., Dong, B., Favero, M. and **Ghahramani, A.**, 2021. "*Test rooms to study human comfort in buildings: A review of controlled experiments and facilities. Renewable and Sustainable Energy Reviews*", 149, p.111359.
11. Nejat, P., Ferwati, M.S., Calautit, J., **Ghahramani, A.** and Sheikhshahrokhdehkordi, M., 2021. "*Passive cooling and natural ventilation by the windcatcher (Badgir): An experimental and simulation*

*study of indoor air quality, thermal comfort and passive cooling power.*" Journal of Building Engineering, 41, p.102436.

12. Bhattacharya, A., Pantelic, J., **Ghahramani, A.** and Mousavi, E.S., 2021. "*Three-dimensional analysis of the effect of human movement on indoor airflow patterns.*" Indoor air, 31(2), pp.587-601.
13. Rafsanjani, H.N., **Ghahramani, A.** and Nabizadeh, A.H., 2020. "*iSEA: IoT-based smartphone energy assistant for prompting energy-aware behaviors in commercial buildings.*" Applied Energy, 266, p.114892.
14. **Ghahramani, A.**, Galicia, P., Lehrer, D., Varghese, Z., Wang, Z. and Pandit, Y., 2020. "*Artificial Intelligence for Efficient Thermal Comfort Systems: Requirements, Current Applications and Future Directions.*" Frontiers in Built Environment, 6, p.49.
15. Arens, E., **Ghahramani, A.**, Przybyla, R., Andersen, M., Min, S., Peffer, T., Raftery, P., Zhu, M., Luu, V. and Zhang, H., 2020. "*Measuring 3D indoor air velocity via an inexpensive low-power ultrasonic anemometer*" Energy and Buildings, p.109805.
16. Pantelic, J., Liu, S., Pistore, L., Licina, D., Vannucci, M., Sadrizadeh, S., **Ghahramani, A.**, Gilligan, B., Sternberg, E., Kampschroer, K. and Schiavon, S., 2020. "*Personal CO2 cloud: laboratory measurements of metabolic CO2 inhalation zone concentration and dispersion in a typical office desk setting."* Journal of exposure science & environmental epidemiology, 30(2), pp.328-337.
17. Luo, M., Wang, Z., Zhang, H., Arens, E., Filingeri, D., Jin, L., **Ghahramani, A.**, Chen, W., He, Y. and Si, B., 2020. "*High-density thermal sensitivity maps of the human body*" Building and Environment, 167, p.106435.
18. Rafsanjani, H.N. and **Ghahramani, A.**, 2020. "*Towards utilizing internet of things (IoT) devices for understanding individual occupants' energy usage of personal and shared appliances in office buildings*" Journal of Building Engineering, 27, p.100948.
19. Rafsanjani, H.N. and **Ghahramani, A.**, (2019). "*Extracting occupants' energy-use patterns from Wi-Fi networks in office buildings*" Journal of Building Engineering, p.100864
20. **Ghahramani, A.**, Zhu, M., Przybyla, R.J., Andersen, M.P., Galicia, P.J., Peffer, T.E., Zhang, H. and Arens, E., 2019. "*Measuring air speed with a low-power MEMS ultrasonic anemometer via adaptive phase tracking*" IEEE Sensors Journal.
21. **Ghahramani, A.**, Pantelic, J., Vannucci, M., Pistore, L., Liu, S., Gilligan, B., Alyasin, S. and Arens, E. (2019) "*Personal CO2 Bubble: Context-dependent Variations and Wearable Sensors Usability*" Journal of Building Engineering, 22, pp.295-304.
22. Wang, J., Wang, Z., de Dear, R., Luo, M., **Ghahramani, A.**, & Lin, B. (2018). "*The uncertainty of subjective thermal comfort measurement*" Energy and Buildings, 181, 38-49.
23. **Ghahramani, A.**, Pantelic, J., Lindberg, C., Mehl, M., Srinivasan, K., Gilligan, B., & Arens, E. (2018) "*Learning occupants' workplace interactions from wearable and stationary ambient sensing systems*" Applied Energy, 230, 42-51.

24. Luo, M., Arens, E., Zhang, H., **Ghahramani, A.**, & Wang, Z. (2018) "*Thermal comfort evaluated for combinations of energy-efficient personal heating and cooling devices*" Building and Environment, 143, 206-216.
25. **Ghahramani, A.**, Dutta, K., & Becerik-Gerber, B. (2018) "*Energy trade off analysis of optimized daily temperature setpoints*" Journal of Building Engineering, 19, 584-591.
26. Wang, Z., de Dear, R., Luo, M., Lin, B., He, Y., **Ghahramani, A.**, & Zhu, Y. (2018). "*Individual difference in thermal comfort: A literature review*" Building and Environment.
27. Ahmadi-Karvigh, S., **Ghahramani, A.**, Becerik-Gerber, B., & Soibelman, L. (2018) "*Real-time activity recognition for energy efficiency in buildings*" Applied Energy, 211, 146-160.
28. **Ghahramani, A.**, Castro, G., Karvigh, S. A., & Becerik-Gerber, B. (2018). "*Towards unsupervised learning of thermal comfort using infrared thermography*" Applied Energy, 211, 41-49.
29. **Ghahramani, A.**, Karvigh, S. A., & Becerik-Gerber, B. (2017). "*HVAC system energy optimization using an adaptive hybrid metaheuristic*" Energy and Buildings, 152, 149-161.
30. Ahmadi-Karvigh, S., **Ghahramani, A.**, Becerik-Gerber, B., & Soibelman, L. (2017) "*One size does not fit all: Understanding user preferences for building automation systems*" Energy and Buildings, 145, 163-173.
31. Aryal, A., **Ghahramani, A.**, & Becerik-Gerber, B. (2017) "*Monitoring fatigue in construction workers using physiological measurements*" Automation in Construction, 82, 154-165.
32. **Ghahramani, A.**, Castro, G., Becerik-Gerber, B., & Yu, X. (2016) *"Infrared thermography of human face for monitoring thermoregulation performance and estimating personal thermal comfort"* Building and Environment, 109, 1-11.
33. Yang, Z., **Ghahramani, A.**, & Becerik-Gerber, B. (2016) "*Building occupancy diversity and HVAC (heating, ventilation, and air conditioning) system energy efficiency*" Energy, 109, 641-649.
34. **Ghahramani, A.**, Zhang, K., Dutta, K., Yang, Z., & Becerik-Gerber, B. (2016) "*Energy savings from temperature setpoints and deadband: Quantifying the influence of building and system properties on savings*" Applied Energy, 165, 930-942.
35. **Ghahramani, A.**, Tang, C., & Becerik-Gerber, B. *(2015)* "*An online learning approach for quantifying personalized thermal comfort via adaptive stochastic modeling*" Building and Environment, 92, 86-96.
36. **Ghahramani, A.**, Jazizadeh, F., & Becerik-Gerber, B. (2014) "*A knowledge-based approach for selecting energy-aware and comfort-driven HVAC temperature set points*" Energy and Buildings, 85, 536-548.
37. Jazizadeh, F., **Ghahramani, A.**, Becerik-Gerber, B., Kichkaylo, T., & Orosz, M. (2014) "*User-led decentralized thermal comfort driven HVAC operations for improved efficiency in office buildings*" Energy and Buildings, 70, 398-410.
38. Li, N., Yang, Z., **Ghahramani, A.**, Becerik-Gerber, B., & Soibelman, L. (2014) "*Situational awareness for supporting building fire emergency response: Information needs, information sources, and implementation requirements*" Fire Safety Journal, 63, 17-28.

39. Jazizadeh, F., **Ghahramani, A.**, Becerik-Gerber, B., Kichkaylo, T., & Orosz, M. (2013) "*Human-Building Interaction Framework for Personalized Thermal Comfort-Driven Systems in Office Buildings*" Journal of Computing in Civil Engineering, 28(1), 2-16.

**Peer-Reviewed Conference Publications**

1. Ghahramani, A., Zhu, M., Przybyla, R., Andersen, M., Min, S., Zhang, H., Peffer, T. and Arens, E., 2019, October. "*An Inexpensive Low-Power Ultrasonic 3-Dimensional Air Velocity Sensor*". In 2019 IEEE SENSORS (pp. 1-4). IEEE.
2. **Ghahramani, A.,** Pantelic, J., Lindberg, C., Mehl, M., Srinivasan, K., Gilligan, B. (2018) "Learning Building Occupants' Social Interactions from Wearable and Fixed Ambient Sensing Systems", Indoor Air
3. Luo, M., Zhang, H., Arens, E., **Ghahramani, A.**, Wang, Z., Jin, L., & He, Y. (2018) Heating and cooling the human body with energy-efficient personal comfort systems (PCS). Indoor Air
4. Ozcelik G., Becerik-Gerber B., Ghahramani A., Wang Y. (2017) "*Can Immersive Virtual Environments Be Used for Understanding Occupant-System Interactions Under Thermal Stimuli?*" In: LC3 2017: Volume I – Proceedings of the Joint Conference on Computing in Construction (JC3), July 4-7, 2017, Heraklion, Greece, pp. 357-364.
5. **Ghahramani A**, Dutta K, Yang Z, Ozcelik G, Becerik-Gerber B. *(2015) "Quantifying the Influence of Temperature Setpoints, Building and System Features on Energy Consumption,"* Winter Simulation Conference, December 6-9, 2015, Huntington Beach, CA
6. Yang Z, **Ghahramani A,** Becerik-Gerber B. (2015) "*Iterative Reassignment Algorithm: Leveraging Occupancy Based HVAC Control for Improved Energy Efficiency,*" Winter Simulation Conference, December 6-9, 2015, Huntington Beach, CA
7. Yang Z, **Ghahramani A,** Becerik-Gerber B. (2015) "*Effects of Variant Occupancy Transitions on Energy Implications of HVAC Setpoint/Setback Control Policies,*" The First International Symposium on Sustainable Human-Building Ecosystems (ISSHBE), October 5-6, 2015, Pittsburgh, PA
8. **Ghahramani A,** Tang C, Yang Z, Becerik-Gerber B. (2015) "*A Study of Time Dependent Variations in Personal Thermal Comfort via a Dynamic Bayesian Network,*" The First International Symposium on Sustainable Human-Building Ecosystems (ISSHBE), October 5-6, 2015, Pittsburgh, PA
9. Jazizadeh F, **Ghahramani A**, Becerik-Gerber B. (2013) "*Personalized Thermal Comfort Driven Control in HVAC Operated Office Buildings"* ASCE Workshop on Computing in Civil Engineering, June 23-25, 2013, Los Angeles, CA, – Nominated for the best paper award –