

SEKHAR, SITARAMAN CHANDRA (Dr)

PhD Adelaide. BE (Mech) (Hons) Rajasthan, Fellow ASHRAE, Fellow ISIAQ, MIEAust., CPeng



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ACADEMIC/PROFESSIONAL QUALIFICATIONS

- B.E. Honours (1984) [Mechanical Engineering] - University of Rajasthan, India
- PhD (1990) - University of Adelaide, Australia
- Chartered Professional Engineer, The Institution of Engineers, Australia
- Fellow, American Society of Heating, Refrigerating & Air-conditioning Engineers (ASHRAE)
- Fellow, International Society of Indoor Air Quality and Climate

AWARDS/HONOURS

- ASHRAE E.K. Campbell Award of Merit, 2021
- Uichi Inouyi Memorial Asian International Award from SHASE, Japan, May 2019
- Long Service Medal, Republic of Singapore, 2017
- Long Service Award (25 Years), NUS, 2017
- ASHRAE Environmental Health Award, 2014
- ASHRAE Distinguished Lecturer (2006 - To date)
- ASHRAE Exceptional Service Award, 2013
- SPRING Singapore Merit Award, 2012
- ASEAN Energy Award 2011 (Team Award)
- ASHRAE Distinguished Service Award, 2010
- The Enterprise Challenge (TEC) Award, Prime Minister's Office, Singapore, 2004, Field trial of a newly developed and patented air-conditioning system. (Team Award)

EMPLOYMENT RECORDS

- Professor (2013 - To date); Associate Professor (2002 - 2012); Assistant Professor (1999 - 2001); Senior Lecturer (1997 - 1999); Lecturer (1992 - 1997) - National University of Singapore
- Post-Doctoral Fellow (Jan 1990 - April 1991) - University of Adelaide, Australia
- Senior Engineer (1984 - 1986) - Eicher Goodearth Limited, New Delhi, India

ADMINISTRATIVE LEADERSHIP

- Co-Director, Centre for Total Building Performance: 2013 - To date
- Program Director MSc (Building Performance and Sustainability) (2020 – To date; 2010 – 2019)
- Co-Program Director MSc (Integrated Sustainable Design) (2010 - 2013)
- Director of External Relations: 2004 -2007
- Program Director, MSc (Building Science): 1999 – 2004; 2007 - 2010
- Deputy Course Leader, MSc (Building Science): 1996 - 1999, Department of Building
- Deputy Director, Centre for Building Performance and Construction: 1998 - 2000

TEACHING AREAS

- Green Building Integration and Evaluation
- Thermal Comfort, Ventilation and Indoor Air Quality
- Building Energy Analysis & Management
- Air-Conditioning and Mechanical Ventilation
- Building Science

RESEARCH AREAS

- Thermal Comfort
- Ventilation, Indoor Air Quality and Airborne Infection Control
- Green Building Technologies
- Building Energy Analysis and Mgt – Energy Simulation, Meas & Verification, Energy Audit
- Total Building Performance and Sustainability
- Heat and Mass Transfer Analysis in Cooling and Dehumidifying Coils
- Energy Efficient Air-conditioning and Air Distribution Systems for Enhanced IAQ
- Computational Fluid Dynamics Application in Buildings

PROFESSIONAL/CONSULTING ACTIVITIES

- Invited Member, WHO Environment and Engineering Control Expert Advisory Panel (ECAP) for COVID-19 (Aug 2020 – To date)
- Member, ASHRAE Residential Buildings Committee (July 2021 – June 2024)
- Member, ASHRAE Epidemic Task Force (Residential Team) (April 2020 – To date)
- Director-at-Large (DAL), ASHRAE Board of Directors (July 2018 – June 2021)
- Member, Position Document Committee on Infectious Aerosols (2021–To date; 2017-2020)
- Invited Member, Working Group on SS 554 CODE OF PRACTICE FOR INDOOR AIR QUALITY FOR AIR-CONDITIONED BUILDINGS (COVID-19 related amendment and advisory)
- Invited Member, Working Group on SS 553 CODE OF PRACTICE FOR AIR-CONDITIONING AND MECHANICAL VENTILATION IN BUILDINGS (COVID-19 related amendment and advisory)
- Member, Position Document on Resiliency in Built Environment (2017 – 2019)
- ASHRAE Environmental Health Committee - Chair (2012 - 2013); Member (2006 – 2012; 2016-2018)
- ASHRAE Indoor Environmental Quality – Global Alliance Ad Hoc Comm Member (2013-2017)
- ASHRAE Std 62.1 Member; TC Mbr, ASHRAE, USA (TC2.1 - Physiology & Human Env; TC4.3 Ventilation req & infiltration)
- President, ASHRAE Singapore Chapter & Member, Board of Governors (2010-11)
- Invited as an assessor by the Australian Research Council (ARC) to review a proposal titled “Improving thermal conditions in housing to support ageing in place”. (May 2016)
- Invited Reviewer for the progress report of the project titled “Ceiling – Mounted Personalized Ventilators Effectiveness in Reducing the Spread of Particles in Office Spaces”. Invited to review the progress report by Kuwait Foundation for the Advancement of Sciences –Research Directorate, April 2016.
- Elected Member – Board of Singapore Green Building Council (SGBC) (March 2013 – 2019)
- Invited Expert Mbr of the IEQ Consortium, National Env Agency, Singapore (Jan 2016–Dec 2017)
- Co-convener of the Working Group for the revision of Singapore Standard SS 554: Code of Practice for IAQ for air-conditioned buildings, SPRING Singapore (Oct 2013 – 2016)
- Invited expert member to review 3 White paper proposals under the LAND AND LIVEABILITY NATIONAL INNOVATION CHALLENGE for NRF, Singapore. (Sept 2015)
- Nominated Chairman of the BCA Specialist Diploma in Facility and Energy Management Board of Examiners (BOE) (1 Dec 2012 – 30 Nov 2016)
- Inv Reviewer - White Paper from NRF Competitive Res Prog (CRP) 11th Call-for-Proposals (April 2013)
- SPRING Singapore - TC Mbr, Building Maintenance Mgt (2007 – 2014)
- Singapore Certified Energy Manager Curriculum and Examination (SCEM C&E) Board (2009-To Date). Chairman, SCEM C&E Board (2009-2014)
- Technical Assessor for IAQ Assessment (SINGLAS) - SPRING Singapore (1997 - Present)
- Tech Co-Chair, HB2003 Healthy Buildings International Conference
- Indoor Air Quality & Building Perf Consultant - SIA Prop, JTC, NLB, Pidemco Land, SCDF, URA

SELECTED PUBLICATIONS

1. Prashant Anand, David Cheong, Chandra Sekhar, 2022. A review of occupancy-based building energy and IEQ controls and its future post-COVID, Science of The Total Environment, Volume 804.
2. P. Anand, C. Deb, Y. Ke, J. Yang, D. Cheong, C. Sekhar, 2021. Occupancy-based energy consumption modelling using machine learning algorithms for institutional buildings, Energy & Buildings, 111478.

3. Chenxi Liao, Mizuho Akimoto, Mariya Petrova Bivolarova, Chandra Sekhar, Jelle Laverge, Xiaojun Fan, Li Lan, Pawel Wargocki, 2021. A survey of bedroom ventilation types and the subjective sleep quality associated with them in Danish housing. *Science of The Total Environment*, Volume 798.
4. Morawska, L., Allen, J., Bahnfleth, W., Bluysen, P. M., Boerstra, A., Buonanno, G., . . . Sekhar, C., . . . Yao, M. (2021). A paradigm shift to combat indoor respiratory infection. *Science*, 372(6543), 689-691.
5. Akimoto, M., Sekhar, C., Bivolarova, M. P., Liao, C., Fan, X., Laverge, J., Lan, L., Wargocki, P. 2021. Reviewing how bedroom ventilation affects IAQ and sleep quality. *ASHRAE Journal*, Vol.63, Iss.4, pp.56-60
6. Julian W. Tang; William P. Bahnfleth; Chandra Sekhar et al. Dismantling myths on the airborne transmission of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). *Journal of Hospital Infection*, 110 (2021) 89-96.
7. Mihara K, Sekhar C, Takemasa Y, Lasternas B, Tham KW. Thermal and perceived air quality responses between a dedicated outdoor air system with ceiling fans and conventional air-conditioning system. *Building and Environment*, 190 (2021), 107574.
8. Chandra Sekhar, Mariya Bivolarova, Mizuho Akimoto & Pawel Wargocki (2021) Detailed characterization of bedroom ventilation during heating season in a naturally ventilated semi-detached house and a mechanically ventilated apartment, *Science and Technology for the Built Environment*, 27:2, 158-180.
9. Kwok Wai Tham, Ganesh Kashinath Parshetti, Prashant Anand, David Kok Wai Cheong and Chandra Sekhar. Performance characteristics of a fan filter unit (FFU) in mitigating particulate matter levels in a naturally ventilated classroom during haze conditions. *Indoor Air*, November 2020.
10. Morawska, L., Tang, J. W., Bahnfleth, W., Bluysen, P. M., Boerstra, A., Buonanno, G., . . . Sekhar, C., . . . Yao, M. (2020). How can airborne transmission of COVID-19 indoors be minimised? *ENVIRONMENT INTERNATIONAL*, 142, 7 pages.
11. Chandra Sekhar, Mizuho Akimoto, Xiaojun Fan, Mariya Bivolarova, Chenxi Liao, Li Lan and Pawel Wargocki, 2020. Bedroom ventilation: Review of existing evidence and current standards. *Building and Environment*, Volume 184. 107229.
12. Luerssen, C., Gandhi, O., Reindl, T., Sekhar, C., & Cheong, D. (2020). Life cycle cost analysis (LCCA) of PV-powered cooling systems with thermal energy and battery storage for off-grid applications. *Applied Energy*, 273.
13. Mihara, K., Sekhar, C., Tham, K. W., Takemasa, Y., & Lasternas, B. (2019). Effects of temp, air movement and initial metabolic rate on thermal sens during transient state in the tropics. *Bldg and Env*, 155, 70-82.
14. Luerssen, C., Gandhi, O., Reindl, T., Sekhar, C., & Cheong, D. (2019). Levelised Cost of Storage (LCOS) for solar-PV-powered cooling in the tropics. *Applied Energy*, 242, 640-654.
15. Anand, P., Sekhar, C., Cheong, D., Santamouris, M., & Kondepudi, S. (2019). Occupancy-based zone-level VAV system control implications on thermal comfort, ventilation, indoor air quality and building energy efficiency. *Energy and Buildings*, 204
16. Yang, B., A.K. Melikov, A. Kabanshi, C. Zhang, F.S. Bauman, G. Cao, H. Awbi, H. Wigö, J. Niu, K.W.D. Cheong, K.W. Tham, M. Sandberg, P.V. Nielsen, R. Kosonen, R. Yao, S. Kato, S.C. Sekhar, S. Schiavon, T. Karimipannah, X. Li, Z. Lin (2019). A review of advanced air distribution methods - theory, practice, limitations and solutions. *Energy and Buildings*, 202, 109359
17. Sekhar, S. C., Anand, P., Schiavon, S., Tham, K. W., Cheong, D. and Saber, E. M. (2018). Adaptable cooling coil performance during part loads in the tropics A computational evaluation. *Energy and Buildings*. Vol 159, 148-163.
18. Sekhar, C., & Zheng, L. (2018). Study of an integrated personalized ventilation and local fan-induced active chilled beam air conditioning system in hot and humid climate. *Building Simulation*, 11(4), 787-801.
19. Wang, Y., Sekhar, C., Bahnfleth, W. P., Cheong, K. W., & Firrantello, J. (2016). Effectiveness of an ultraviolet germicidal irradiation system in enhancing cooling coil energy performance in a hot and humid climate. *Energy and Buildings*. 130, 321-329.
20. S.C.Sekhar, (2016). Thermal comfort in air-conditioned buildings in hot and humid climates - why are we not getting it right? *Indoor Air*, 26: 138–152.
21. LICINA, D, Arsen Melikov, S C Sekhar and K W Tham, (2015). Air temperature investigation in microenvironment around a human body. *Building and Environment*. 92, 39-47.
22. YANG J., S.C. Sekhar, K.W. Cheong and Benny Raphael, (2014). Performance evaluation of an integrated Personalized Ventilation-Personalized Exhaust system in conjunction with two background ventilation systems. *Building and Environment*, 78, 103-110.

23. Li, R., Sekhar, S. C., & Melikov, A. K. (2010). Thermal comfort and IAQ assessment of under-floor air distribution system integrated with personalized ventilation in hot and humid climate. *BUILDING AND ENVIRONMENT*, 45(9), 1906-1913
24. S.C. Sekhar et al (2005). Findings of personalized ventilation studies in a hot and humid climate. HVAC&R Research, ASHRAE Vol 11, No 4,603-620.
25. Sekhar, S. C., Tham, K. W., Maheswaran, U., & Cheong, K. W. (2004). Development of energy-efficient single-coil twin-fan air-conditioning system with zonal ventilation control. ASHRAE Transactions, 110 PART II, 204-217.