

**SUSHOBHAN SEN, PhD**

3216 Newmark Lab, 205 N Matthews Ave, Urbana, IL 61801

+1-(502)-641-2388 ◦ [sen6@illinois.edu](mailto:sen6@illinois.edu)[sushobhansen.github.io](https://sushobhansen.github.io) ◦ [linkedin.com/in/sushobhansen](https://linkedin.com/in/sushobhansen)**EDUCATION****University of Illinois at Urbana-Champaign (UIUC)**

Urbana, IL

*Doctor of Philosophy in Civil Engineering*

December, 2019

Thesis Topic: Role of Pavements in Urban Energetics

*GPA: 4.0/4.0***University of Illinois at Urbana-Champaign (UIUC)**

Urbana, IL

*Master of Science in Civil Engineering*

August, 2015

Thesis Topic: Impact of Concrete Pavements on the Urban Heat Island

*GPA: 4.0/4.0***Indian Institute of Technology Roorkee**

Roorkee, India

*Bachelor of Technology*

May, 2013

Major: Civil Engineering

*GPA: 9.5/10.0**Institute Silver Medal***RESEARCH EXPERIENCE***University of Illinois at Urbana-Champaign***Role of Pavements in Urban Energetics**

August, 2015 - December, 2019

Assessment of the local microclimatic impact of pavements on urban areas, with a focus on the Urban Heat Island (UHI) effect. I developed an aging albedo model for pavements and a pavement-urban canyon Computational Fluid Dynamics (CFD) model to study the local microclimate in Power Ranch, AZ. My work provides engineers and planners with quantitative tools to evaluate the benefits of interventions in improving local microclimate, livability, and public health.

**Evaluation of Bonded Concrete Overlays on Asphalt Pavements**

May, 2019 -

December, 2019

Characterization of Bonded Concrete Overlays on Asphalt Pavement (BCOA) cores from around the US, bond strength between overlay and asphalt substrate, and characterization of base materials. Funded by the National Cooperative Highway Research Program (NCHRP).

**Preservation Sustainability Assessment Tool**

August, 2017 - August, 2018

Developed the Heat Island analysis component of the Preservation Sustainability Assessment

Tool (PSAT) for the Federal Highway Administration (FHWA). Calculated the Global Warming Potential (GWP) of several pavement preservation techniques to quantify their heat island impact for all 50 states in the US, and integrated it into an Excel-based tool. Done in collaboration with researchers from the University of Illinois and Michigan State University.

**Critical thinking in a Geometric Design class** January, 2018 - May, 2018  
Conducted a study for a class on the Geometric Design of Roads to demonstrate how critical thinking could be developed by designing a class project around autonomous vehicles. Designed a class project where students would work in teams to develop new geometric design standards for autonomous vehicles and demonstrated the effectiveness of this method in developing critical thinking and meeting ABET accreditation requirements.

**Impact of Concrete Pavements on Urban Heat Island** August, 2013 - August, 2015  
Determination of the impact of pavement surface and sub-surface structure and materials on the Urban Heat Island. I developed a new method to measure the albedo of pavements in the field, and proposed one of the first aging albedo models for asphalt pavements. I developed a numerical pavement heat transfer model and devised new metrics to quantify the microscale impact of pavements on UHI.

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## TEACHING EXPERIENCE

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*University of Illinois at Urbana-Champaign*

**CEE Transportation Instructional Fellow** January - May, 2017 & 2019  
Instructor of record for a class on the Geometric Design of Roads.

**Graduate Teaching Assistant** January - May, 2016 & 2018  
TA for a class on the Geometric Design of Roads. Included in the campus-wide list of excellent TAs based on anonymous student feedback in 2018.

**Graduate Teaching Assistant** August, 2018 - December, 2018  
TA for an interdisciplinary course on teaching and leadership for graduate students across engineering departments.

**Graduate Teaching Assistant** March, 2018 - April, 2018  
TA for an interdisciplinary field course on infrastructure assessment and community service in Puerto Rico in the wake of Hurricane Maria.

**Workshop Instructor** April & October, 2019  
Led two workshops on each day for engineering students: Introductory Python for beginners,

and Advanced Python for scientific applications.

## WORK EXPERIENCE

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*ePAVE, LLC*

### Technical Intern

June, 2018 - August, 2018

Interned at ePAVE, LLC, a company developing a cool pavement solution to mitigate the urban heat island in Los Angeles, CA. Wrote an NSF SBIR Phase I proposal, a white paper on cool pavements, and a product manufacturing manual.

## REPORTS AND PUBLICATIONS

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### Peer-Reviewed Journal Articles

- (J1) **Sen, S.**, Fernandéz, J.P.R.M., and Roesler, J. *Reflective Parking Lots for Microscale Urban Heat Island Mitigation*. Under review
- (J2) **Sen, S.**, and Roesler, J. *Enhancing Critical Thinking in a Geometric Design Class using Autonomous Vehicle Problem*. Under review
- (J3) **Sen, S.**, and Roesler, J. (2020) *Wind direction and cool surface strategies on microscale urban heat island*. Urban Climate, Vol. 31, 100548, doi: [10.1016/j.uclim.2019.100548](https://doi.org/10.1016/j.uclim.2019.100548)
- (J4) **Sen, S.**, Roesler, J., Ruddell, B., and Middel, A. (2019) *Cool pavement strategies for urban heat island mitigation in suburban Phoenix, Arizona*. Sustainability, Vol. 11, No. 16, 4452, doi: [10.3390/su11164452](https://doi.org/10.3390/su11164452)
- (J5) **Sen, S.**, and Roesler, J. (2019) *Thermal and optical characterization of asphalt field cores for microscale urban heat island analysis*. Construction and Building Materials, Vol. 217, pp. 600-611, doi: [10.1016/j.conbuildmat.2019.05.091](https://doi.org/10.1016/j.conbuildmat.2019.05.091)
- (J6) Baral, A., **Sen, S.**, and Roesler, J. (2018) *Use-phase assessment of photocatalytic cool pavements*. Journal of Cleaner Production, Vol. 190, pp. 722-728, doi: [10.1016/j.jclepro.2018.04.155](https://doi.org/10.1016/j.jclepro.2018.04.155)
- (J7) **Sen, S.**, Roesler, J., and King, D. (2019) *Albedo estimation of finite-sized concrete specimens*. Journal of Testing and Evaluation, Vol. 47, No. 2, pp. -, doi: [10.1520/JTE20170059](https://doi.org/10.1520/JTE20170059)
- (J8) **Sen, S.**, and Roesler, J. (2017) *Microscale heat island characterization of rigid pavements*. Transportation Research Record: Journal of the Transportation Research Board, No. 2639, pp. 73-83, doi: [10.3141/2639-10](https://doi.org/10.3141/2639-10)
- (J9) **Sen, S.**, and Roesler, J. (2016) *Aging albedo model for asphalt pavements*. Journal of Cleaner Production, Vol. 117, pp. 169-175, doi: [10.1016/j.jclepro.2016.01.019](https://doi.org/10.1016/j.jclepro.2016.01.019)
- (J10) **Sen, S.**, and Roesler, J. (2016) *Contextual heat island assessment for pavement preservation*. International Journal of Pavement Engineering, Vol. 19, No. 10, pp. 865-873,

doi: [10.1080/10298436.2016.1213842](https://doi.org/10.1080/10298436.2016.1213842)

#### *Peer-Reviewed Conference Papers*

- (C1) **Sen, S.**, and Roesler, J. (2019) *Coupled pavement-urban canyon model for cool pavements assessment*. Airfield and Highway Pavements 2019: Innovation and Sustainability in Highway and Airfield Pavement Technology, Chicago, IL, USA, pp. 207-215, doi: [10.1061/9780784482476.022](https://doi.org/10.1061/9780784482476.022)
- (C2) Baral, A., **Sen, S.**, and Roesler, J. (2018) *Environmental design concept for multi-functional concrete overlays*. 9<sup>th</sup> International DUT-Workshop on Research and Innovations for Design of Sustainable and Durable Concrete Pavements, Potsdam, Germany
- (C3) **Sen, S.**, and Roesler, J. (2017) *Pavement geometry in microscale urban heat islands*. Conference of the Transportation Association of Canada, St. Johns, NL, Canada ([link](#))
- (C4) **Sen, S.**, Baral, A., and Roesler, J. (2017) *Use-phase sustainability through preservation*. 10<sup>th</sup> International Conference on Road and Airfield Pavement Technology, Hong Kong
- (C5) **Sen, S.**, and Roesler, J. (2017) *An uncoupled pavement-urban canyon model for heat islands*. International Symposium on Pavement Life Cycle Assessment, Champaign, IL, ISBN 978-1-315-15932-4, pp. 111-120, doi: [10.1201/9781315159324-13](https://doi.org/10.1201/9781315159324-13)
- (C6) **Sen, S.**, and Roesler, J. (2016) *Albedo as an engineering property of concrete pavements*. 11<sup>th</sup> International Conference on Concrete Pavements, San Antonio, TX, ISBN 978-0-9860291-2-7, pp. 59-71 (**awarded best paper by a young author**)
- (C7) King, D., Roesler, J., and **Sen, S.** (2016) *Emissions reducing benefits of multi-functional photocatalytic concrete inlays*. 11<sup>th</sup> International Conference on Concrete Pavements, San Antonio, TX, ISBN 978-0-9860291-2-7, pp. 72-81
- (C8) **Sen, S.**, King, D., and Roesler, J. (2015) *Structural and environmental benefits of concrete inlays for pavement preservation*. Airfield and Highway Pavements 2015, Miami, FL, pp. 697-707, doi: [10.1061/9780784479216.062](https://doi.org/10.1061/9780784479216.062)
- (C9) **Sen, S.**, and Roesler, J. (2014) *Assessment of concrete pavement structure on urban heat island*. International Symposium on Pavement Life Cycle Assessment, Davis, CA, pp. 191-200 ([link](#))

#### *Theses*

- (T1) **Sen, S.** (2019) *Role of pavements in urban energetics*. University of Illinois at Urbana-Champaign, Urbana, IL. Doctoral dissertation
- (T2) **Sen, S.** (2015) *Impact of concrete pavements on the Urban Heat Island*. University of Illinois at Urbana-Champaign, Urbana, IL. Masters Thesis

#### *Reports*

- (R1) Zhou, Q., Okte, E., **Sen, S.**, Ozer, H., Al-Qadi, I. L., Roesler, J. R., and Chatti, K. (2019) *Development of a Life-cycle Assessment Tool for Pavement Preservation and*

*Maintenance on Flexible and Rigid Pavement Vol I.* Illinois Center for Transportation Series No. ICT-19-010, Illinois Center for Transportation, UIUC, Rantoul, IL ([link](#))

- (R2) Zhou, Q., Okte, E., **Sen, S.**, Rajaei, S., Ozer, H., Al-Qadi, I. L., Roesler, J. R., and Chatti, K. (2019) *Development of a Life-cycle Assessment Tool for Pavement Preservation and Maintenance on Flexible and Rigid Pavement Vol II.* Illinois Center for Transportation Series No. ICT-19-011, Illinois Center for Transportation, UIUC, Rantoul, IL ([link](#))
- (R3) **Sen, S.**, and Moradian, K. (2018) *Better pavements make better communities: the promise of cool pavements.* White paper for ePAVE, LLC, Los Angeles, CA ([link](#))

### *Proposals*

- (P1) *Multi-Functional Concrete Inlays* (2014). Proposal to the University Transportation Center for Highway Pavement Preservation at Michigan State University. PI: Roesler, J.
- (P2) *Fatigue and Fracture of Fiber Reinforced Cementitious Bonded Overlay for Asphalt Pavement Preservation* (2015). Proposal to BASF GmbH. PI: Roesler, J.
- (P3) *SBIR Phase I: An Environmentally Sustainable Surface Treatment for Pavement Preservation: Research & Development Study* (2018). Proposal to the National Science Foundation. PI: Moradian, K.
- (P4) *Best Practice Guidelines for Cool Pavements* (2019). Proposal to RMC Research & Education Foundation. PI: Roesler, J.

## HONORS AND AWARDS

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### *Illinois Center for Transportation*

#### **PhD Student Symposium Award (2<sup>nd</sup> place)**

October, 2017

Awarded second place for poster and presentation on *Assessment of the Urban Microclimatic Impact of Pavements* at the 6<sup>th</sup> International Transportation PhD Student Symposium, Urbana, IL.

### *International Society for Concrete Pavements*

#### **Bengt F. Friberg Award for Best Paper by a Young Author**

August, 2016

Awarded for *Albedo as an Engineering Property of Concrete Pavements* at the 11<sup>th</sup> International Conference on Concrete Pavements, San Antonio, TX.

### *University of Illinois at Urbana-Champaign*

#### **Mavis Future Faculty Fellowship**

August, 2017 - July, 2018

Fellowship in the College of Engineering to train top graduate students for a future career in academia.

**CEE Transportation Instructional Fellowship**

January, 2017 &amp; 2019

Instructional fellowship to teach a class as the instructor-of-record.

**Teacher Scholar Certificate**

May, 2018

Teaching certification from the Center for Innovation in Teaching and Learning (CITL).

**Graduate Teacher Certificate**

May, 2018

Teaching certification from the Center for Innovation in Teaching and Learning (CITL).

**Ravindar K and Kavita Kinra Fellowship**

August, 2013 - July, 2014

Fellowship in the Department of Civil and Environmental Engineering to explore a new area of research.

*Indian Institute of Technology Roorkee***Institute Silver Medal and Other Honors**

October, 2013

Institute Silver Medal and other honors for graduating with the highest GPA in the B.Tech (Civil Engineering) Class of 2013.

**LEADERSHIP AND SERVICE**

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*International Society for Concrete Pavements***Webmaster and student member**

July, 2015 - Present

Assisted in the preparation of conference proceedings and flash drive for the 11<sup>th</sup> International Conference on Concrete Pavements. Regularly assist in maintenance of the [ISCP website](#).**Peer Review**

August, 2014 - Present

Provided peer-review for manuscripts submitted to the International Journal of Pavement Engineering, Solar Energy, Environmental Research Letters, Journal of Cleaner Production, Transportation Research Record, Measurement, Journal of Nondestructive Evaluation, Urban Climate, and the International Journal for Heat and Mass Transfer.

*University of Illinois at Urbana-Champaign***ITE UIUC Student Chapter**

August, 2015 - August, 2017

Secretary of the Institute of Transportation Engineers (ITE) Student Chapter.

**IGSA at UIUC**

August, 2013 - Present

Elected President of the Indian Graduate Students Association (IGSA) at UIUC from

August, 2014 - August, 2015 and webmaster from August, 2015 - 2018.