Sk Faisal Kabir, PhD

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RESEARCH INTERESTS

Research domains	Transportation Engineering, Geoenvironmental Engineering
Research methods	Laboratory Experiments, Characterization tools, Mathematical modeling, Synthesis
Research interests	• Sustainable and resilient transportation materials • Smart pavement management using AI • Energy-efficient roadway solutions •Recycling • Solid Waste Management

PROFESSIONAL PREPARATION

August 2020	*Doctor of Philosophy in Civil, Environmental and Sustainable Engineering* Arizona State University (ASU), Tempe, AZ Dissertation Title: Surface Activation of Rubber to Enhance the Durability and Chemo-Mechanics of Asphalt
August 2015	*Master of Science in Civil Engineering* North Carolina A&T State University, Greensboro, NC Dissertation Title: Groundwater Contaminant Transport Modeling Using 4DVar and 3DVar Techniques Coupled with EnKF
February 2011	*Bachelor of Science in Civil Engineering* Bangladesh University of Engineering and Technology, Dhaka, Bangladesh Dissertation Title: Comparative Study of Top-Down Construction Technique with Other Conventional Techniques

ACADEMIC EXPERIENCE

September 2024- Present	Research Affiliate Scholar, Arizona State University
Fall 2021 - Spring 2023	Postdoctoral Research Associate, CREATES, Rowan University, Glassboro, NJ
Fall 2020 - Summer 2021	Postdoctoral Research Associate, Arizona State University, Tempe, AZ
Spring 2019 - Summer 2020	Graduate Research Assistant, Arizona State University, Tempe, AZ
Fall 2016 - Fall 2018	Graduate Research Assistant, North Carolina A&T State University, Greensboro, NC
Fall 2015 - Spring 2016	Graduate Teaching & Research Assistant, Civil Engineering, University of North Carolina at Charlotte, NC
Fall 2013-Spring 14	Graduate Teaching Assistant, Industrial and Process Engineering, North Carolina A&T State University, Greensboro, NC
January 2012 - July 2012	Lecturer, Civil Engineering Department, World University, Dhaka, Bangladesh

INDUSTRIAL EXPERIENCE

2023 - Present	**SITE Technologies, Pavement Engineer**
2012-2013	Subdivisional Engineer, Public Works Department, Dhaka, Bangladesh
2011	Site Engineer (Civil), Siemens (India) Pte. Ltd., Dhaka, Bangladesh

TEACHING COURSES

Spring 2023-Fall 2021	Senior and Junior Undergraduate Research Clinic, Rowan University, Glassboro, NJ
Fall 2015-Spring 2016	Introduction to Geotechnical Laboratory (CEGR 3258), University of North Carolina at Charlotte, NC
Fall 2013-Spring 2014	Engineering Statistics (ISEN 370), North Carolina A&T State University, Greensboro, NC
January 2012 - July 2012	Mechanics of Solid (Theory+Lab), Introduction to Environmental Engineering, Hydrology.

RESEARCH PROJECTS OVERVIEW

July 2021-April 2023 — Postdoctoral Research Associate, Rowan University

1. **Improving Asphalt Binder Properties for Cold Regions Using Plastic Modifiers**
   This study includes using waste plastics in modifying asphalt binders to make a storage-stable product that can improve cold region binder performance. The modified binder improves mechanical properties, such as flexibility and resistance to cracking, offering a sustainable solution for durable asphalt pavements in challenging climates. 2 peer-reviewed scholarly articles have been published from this project.
2. **Use of Warm Mix Asphalt Technology as a Compaction Aid in Cold Regions**
   Warm Mix Asphalt (WMA) technology is popular to reduce compaction temperature. However, this project aimed to utilize WMA as a compaction aid in cold regions, enhancing workability and reducing energy consumption during pavement construction. By lowering mixing and compaction temperatures, WMA improves binder-aggregate adhesion and compactability, resulting in durable road surfaces while mitigating environmental impact and conserving resources. The outcome is one peer-reviewed scholarly article from this project.
3. **Development of Self-Healing Asphalt Mixture using Nanoparticle-Modified Asphalt Binder**
   The development of self-healing asphalt mixtures involves incorporating nanoparticle-modified asphalt binder, enhancing its healing capabilities. Nanoparticles facilitate crack sealing and healing at the molecular level upon exposure to heat or light, improving pavement durability and reducing maintenance needs, thus offering sustainable and resilient infrastructure solutions. One peer-reviewed scholarly article showing the performance of various nanomaterials has been published.
4. **Integrating Recycled Materials in Airfield Mixtures for Cold Regions**
   Using RAP enhances the engineering properties of the asphalt mixture, such as improved rutting resistance, fatigue performance, and moisture sensitivity. This integration not only supports environmental goals but also ensures durable and high-performing airfield pavements capable of withstanding the unique challenges posed by cold climates. Although using 100% RAP is very challenging, this project provides an insight into do's and don'ts of using it on pavements.
5. **Phase change materials for deicing of pavement surface in winter weather**
   This proposal was proposed by Dr. Kabir for FY 2023-24 and was funded by ERDC. The project aimed to develop an alternative to salt used in pavements to aid deicing without deteriorating the pavement surface. These proposed materials undergo a phase transition, releasing latent heat upon solidification, effectively melting ice and snow. Incorporating PCMs into pavements improves safety by reducing ice accumulation, offering a sustainable solution for winter maintenance in cold climates.

Spring 2016-Summer 2020 — Graduate Research Assistant, Arizona State University

During his PhD, Dr Kabir have worked in parallel on a few projects. The connection between these projects was developing a smart, environmentally friendly asphalt binder. He has used waste polymers such as crumb rubber, and waste plastics and worked on low-cost devulcanization technology for rubber and surface functionalization for plastics. Research outcomes resulted into 20+ publications along with 3+ conference paper.

APPOINTMENTS (Continued)

Fall 2013- Summer 2015	*Graduate Research Associate*, North Carolina A&T State University During his MS in Civil Engineering, Dr. Kabir worked on developing mathematical modeling to predict subsurface water contaminant transport models. Two implemented algorithms were: Three-dimensional (3D) and Four-dimensional (4D) variational data assimilation (VAR) techniques, namely 3DVAR and 4DVAR. The outcome has been presented in a peer-reviewed scholarly article.

SELECT PUBLICATIONS (PAST FIVE YEARS)

1. Pahlavan, F., Kaur, H.; Khodadaditirkolaei, H.; **Kabir, S. F**; Lin, J.; Ackerman, B., Laura KG; Fini, E. H. (2025). A novel adsorbent for efficient metal recovery from aqueous solutions: Carbon-coated oil-treated plastic granules as a sustainable approach to resource conservation. Resources, Conservation and Recycling, Volume 223, 108521.
2. Revelli, V., **Kabir, S. F**., Ali, A., Mehta, Y., & Cox, B. C. (2024). Understanding the Storage Stability of Polyethylene Modified Binders: A Laboratory Case Study Using Waste Plastics. Journal of Materials in Civil Engineering, 36(4), 04024038.
3. Saadeh, S., Katawal, P., **Kabir, S. F.**, Fini, E. H., & Titi, H. H. (2024). Performance of reclaimed asphalt pavements containing recycled waste plastics. Journal of Cleaner Production, 442, 140935.
4. Ali, A., **Kabir, S. F.,** Ali, A., Elshaer, M., Mehta, Y., & Nazzal, M. (2023). Compactability and Performance of Warm-Mix Additives at Lower Than Traditional Compaction Temperatures. Journal of Materials in Civil Engineering, 35(12), 04023475.
5. Mitra, D., **Kabir, S. F.**, Ali, A., Mehta, Y., & Elshaer, M. (2023). Evaluation of the impact of nanomodification on Self-Healing behavior of asphalt binders. Construction and Building Materials, 405, 133358.
6. Revelli, V., **Kabir, S. F.**, Ali, A., Mehta, Y., Cox, B. C., & Elshaer, M. (2023). Storage Stability and Performance Assessment of Styrene-Butadiene-Styrene: Waste Polyethylene–Modified Binder Using Waste Cooking Oil. Journal of Materials in Civil Engineering, 35(11), 04023417.
7. **Kabir, S. F.**, Ali, A., Purdy, C., Decarlo, C., Elshaer, M., & Mehta, Y. (2023). Thermal cracking in cold regions' asphalt mixtures prepared using high polymer modified binders and softening agents. International Journal of Pavement Engineering, 24(2), 2147523.
8. **Kabir, S. F.**, Zheng, R., Delgado, A. G., & Fini, E. H. (2021). Use of microbially desulfurized rubber to produce sustainable rubberized bitumen. Resources, Conservation and Recycling, 164, 105144.
9. **Kabir, S. F.**, Sukumaran, S., Moghtadernejad, S., Barjasteh, E., & Fini, E. H. (2021). End of life plastics to enhance sustainability of pavement construction utilizing a hybrid treatment of bio-oil and carbon coating. Construction and Building Materials, 278, 122444.

RESEARCH GRANT

2023	US Army Engineer Research and Development Center (ERDC) under Contract No. W913E523C0007.

SYNERGISTIC ACTIVITIES

K-12 /Community Outreach	.• Delivered hands-on STEM outreach through the **NanoBus Program (NCA&TSU)**, engaging middle and high school students across six schools. • Contributed to K–12 laboratory outreach through live demonstrations promoting engineering concepts. • Mentored a high school student for a research project presented at the **Arizona Science and Engineering Fair (2020)**.
Research Chair and Award (Graduate Student Avisory Council)	• Partnered with the Graduate School Program Director in program planning and budget oversight; delivered student-centered instruction with emphasis on safety. •Served on GSAC, participating in competitive review and selection of graduate mini-research grant awardees.
Preparing Future Faculty Program	Dr. Kabir participated in this workshop as a preparation for future minority faculty preparing program held at North Carolina A&T State University and another in Auburn University. • Assisted in organizing two workshops and a symposium on sustainable bioadhesives (2018-2019), held in North Carolina and Arizona.

RESEARCH ADVISING & MENTORING

Research Mentoring	• Venkatsushanth Revelli (Ph.D) • Debzani Mitra (MS) • Mahmoud Samara (MS) • Abdelrahman Ali (MS)
Undergraduate Mentoring	Project 1- Investigating the Compatibility of Waste Plastics in Asphalt Binders to Reduce Phase Separation • Garrett Kerr, • Tamer Ozturk, • John Meale, • Walter Foard, • Christian Jones, • Zach Cyrelson Project 2- Laboratory Scale Investigation on Thermal Cracking of Asphalt Mixtures Prepared with Warm Mix Additives for Use in Cold Regions • Brayden Carr, • Deborah Onibuore, • Meghan Sparks, • Anthony Carr, • Boramy Virya

AWARDS

2020	• NSF proposal student grant on the economic viability of surface activated rubber,
2020	Travel grant, Transportation research board,
2019	• 3rd position in 9th SSEBE Competition ASU,
2015	• Top Graduate Student, NCA&TSU,
2003-2010	• Education Board Scholarship for Merit, Secondary and higher secondary school certificate,
1997-2000	• Education Board Scholarship for Merit, Primary school.

PATENTS/PATENT APP

US11717989B2- Treated plastic granules
US11261315 -Environmentally friendly asphalt binder additive
US Patent App. 17/822,304 -Hemp Composite
US Patent App. 17/643,377-Microbial desulfurization and surface activation of rubber

SCHOLARLY REVIEW

- Journal of Materials in Civil Engineering
- Resources, Conservation & Recycling Journal
- Coatings
- International Journal for Pavement Engineering
- ASCE Construction Research Congress (CRC)

PROFESSIONAL MEMBERSHIPS

- American Society of Civil Engineers (ASCE)
- Academy of Pavement Science and Engineering (APSE)