

Gabriel Nsengiyumva, Ph.D.

CAE Engineer

Tesla Inc.

Phone: (+1)402-686-7954

Email: gabriron01@gmail.com

Website: www.gnsengiyumva.com

1 Education and Employment History

1.1 Education History

- Doctor of Philosophy in Civil Engineering, 01/2020 – 12/2020 (with 4 years at UNL)
Texas A&M University, College Station, Texas
- Master of Science in Civil Engineering, 01/2014 – 12/2015
(Minor in Mechanical and Materials Engineering)
University of Nebraska-Lincoln, Lincoln, Nebraska
- Bachelor of Engineering in Civil Engineering, 01/2010 – 02/2014
Kyung Hee University, Suwon, South Korea

1.2 Employment History

- CAE Engineer, Analysis Engineering
Tesla Inc., 03/2022 – Present
- Postdoctoral Researcher, Texas A&M Engineering Experiment Station
Texas A&M University, 01/2021 – 03/2022
- Graduate Assistant - Research, Texas A&M Engineering Experiment Station
Texas A&M University, 01/2020 – 12/2020
- Graduate Research Assistant, Nebraska Transportation Center
University of Nebraska-Lincoln, 01/2015 – 12/2019
- Graduate Teaching Assistant, Nebraska Transportation Center
University of Nebraska-Lincoln, 01/2014 – 12/2015

2 Selected Honors and Awards

- Second Place in Modeling Inelasticity & Multiscale Behavior Student Paper Competition, EMI, 2020
- Best Poster Award, Geo-Omaha, 2019
- Outstanding Master Thesis Award, University of Nebraska-Lincoln, 2015
- College of Engineering Conference Travel Grant, University of Nebraska-Lincoln, 2015, 2019
- Nebraska Transportation Center Travel Fund, University of Nebraska-Lincoln, 2015, 2019
- Civil Engineering Scholarship, Kyung Hee University, 2010
- National Scholarship, Rwanda, 2010

3 Research Areas/Interests

- Nonlinear Mechanics of Solids
- Modeling and Characterization of Complex Heterogeneous Materials for Civil Engineering
- Engineering of Materials for Civil Infrastructure, Defense, Energy, and Health
- Constitutive Modeling of Materials: Viscoelasticity, Fracture, Damage, and Durability
- Recycling and Engineered Use of Infrastructure Materials
- Inverse Methods for Engineering Materials Characterization
- Additive Manufacturing for Nonconventional Materials and Design
- Artificial Intelligence for Performance Prediction of Infrastructure

4 Research Accomplishments

4.1 Publication

4.1.1 Peer-Reviewed Journal Publications

1. **G. Nsengiyumva**, and Y. Kim (2022). "Field Displacement-Based Inverse Method for Elastic and Viscoelastic Constitutive Properties". *Experimental Mechanics*.
<https://doi.org/10.1007/s11340-022-00876-0>
2. **G. Nsengiyumva**, H. Haghshenas, Y. Kim, and S. Kommidi. (2020). "Mechanical-Chemical Characterization of the Effects of Type, Dosage, and Treatment Methods of Rejuvenators in Aged Bituminous Materials", *Transportation Research Record*.
<https://doi.org/10.1177/0361198120909110>
3. **G. Nsengiyumva** and Y. Kim. (2019). "Effect of Testing Configuration in Semi-Circular Bending Fracture of Asphalt Mixtures: Experiments and Statistical Analyses", *Transportation Research Record*, 2673(5), 320–28. <https://doi.org/10.1177/0361198119839343>
4. S. Im, T. You, Y. Kim, **G. Nsengiyumva**, R. Rea, and H. Haghshenas. (2018). "Evaluation of Thin-Lift Overlay Pavement Preservation Practice: Mixture Testing, Pavement Performance, and Lifecycle Cost Analysis", *Journal of Transportation Engineering, Part B: Pavements*, 144(3), 04018037. <https://doi.org/10.1061/JPEODX.0000064>
5. M. Khedmati, H. Alanazi, Y. Kim, **G. Nsengiyumva**, and S. Moussavi. (2018). "Effects of Na₂O/SiO₂ molar ratio on properties of aggregate-paste interphase in fly ash-based geopolymer mixtures through multiscale measurements", *Construction and Building Materials*, 191, 564-574. <https://doi.org/10.1016/j.conbuildmat.2018.10.024>
6. K. Zare-Rami, Y. Kim, M. Khedmati, **G. Nsengiyumva**, and H. Alanazi. (2018). "Two-way linked multiscale method integrated with nanomechanical tests and cohesive zone fracture to model highly heterogeneous binding materials", *Journal of Engineering Mechanics*, 144(10), 04018095. [https://doi.org/10.1061/\(ASCE\)EM.1943-7889.0001518](https://doi.org/10.1061/(ASCE)EM.1943-7889.0001518)
7. **G. Nsengiyumva**, T. You, and Y. Kim. (2017). "Experimental-statistical investigation of testing variables of a semicircular bending (SCB) fracture test repeatability for bituminous mixtures", *Journal of Testing and Evaluation*, 45(5), 1691-1701.
<https://doi.org/10.1520/JTE20160103>

4.1.2 Peer-Reviewed Journal Publications (Revised/Submitted)

1. M. Rahmani, Y. Kim, and **G. Nsengiyumva** (202X) "Mechanistic Modeling of Reflective Cracking and Life Cycle Cost Analysis of Rehabilitated Flexible Pavements", Transportation Research Board
2. **G. Nsengiyumva**, P. Akula, Y. Kim and D.N.Little (202X). "Evaluating Fracture Properties of Chemically Stabilized Soil Using Digital Image Correlation and Finite Element Modeling", Experimental Mechanics
3. S. R. Kommidi, Y. Kim, and **G. Nsengiyumva**. (202X). "Modeling of Inelastic Deformation and Rate-dependent Fracture in Rat Bone." Journal of Engineering Mechanics, revised.
4. **G. Nsengiyumva** and Y. Kim. (202X). "Field Displacement-Based Inverse Method for Identifying Elastic and Viscoelastic Constitutive Properties of Materials." Experimental Mechanics

4.1.3 Peer-Reviewed Conference Articles: Proceedings or Abstracts

1. S. R. Kommidi, **G. Nsengiyumva**, Y. Kim, and D-G. Kim. (2020). "Characterization of Linear Viscoelastic Properties of Bone Microstructure Using Nanoindentation Test and Its Finite Element Modeling Incorporated with Inverse-Optimization Method." 2020 ASCE-EMI Student Paper Competition (MIMB Committee), **Best Paper Award (2nd Place)**.
2. **G. Nsengiyumva** and Y. Kim. (2020). "Constitutive Properties of Materials from Digital Image Correlation." AM3P (Advances in Materials and Pavement Performance Prediction) Conference, San Antonio, Texas.
3. J. E. S. Teixeira, **G. Nsengiyumva**, and Y. Kim. (2018). "Crack Modeling of Bituminous Mixtures Using Nonlinear Viscoelastic Cohesive Zone Considering Rate-, Mode-, and Aging-Dependent Fracture." Paper Abstract of the 2019 International Conference on Highway Pavements & Airfield Technology, Chicago, Illinois.
4. K. Zare-Rami, M. Khedmati, Y. Kim, S. Amelian, **G. Nsengiyumva**, and S. Kommidi. (2017). "Two-Way Linked Multiscale Modeling of Interphase Behavior in Cementitious Mixtures." Paper Abstract of the 2017 ASCE-EMI Annual Conference, University of California-San Diego, California.

4.1.4 Reports

1. M. Rahmani, **G. Nsengiyumva**, Y. Kim, and J. Hu. (2020). "Evaluation of Mixtures and Pavement Performance for Rehabilitation Methods."
2. **G. Nsengiyumva** and Y. Kim. (2020). "Feasibility and Implementation of Balanced Mix Design in Nebraska". Nebraska Transportation Center.
3. D. G. Linzell, Y. Kim, C. Fang, and **G. Nsengiyumva**. (2019). "Protecting Critical Civil Infrastructure Against Impact from Commercial Vehicles-Phase I"
4. H. Haghshenas, **G. Nsengiyumva**, Y. Kim, K. Santosh, and S. Amelian. (2019). "Research on High-RAP Asphalt Mixtures with Rejuvenators-Phase II."

5. **G. Nsengiyumva**, K. Santosh, Y. Kim, H. Xu, and Y. Yang. (2018). "New Mixture Additives for Sustainable Bituminous Pavements". Nebraska Transportation Center.
6. T. You, S. Im, Y. Kim, H. Haghshenas, and **G. Nsengiyumva**. (2015). "Evaluation of Thin Asphalt Overlay Practice Preserving Nebraska's Asphalt Pavements". Nebraska Transportation Center.
7. **Nsengiyumva, G.**, Kim, Y. R., & You, T. (2015). "Development of a Semicircular Bend (SCB) Test Method For Performance Testing of Nebraska Asphalt Mixtures". Mid-America Transportation Center.

4.1.5 Dissertation and Thesis

1. **G. Nsengiyumva**. (2020). "Advancement of Performance Test Methods of Bituminous Mixtures for Practical Implementation and Fundamental Understanding of Deformation and Fracture", Texas A&M University, College Station, Texas.
2. **G. Nsengiyumva**. (2015). "Development of semi-circular bending (SCB) fracture test for bituminous mixtures" University of Nebraska-Lincoln, Lincoln, Nebraska. (**Outstanding Master Thesis Award**).

4.2 Presentations

4.2.1 Conference Presentations

1. "Constitutive Properties of Materials from Digital Image Correlation." *Presented at the 2020 AM3P (Advances in Materials and Pavement Performance Prediction) Conference*, Virtual, 2020.
2. "Effects of Type, Dosage, and Treating Methods of Rejuvenators in Aged Bituminous Materials: Mechanical-Chemical Characterization." *Presented at the 99th Transportation Research Board Annual Meeting*, Washington, D.C., 2020.
3. "Effect of Testing Configuration in Semi-circular Bending Fracture of Asphalt Mixtures: Experiments and Statistical Analyses." *Presented at the 98th Transportation Research Board Annual Meeting*, Washington, D.C., 2019.
4. "Effect of Testing Configuration in Semi-circular Bending Fracture of Bituminous Mixtures: Experiments and Statistical Analyses." *Presented at the 2019 Geo-Omaha Conference*, Omaha, Nebraska, 2019. **Best Poster Award**.
5. "Thin Asphalt Overlay Pavement Preservation in Nebraska: Laboratory Tests, MEPDG, LCCA, and Field Performance." *Presented at the 96th Transportation Research Board Annual Meeting*, Washington, D.C., 2017.
6. "Investigation of Testing Variables of Semicircular Bending Test for Asphalt Concrete Mixtures: Experimental-Statistical Approach." *Presented at the 95th Transportation Research Board Annual Meeting*, Washington, D.C., 2016.
7. "Development of a Semicircular Bending Test Method to Advance Performance and Design of Nebraska Asphalt Mixtures" Invited Presentation at the 2019 Nebraska Asphalt Conference, Kearney, Nebraska, 2019.

8. "Determination of Material Properties from Experimental-Simulation Local Displacement Data Through Optimization" Invited Presentation at the University of Wisconsin-Madison, Madison, Wisconsin, 2019.

5 Teaching and Mentoring

5.1 Classroom Teaching

- Materials of Construction (Teaching Assistant) Junior Level
University of Nebraska-Lincoln, Lincoln, NE

5.2 Mentoring of Undergraduate Researchers

1. Mr. Murtaza Nalwala : 04/2017 - 08/2019
2. Mr. Landry Rubare : 09/2018 - 06/2019
3. Ms Sussan Moussavi : 05/2017 - 05/2018
4. Ms Capri Keeler : 10/2016 - 05/2018
5. Ms Jaya Washington : 06/2017 - 08/2017
6. Mr. Jason Kim : 06/2015 - 08/2015

5.2.1 Honors/Recognition With Undergraduate Mentees

1. J. Washington, **G. Nsengiyumva**, H. Alanazi, and Y. Kim. (2017). "Sustainable Infrastructure Mixtures with Alternative Cementitious Binder Enhancing Interphase Transition (ITZ) Properties". Research Experiences for Undergraduates. University of Nebraska-Lincoln, Lincoln, Nebraska. **(Best Poster Award)**.
2. J. Washington: Dwight Eisenhower Transportation Fellowship, 2017.
3. Capri Keeler: Chi Epsilon National Scholarship, 2018

6 Industry Experience

- CAE Engineer, Analysis Engineering March 2022 – Present
Tesla, Inc., Fremont, California, United States of America
- Intern, Department of Technology and Research June 2012 – August 2012
Dongsung Engineering Co., Ltd, Seongnam-si, Gyeonggi-do, Republic of Korea

7 Professional Service

7.1 Peer-Review of Journals

1. Transportation Research Record: Journal of the Transportation Research Board 2014 – Present
2. Journal of Transportation Engineering, Part B: Pavements (ASCE) 2014 – Present
3. Road Materials and Pavement Design (Taylor & Francis) 2014 – Present
4. Journal of Materials in Civil Engineering (ASCE) 2014 – Present
5. International Journal of Pavement Engineering (Taylor & Francis) 2014 – Present
6. Nuclear Engineering and Design (Elsevier) 2014 – Present
7. Journal of Testing and Evaluation (ASTM) 2014 – Present

8. Advances in Materials and Pavement Performance Prediction 2014 – Present

7.2 Leadership Activities

- Laboratory Manager, Texas A&M Engineering Experiment Station 01/2020 – Present
Texas A&M University, College Station, Texas
- President, Rwandan Students Association 12/2016 –12/2017
University of Nebraska-Lincoln, Lincoln, Nebraska
- Laboratory Manager, Geo-Materials Labs at Scott Engineering Center 12/2015 –12/2019
University of Nebraska-Lincoln, Lincoln, Nebraska

7.3 Outreach Activities

- NSF project dissemination activities, The Lincoln Children's Museum 04/2018
Lincoln, Nebraska
- NSF project dissemination activities, Nebraska Science Festival 04/2018
University of Nebraska State Museum, Lincoln, Nebraska

8 Professional Membership

1. American Society of Civil Engineers (ASCE)

9 Training Received

- Deep Learning Artificial Intelligence, Nvidia Deep Learning Institute, Spring 2020
Texas A&M University, College Station, Texas
- Preparing for Future Faculty, Office of Graduate Studies, Summer 2019
University of Nebraska-Lincoln, Lincoln, Nebraska
- Graduate Teaching Assistants' Workshop, Office of Graduate Studies, Summer 2016
University of Nebraska-Lincoln, Lincoln, Nebraska
- International Teaching Assistants Training, Office of Graduate Studies, Summer 2015
University of Nebraska-Lincoln, Lincoln, Nebraska
- Using Cluster of Supercomputers, Holland Computing Center, Summer 2015
University of Nebraska-Lincoln, Lincoln, NE
- Asphalt Technician Training, Nebraska Department of Transportation, Summer 2014
Lincoln, NE

10 Spoken Languages

1. Kinyarwanda Native
2. English Fluent
3. Korean Intermediate
4. French Intermediate
5. Swahili Basic

11 References

1. Ernest Nsabimana, Ph.D., | Minister of Infrastructure

Kimihurura, KG 1 Roundabout, Kigali
Phone: (+250)78-838-7125
Email: info@mininfra.gov.rw

GOVERNMENT OF RWANDA

2. Yong-Rak Kim, Ph.D., F.EMI | Professor (Ph.D. Advisor)

Zachry Department of Civil and Environmental Engineering
503H, DLEB | 3136 TAMU | College Station, TX 77843-3136
Phone: 979-847-7366
Email: yong-rak.kim@tamu.edu

TEXAS A&M UNIVERSITY

3. Mehrdad Negahban, Ph.D. | Professor

Department of Mechanical & Materials Engineering
W311 NH | 900 N 16th St | Lincoln, NE 68588-0526
Phone: 402-472-2397
Email: mnegahban@unl.edu

UNIVERSITY OF NEBRASKA-LINCOLN

4. Robert Rea, PE | Assistant Materials and Tests Engineer

Nebraska Department of Transportation
Materials and Research | 1400 Highway #2 | Lincoln, NE 68509
Phone: 402-479-3839
Email: robert.rea@nebraska.gov

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