University of Nebraska Lincoln

COLLEGE OF ENGINEERING
Department of Mechanical & Materials Engineering

15 January 2021

Black Trailblazer in Engineering (BTE) Committee
Purdue University
610 Purdue Mall
West Lafayette, IN 47907

Re: Cover Letter for Black Trailblazer in Engineering Workshop

Dear BTE Committee,

My name is Kossi Loic Mawunyegan Avegnon of the Mina tribe from West Africa. I was raised in French-speaking Togo and educated in English-speaking Ghana since the age of 16 years. Now, I am a graduate research assistant in Mechanical and Materials Engineering at the University of Nebraska-Lincoln (UNL) in advanced manufacturing. I started my Ph.D. studies in fall 2019 under the supervision of Dr. Michael Sealy who directs the Nebraska Engineering Additive Technologies (NEAT) Lab. Joining the NEAT Lab has been an amazing opportunity to gain skills that would benefit my long-term career goal to become a faculty member at an R1 research institute. In pursuit of this goal, I am applying to participate in the Black Trailblazers in Engineering (BTE) Workshop at Purdue University. As the only black graduate student in mechanical engineering at UNL, I clearly recognize the need to promote diversity in academia. Participation in the program enables me to advance my diversity goals by sharing ideas on effective K-12 outreach tools among participants; learn how to grow my manufacturing mentorship and apprenticeship network; and gain professional academic skills needed to build a successful research program and be competitive for funding.

Since my undergraduate studies, I invested my talents in building 3D printers using locally available materials and electronic waste found in everyday household appliances. I travelled throughout West Africa promoting recycling and reuse to keep materials out of landfills and repurposed them into value-added manufacturing equipment. Through that experience, I recognized the need to create avenues and opportunities for up-coming engineers in underserved communities. The untapped talent in these communities is awe-inspiring but needs strong advocates to promote pathways for success. I aim to provide these pathways through higher education. I decided to pursue a Ph.D. to advance my knowledge on problems and potential solutions in manufacturing that would help my community. Working with Dr. Sealy has broadened my exposure to possible career paths and ways to serve society through a position in academia.

My first experience was tutoring undergraduates at the University of Mines and Technology in Ghana as a teaching-assistant. I found it fulfilling to successfully explain machine design problems and concepts that were complex to me as a student. Later, I was an instructor of unmanned aerial vehicles for the Ghanaian Army. I lectured on drone components, safety, flight mechanics, maintenance, and drone defense. As a UNL student, I continue providing remote learning opportunities on solid modeling to underserved students from Ghana through a private-public education partnership known as University Hub.

I am also passionate about research. Since joining UNL, I have been actively involved in metal additive manufacturing for the Army, Navy, and NASA. I gained experience and insight on new research areas pertaining to fatigue, sensing, and in-situ monitoring. I am approximately one of ten students in the United States with in-depth expertise in hybrid additive manufacturing. I have two peer-reviewed publications, one under review, and two in preparation.

I am thankful to you for organizing this workshop and recognize its importance to my professional community. I truly hope to participate and contribute my experience and background. I look forward to learning more in the coming weeks.

Sincerely,

Kossi Loic M. Avegnon
Graduate Research Assistant, Nebraska Engineering Additive Technologies (NEAT) Lab
Department of Mechanical and Materials Engineering
University of Nebraska-Lincoln

Research Expertise and Interest:

My field of expertise is advanced manufacturing. My background is primarily experimental research in hybrid additive manufacturing (AM), machining, materials characterization, and mechanical testing. Hybrid additive manufacturing refers to coupling 3D printing with a secondary process. More specifically, my research interest at UNL has focused on developing a process-property-performance evaluation paradigm for online inspection of heterogenous 3D printed parts with high spatial resolution and accuracy using hybrid additive manufcaturing. The title of my dissertation is "Machining-based Sensing for Heterogenous Properties in Hybrid Additive Manufacturing." This work aims to solve challenges with inspecting additive parts by monitoring energy consumption using a pseudo-non-destructive machining method as a sensor. My five-year research plan is to continue pioneering fundamental science and engineering problems in hybrid additive manufacturing in a diverse and inclusive environment. I plan to grow my research background in advanced manufacturing by working as a visiting or post-doctoral scholar in other related areas with the aim of broadening my understanding of relevant scientific problems. Right now, my specific research interests to establish my future career are (1) signal decomposition machining-based sensing of metals in hybrid additive manufacturing, (2) irradiation resistant nuclear materials developed though hybrid AM; and (3) frugal manufacturing design and innovation for rural communities.

Research Agenda:

Project 1: Signal Decomposition after Machining-based Sensing of Metals in Hybrid AM - To improve the mechanical properties and performance of printed parts, AM is coupled with surface treatments, which forms complex internal reinforced domains that affects plastic flow. However, mapping the heterogeneous properties of hybrid parts is a challenge using existing data analysis tools due to a lack of resolution or accuracy. My research group will develop a new computational methods to decompose energy signals from pseudo-nondestructive milling that enables rapid, high-resolution mapping of heterogenous material properties. The outcome is improved quality control in aerospace and defense manufacturing.

Project 2: Irradiation Resistant Nuclear Materials by Hybrid AM - Molten salt reactors are subjected to highly corrosive environments at elevated temperatures. Next generation reactors require advanced materials capable of withstanding extreme environments. The overarching goal of this research is to improve the lifespan and irradiation resistance of nuclear materials by combining surface treatments and additive manufacturing to print favorable mechanical properties that inhibits stress corrosion cracking.

Project 3: *Frugal Additive Manufacturing of Concrete Houses* - Urban sprawl in Africa has resulted in a housing shortage. New manufacturing technologies are needed to fabricate housing that is affordable, uses locally sourced materials, and has a short production cycle. The use of additive manufactured concrete structures is growing in industrialized countries with well-established infrastructure. However, suburban African cities lack common infrastructure which prevents affordable middle class new housing developments. Therefore, this research seeks to understand granular mechanics and rheology of low-cost regional soils for use in additive manufactured housing.

Research Goals:

Career:	• Post-doctoral fellowship in advanced manufacturing • Tenure track faculty position at an R1 research university • Publish and present at the International Academy of Production Engineering (CIRP) General Assembly • Pursue training and opportunities for early career investigator grants (e.g., NSF CAREER, ONR YIP) • Learn how to recruit and mentor graduate students
Intellectual Property/ Startup	• Pursue new patents in frugal manufacturing and hybrid AM • Create new startup companies in Ghana and Togo in frugal manufacturing • Expand U.S. reach of electronic waste 3D printing through Klaks Technologies Ltd. • Create a cross continent remote or in-person platform for undergraduate research experiences in additive manufacturing

Educational Plan: My long-term educational goal is to train the next generation of engineers, particularly from underrepresented groups, in advanced manufacturing technology as well as the instill the skills needed to build and work in diverse and inclusive teams. In pursuit of this goal, my educational objective is to learn how to become a competitive faculty member capable of inspiring more black students to purse engineering careers. My approach is to gain mentorship through organizations such as the National Society of Black Engineers and the International Academy of Production Engineering (CIRP). CIRP represents the top scientists and engineers in manufacturing around the world, and I aim to produce strong scholarship that merits me becoming the first West African member in CIRP. I also aim to build an academic apprenticeship program targeting underrepresented students in the field of additive manufacturing. I have benefited from my advisor's apprenticeship program that has put me on a pathway to academic employment. I want to capitalize on my experience by targeting underrepresented groups from Africa.

Teaching Expertise and Interest: My teaching interests is content related to advanced manufacturing. In April 2020, I partnered with Ghanaian University of Mines and Technology (UMaT) to host an educational outreach opportunity for undergraduate students at the newly established University Hub. The University Hub is a center which focuses on equipping students with digital and entrepreneurial skills. I served as a design instructor. I taught SolidWorks and CAD design remotely to Ghanaian students in addition to my research and academic responsibilities at UNL. I was also a judge of a design competition our company held in July 2020 to support young Ghanaian engineers trying to solve local problems identified within the community. At UMaT, I served as a teaching assistant after graduating in 2017. While there, I held tutorial sessions for students and coordinated the development of a course curriculum plan for Bachelor degrees in Railway Engineering and Transportation Management in Ghana. The curriculum was adopted by the School of Railways and Infrastructure Development at Essikado in Ghana. Also, I taught unmanned aerial vehicles for the Ghanaian Army that helped me connect real-world problems to curriculum content.

In addition to advanced manufacturing, I am passionate about entrepreneurial education. As a student, I became a co-founder and lead designer of a startup company formed in 2017 known as Klaks Technologies Ltd. Klaks is a start-up company that builds 3D printers out of electronic waste. I developed several commercial products. The most notable is a 3D printed ear-phone holder that sold close to 500 units within the first 3 months. In fact, I was invited to the Ghana-British Council Innovation Exhibition in 2018 and presented on electronic waste manufacturing to Ghana's President (H. E. Nana Addo Dankwa Akufo-Addo), which was a highlight in my career. I hope to share my enthusiasm and passion for commercializing manufacturing technology through entrepreneurial education.

Education Goals

Promoting Diversity and Inclusion:	• *Recruiting African Graduate Students* - Establish an international additive manufacturing education series capitalizing on remote learning tools gained during the COVID pandemic. African universities are unable to afford metal additive manufacturing equipment; however, there is high demand in using additive manufacturing to solve everyday challenges in rural African communities. Therefore, I plan to provide a series of recorded lectures and live demonstrations on hybrid metal additive manufacturing to increase scientific literacy in the region and promote pathways for pursuing graduate education by sharing my experience. • *Outreach to Underrepresented Communities in K-12* - Mentor K-12 design project in additive manufacturing celebrating Black history
New Course Development	• Frugal Manufacturing: Building upon my experience in recycling electronic waste for building 3D printers, this course seeks to teach students how to innovatively think and design using low-cost off-the-shelf manufacturing solutions to solve everyday challenges of rural communities in Africa and the U.S. • Aerospace Additive Manufacturing: Building on my experience in drone education and additive manufacturing, this course teaches students design for manufacturing principles needed for aerial vehicles at low altitudes and space flight.
Professional Development:	• Attend the Purdue Black Trailblazers in Engineering Workshop and other National Society of Black Engineers Professional Development workshops • Complete a summer research exchange at the University of Rouen (France) • Attend proposal writing workshops and serve on reviewer panels after Ph.D. degree

Kossi Loic Mawunyegan Avegnon

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Lincoln, NE 68508

(402) 450-6561
kavegnon2@unl.edu

EDUCATION

- **Ph.D., Mechanical Engineering** GPA 3.764/4.00 May 2023
  University of Nebraska, Lincoln, NE
  - Thesis: Machining-based Sensing in Hybrid Additive Manufacturing
  - Advisor: Michael Sealy, Ph.D.

- **B.S., Mechanical Engineering** GPA 3.81/4.00 Jun. 2017
  University of Mines and Technology, Tarkwa, Ghana
  Graduated with honors: Magna Cum Laude (First Class Honors)

HONORS/AWARDS

- **Research,** 2nd NSF National Nanotechnology Coordinated Infrastructure Image Contest, Most Stunning (Honorable Mention), Plenty of Beauty at the Bottom — Oct. 2020
- **Research,** 1st Nebraska Center for Materials and Nanoscience NanoArt Competition, University of Nebraska-Lincoln — Sep. 2020
- **Innovation**, 1st Innovation Award for an electronic waste 3D printer, University of Mines and Technology Innovation and Career Fair, Tarkwa, Ghana — Apr. 2017

RESEARCH INTEREST

In-situ Process Monitoring: Development of an in-situ process monitoring method for the process performance assessment and understanding of defects formation of additively manufactured components (3D printed components) to improve quality control in the aerospace, and defense fields.

- Thermal imaging during printing
- Energy consumption during machining

RESEARCH EXPERIENCE

- **Research Assistant,** *Nebraska Eng. Additive Tech. (NEAT) Lab* Aug. 2019 - Present
  University of Nebraska, Lincoln, NE
  Advisor: Michael Sealy, Ph.D.
  - Fatigue Behavior of Metals from Additive Manufacturing
    - Investigated static and dynamic behavior of additively manufactured 316 SS and 630 SS
    - Measured surface integrity (*e.g.*, topography, microhardness, residual stress, microstructure) of additively manufactured 316 SS, 630 SS, and Ti6Al4V
    - Investigated the impact of print parameters and print orientation on surface integrity and mechanical properties

  - In-situ Monitoring of AlSi10Mg during Additive Manufacturing by Thermal Imaging
    - Integrated an in-situ thermal imaging camera to measure porosity defects during powder bed fusion on a Lumex Avance 25 hybrid metal 3D printer
    - Successfully demonstrated closed-loop defect detection and removal using Lumex built-in CNC milling platform
    - Co-developed python code for communication between thermal camera and CNC component of Matsuura Lumex Avance-25

  - Machining-based Sensing of Metals in Hybrid Additive Manufacturing
    - Investigated energy-based process signature during dry hard milling by examining the basic relationships between spindle motor resistance during milling and surface integrity as process parameters and tool flank wear vary

  - Demonstrated interlayer ultrasonic peening during additive manufacturing affects energy consumption in 316 SS and developed a tool to visually map energy data
  - First to demonstrate 8.7% increase in net cutting specific energy when milling interlayer ultrasonic peened 316 SS as compared to continuously printed.

- Impact Testing of Football Helmets Incorporating Novel 3D Printed Spacers
  - Lead student investigator of helmet impact tests for commercial partner, Hardhead Helmets LLC
  - Successfully showed energy absorption increased by 20% based on National Operating Committee on Standards for Athletic Equipment (NOCSAE) for drop impact tests

INDUSTRY EXPERIENCE

- **Entrepreneur and Founder** Tarkwa, Ghana Jun. 2016 - Present
  Klaks Technologies Ltd.
  - Lead designer and co-founder of 3D printing startup based on capstone design project
  - Raised approximately $20,000 in venture capital funding in first five months
  - Built the first polymer 3D printer from electronic e-waste in West-Africa
  - Invited to the Ghana-British Council Innovation Exhibition (2018) to present on e-waste manufacturing to Ghana's President (Nana Akufo-Addo)

- **Engineering Intern,** *Mechanical Engineering* Tarkwa, Ghana Aug. 2018
  University of Mines and Technology
  - Lead student safety auditor for the flotation blower and ball mill area at Golden Star Bogosso Ltd. mining company
  - Co-authored technical report on safety and maintenance measures needed to comply with The Minerals Commission Act in Ghana.

- **Engineering Intern,** *Manufacturing Department* Winneba, Ghana July. 2014
  Great KOSA Vision Ltd.
  - Built a Vernier caliper to assess design and manufacturing skills along with equipment competency
  - Trained to use lathe, grinding wheels, mills, shaping machines
  - Assisted in the body construction of first locally made armored car

TEACHING EXPERIENCE

- **Instructor,** *University Hub (Private-Public Education Partnership)* Apr 2020
  University of Mines and Technology and Klaks Technologies Ltd
  - Remote google classrooms instructor on SolidWorks for six students in Ghana
  - At the end of the course, students were expected to analyze 3D models, understand the basics of SolidWorks, and effectively create parts and assemblies using SolidWorks

- **Teaching Assistant,** *Mechanical and Materials Engineering Dept.* Aug. 2019 - Dec. 2019
  University of Nebraska-Lincoln, Lincoln, NE
  - Graded homework for MECH 370: Manufacturing Methods and Processes
  - Held weekly office hours to assist students with manufacturing problem solving in materials, mechanics, casting, forming, machining, and welding

- **Instructor,** *Soko Aerial Centre for Unmanned Aerial Vehicles* Feb. 2019 - Jul. 2019
  Ghana Army Signal Training School, Accra, Ghana
  - Primary drone instructor for quad-helicopters; lectured on drone components, safety, flight mechanics, maintenance, and drone defense
  - Developed the syllabus and content for a condensed one-week drone piloting course currently in use at the Centre

- Developed a multipurpose command vehicle for the Ghanaian army to assist in search and rescue as well as critical missions

- **Teaching Assistant,** *Mechanical Engineering Dept.* Aug. 2017 - May 2018
  University of Mines and Technology, Tarkwa, Ghana
  - Developed Industrial Maintenance course, including lecture content and handout materials, on work measurement and methods, ergonomics, time study and productivity.
  - Developed the course curriculum plan for the first Bachelors of Science degrees in Railway Engineering and Transport Management in Ghana

SKILLS

- **Modeling:** Abaqus, SolidWorkds, LumexCAM, MasterCAM, Fusion 360, Tekla Structures, AutoCAD
- **Programming**: Python, Matlab, Gcode for AM, Excel VBA
- **Hybrid Additive Manufacturing:** Directed energy deposition (Optomec LENS® + Milling); Powder bed fusion (Matsuura Lumex Avance-25 + Milling) Fused filament fabrication
- **Surface Treatments:** Laser shock peening, shot peening, ultrasonic peening
- **Characterization:** Scanning electron microscope, electron backscattered diffraction, energy dispersive X-ray spectroscopy, microhardness, optical microscopy, mechanical polishing, electrochemical polishing
- **Material testing:** Residual stress measurement (hole drilling), tensile testing, shear testing, fatigue testing, digital image correlation (strain measurement) energy, microhardness, optical microscopy, polishing
- **Languages:** English (fluent) French (fluent)

PUBLICATIONS

- **Journal Articles**

  [1] Anthony Simons, **Kossi L. M. Avegnon**, Cyrus Addy, 2019, "Design and Development of a Delta 3D Printer Using Salvaged E-Waste Materials," *Journal of Engineering,* 2019, pp. 1-9. doi: 10.1155/2019/5175323.

  [2] Anthony Simons, Daniel Amankwah, **Kossi L. M. Avegnon**, Adaze, E., (2018), "Finite Element Analysis of Electrically-Powered Cable Stripper," *Ghana Journal of Technology*, 3(1), pp. 1-8.

- **Conference Proceedings**

  [1] Anthony Simons, Daniel Amankwah, **Kossi L. M. Avegnon**, Ernest Adaze, 2018, "Design of Electrically Powered Cable Stripper for Nexans Kabel Metal (Gh) Limited," *Proceedings of the Fifth Biennial UMaT International Conference on Mining & Mineral Proceeding, "Expanding the Frontiers of Mining Technology,"* Aug. 1-4, 2018, Tarkwa, Ghana.

  [2] Anthony Simons, Merschak Ehurone, **Kossi L. M. Avegnon**, 2018, "Design of an Alignment Device for Undercarriage Track Link of Earthmoving Machines at Mantrac (CAT) Workshop (Kumasi)," *Proceedings of the Fifth Biennial UMaT International Conference on Mining & Mineral Proceeding, "Expanding the Frontiers of Mining Technology,"* Aug. 1-4, 2018, Tarkwa, Ghana.

SERVICE / LEADERSHIP

- **Reviewer Experience:** (Under Advisor's Supervision)
  - ASME – J. Micro- and Nano-Manufacturing 1 paper since 2020
  - CIRP – J. Manufacturing Science and Technology 1 paper since 2020
  - IME – J. Engineering in Medicine 1 paper since 2020

- Mentored research team working on surface treatments of hybrid AM metal parts (2020)

- **Exhibitions & Educational Outreach in Additive Manufacturing**
  - Ghana-British Council Innovation Exhibition, Accra, Ghana — Aug 2017
  - #3DPrint Africa Open Workshop, Accra, Ghana — Jan 2017
    Woelab, Lomé, Togo
  - Innovation Week at Advance Information Technology — Sept. 2016
    Institute-Kofi Annan Centre of Excellence, Accra, Ghana
  - Technology & Innovation Fair, Ministry of environment, Accra, Ghana — Sept. 2016

REFERENCES

- **Dr. Michael Sealy**
  Asst. Professor, Mechanical Engineering
  University of Nebraska-Lincoln
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  Chief executive officer, Soko Aerial Centre for Unmanned Aerial Vehicles
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  Burma Camp, Accra, Ghana

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  Tarkwa, Ghana

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University of Nebraska Lincoln

COLLEGE OF ENGINEERING
Department of Mechanical & Materials Engineering

January 18, 2021

Black Trailblazers in Engineering
610 Purdue Mall
Hovde Hall
West Lafayette IN 47907

Re: Recommending Mr. Kossi Loic Avegnon for Black Trailblazer in Engineering Program

To whom it may concern:,

I am writing this letter in support of Mr. Kossi Loic Avegnon's application for the Black Trailblazer in Engineering Program. I am an Assistant Professor in Mechanical and Materials Engineering at the University of Nebraska-Lincoln specializing in advanced manufacturing for medicine and food. I have known Loic for nearly 1.5 years as a graduate research assistant in my lab. He was also a student in my investigative research course on additive manufacturing last spring and my engineering entrepreneurship course last fall. It has been a joy to teach and work with Loic. He is a well-rounded candidate that excels in both academics and leadership. I would rank him in the top 1% of the students that has made a significant contribution to the mechanical engineering profession, our department, and the broader scientific community. He is a worthy recipient to your program.

Loic's research and academic performance have been exceptional. In his second year, he won 2nd place in a nationwide National Science Foundation Image Contest, know as Plenty of Beauty at the Bottom, for his research in additive manufacturing. His cumulative GPA is a respectable 3.76. He performed exceptionally well in my experimental research course on Additive Manufacturing, where the goal was to blend traditional lecture style learning with hands-on investigative research. In my class, he managed a team that investigated machined-based sensing of stress fields after interlayer peening during additive manufacturing. His research objective was to test hypothesis was that anisotropic variation in mechanical properties was proportional to the energy consumed during milling of as-printed and interlayer ultrasonic peened samples. Mapping heterogeneous variation of energy consumed during milling helps decouple effects from inducing internally reinforced domains with the innate variation caused by printing. His results were scheduled to be presented at 2020 Solid Freeform Fabrication Symposium (academia's largest additive manufacturing conference) in Austin, TX; however, COVID-19 disruptions delayed dissemination. His team was the only one out of seven to produce a journal quality manuscript, which is currently under review. In terms of impact, this work represents the first known study on machined-based sensing for metal additive manufacturing and demonstrates a simple, low-cost solution for detecting defects. Defect detection has been identified as a high priority for aerospace and medical device industries which have no margin for error that could otherwise result in catastrophic failure. I was highly impressed and pleased with his research work. In terms of service, he trained his teammates on using the power

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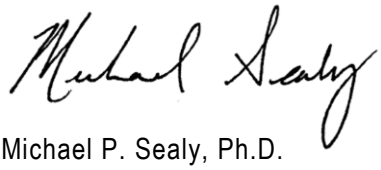
analyzer, Optomec LENS metal 3D printer, and a data analysis toolkit. He was assessed by his peers and received perfect marks for participation, quality of work, timeliness, and professionalism from all teammates.

Lastly, I would like to address Loic's leadership and innovation attributes. As an undergraduate student, Loic successfully formed a startup company to recycle electronic waste for use in 3D printers. His company has been highlighted across west Africa with recognition from the Ghanaian President. Since joining UNL, he continues to serve his alma mater, the University of Mines and Technology (Ghana), through educational outreach activities, such as a Solidworks instructor or the COVID-19 design innovation judge. He continues to mentor undergraduate and graduate students in building research skills.

Loic's long-term career goal is to pursue a faculty position in the U.S. This opportunity would help build his network and become a more competitive independent academic scholar. He has my highest recommendation for acceptance. Let me know if I can be of further assistance in the evaluation of his application.

Sincerely,



Michael P. Sealy, Ph.D.
Assistant Professor, Mechanical and Materials Engineering
University of Nebraska-Lincoln

January 22nd, 2021

Black Trailblazers in Engineering (BTE) Committee
Purdue University, College of Engineering
701 West Stadium Avenue
West Lafayette, IN 47907

Dear Members of the BTE Committee,

It is with great excitement that I write this letter on behalf of Kossi Loic Mawunyegan Avegnon, in support of his application to participate in the Black Trailblazers in Engineering (BTE) program.

I first met Loic almost two years ago when he joined the Mechanical and Materials Engineering department at the University of Nebraska-Lincoln. During the past year I have also had the opportunity to collaborate with him in a research project, which has allowed me to know him better as a person and as a scholar. Loic is a brilliant self-driven independent learner, and his initiative, persistence, and dedication to his scholar and academic activities is exemplary. Equally important is his personal character, and Loic is always kind, respectful, and generous; he is the type of person that makes everyone feel immediately welcomed and included.

Loic is a member of the additive manufacturing (AM) research cluster in our College. Although there are several more senior members, he quickly has become the primary point of contact of his group. In addition to his academic, teaching, and research responsibilities, he strived to become an expert in all aspects of the metal AM and surface treatment equipment available in our College. This expertise was extremely valuable for our most recent research project in which we studied the effect of different surface treatments when used as hybrid processes with metal AM. Even though the scope of this project was well beyond his responsibilities, Loic had the initiative to jump in and treated every aspect of the work thoughtfully and diligently. He offered ideas and solutions to improve the safety and efficiency of difficult manufacturing steps, worked evenings and weekends to reduce our total manufacturing time, and often took care of the transitions in the metal AM process which are amongst the most time consuming and troublesome AM tasks. Loic is creative, dependable, and enthusiastic, and I would gladly collaborate with him anytime.

Even before working together in this project, Loic had approached me with questions related to acoustic and ultrasonic measurements, and we have had several very productive conversations related to his research ideas. He quickly learned the basics of acoustic measurements, signal processing, and ultrasonic nondestructive evaluation. Moreover, he readily applied this new information to his own research efforts. Loic approaches both learning and teaching with respect and a positive attitude, which I believe stem from his genuine commitment to lifelong-learning. He listens attentively, asks questions, engages in productive discussions, and always shows empathy.

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Working closely with him has also allowed me to learn more about him and his goals. He is the only black student in our department and one of the few black students in our College. This awareness has inspired him to advocate to improve our College's recruitment and retention of black engineers. Loic has an incredibly diverse background from the places he's lived in, his fluency in different languages, his understanding of different African cultures, his life experiences, and his technical expertise. This background allows him to easily connect with others and makes him a valuable asset to promoting inclusive excellence in any team. Additionally, Loic is determined to become a faculty member and has strong entrepreneurial inclinations; he is well-positioned and oriented to maximize the social impact of his scholarly, academic, and engagement work.

Loic has the intelligence, ideas, initiative, personality, and drive to become a faculty trailblazer in engineering and open pathways for students from all backgrounds to participate and be successful in engineering disciplines. Loic strives for excellence in every aspect of his life and inspires us around him to do the same. I am confident Loic will become a pivotal asset to the department he joins in the future, and I am looking forward to seeing his success and impact. For these reasons, I highly recommend Loic for the Purdue BTE program.

I would be happy to further discuss Loic's skills and character and provide any additional information. Please contact me at (956) 309-4774 or luz.sotelo@huskers.unl.edu.

Sincerely,

Luz D. Sotelo (she|they)
Ph.D. Candidate, University of Nebraska–Lincoln