Olivia K. Hernandez

The Ohio State University
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Hernandez.127@osu.edu

Dear Black Trailblazers in Engineering committee,

I am excited to be applying for the Black Trailblazers in Engineering Workshop. As a Black woman in STEM, I am passionate about networking with, and learning from, others who are similar to myself and seeing what obstacles they have faced which would allow me to be better able to help and assist others who are facing similar circumstances in successfully overcoming them. Further, this program would allow me to gain skills into working in the academic arena, and understanding norms of academic success which often seem to be unwritten.

It is important to have role models that look like you, and it is my goal to be a role model for Black individuals in engineering by being an engineering faculty member. I have been watching the "SeeHer" campaign which focuses on having accurate representations of females in the media. This is a great start, but I fear does not have the depth needed. With the volatility around race in the United States, and the burgeoning BLM movement, I feel it is even more relevant to have programs and workshops that focus on developing the next generation of Black leaders to be strong and prepared to take on the world. In order to do this, I need to have the tools and skills to help others recognize their highest potential, and BTE can provide me with what I need so that I can aid others.

While I was a TA for a Quality and Reliability Engineering course, I recognized the value of encouraging a student who came to me for advice on potentially pursuing a higher degree. I also volunteered to be a mentor while I was working in financial services for new hires in the Corporate Development Program (for fast-tracking high potential new hires as managers). Serving not only as a role model, but a mentor, and positive example for Black engineers are my goals for being an engineering faculty member. I was also a camp leader for a summer camp for girls interested in STEM at The Ohio State University. Thus far, I have attended multiple conferences and given presentations on my research to show that driven and successful Black engineers are out there. My publications have hundreds of reads, and there are more manuscripts in the works. I will be continuing my research and education in a postdoctoral position as Drexel University.

I believe in the value of having diversity of opinions, experiences, viewpoints, and races, to name just a few. Personally, I have created my PhD research by combining Human Factors with Operations Research, which has allowed novel connections and deeper understanding of problems with an aim of improving comprehension for students via active learning. In general, diversity allows creative collaborations which can take the best of different areas and create something new and improved, which is illustrated in my dissertation. Yet, diversity can also cause discomfort, at least initially, so it is beneficial to provide support for those who have great knowledge to share, but may require some additional assistance to do so, such as I will be able to do by utilizing the tools that the BTE program will provide.

Thank you for your consideration and time. I look forward to hearing from you.

Sincerely,

Olivia Kay Hernandez

Research and Education Plan

A multi-pronged approach is proposed, which includes the following facets. Note, these areas are not mutually exclusive:

1) Involvement with novel and cutting-edge technologies
2) Targeted recruitment in STEM and predominantly Black schools
3) Support systems and services
4) Applying skills in the real world
5) Having role models or examples of successful Black engineers

Involvement with novel and cutting-edge technologies

I would like to continue some of the work from my dissertation, specifically around the use of augmented reality (AR) with a virtual patient that displays subtle visual cues for enhancing the ability of trainees to perform sensemaking in order to accurately diagnose a patient and create an appropriate treatment plan using active learning. Though thus far I have only worked with AR, virtual reality is another area I find interesting and could readily relate to my previous studies. I would like to extend what I have done with AR to other technologies. Active learning is more engaging for students, and provides collaboration opportunities and accessibility for students with differing learning styles.

There are always a lot of new, cool things going on in engineering, and by exposing Black students to that we can spark interest and showcase new fields which they may want to pursue in higher education. Illustrating the breadth of engineering can help students find the best fit for their interests.

Targeted recruitment in STEM and predominantly Black schools

For the continuation and expansion of my dissertation work, the development of self-contained programs that can supplement existing STEM education in K-12, focusing on schools that are mostly Black, as well as community colleges, can be created. The goals would be to generate interest, and increase exposure and awareness of these fields among underrepresented groups. This can be done in low risk and low consequence simulated active learning environments through the use of AR.

Providing resources to excite and encourage Black youth to become involved in STEM courses need not only come in monetary form, but also by providing technology, mentors and role models as discussed in additional detail later. The assets do not need to be limited to Black youth, but also other underserved populations. This takes into account proactive concepts of universal instructional design. When the environment is accessible for everyone, a wide range of groups can be included, especially Black youth.

Support systems and services

Encouraging use of existing resources by illustrating where to find them and how to apply or use them can squeeze additional value out of what is already present and expose it to those who might need it most. This can be done by joining clubs or groups, or advertising available resources such as career services. This can also be used to find gaps and remediate them, with possibly the establishment of new chapters of national groups, or the creation of net new groups e.g., NSBE. Demonstrating there is a strong support system in place and how Black engineers encourage one another and there is camaraderie rather than simply competition can provide additional encouragement for Black youth to enter engineering. Black engineering faculty can volunteer for school organizations, or participate in mentoring programs.

Presently, with my dissertation research, the AR virtual patient is a young adult White male. The educational and practical value of the AR can be enhanced by allowing diverse patient representation via the selection of different factors, including gender, age, ethnic group, or body type.

Applying skills in the real world

I feel that having projects with companies or other partners working on real world issues can provide value and benefit for engineering students regardless of current education level. The ability to apply skills learned in the classroom to the world can instill a sense of accomplishment, pride and self-worth, and allows the student to have tangible evidence of their skillset. It is also beneficial for interviewing and resume building. Knowledge of one's capability can help bolster the student's confidence through potential rough times, for example receiving a poor grade. By having good relationships with companies, other academic institutions, or even other departments within the same academic institution, many new opportunities can be provided to students.

The actual implementation of the students' ideas aids in demonstrating their degree of understanding of the issue and how to resolve it, returning to active learning concepts. Further, saving money or reducing defects can have an evident impact on the company or institution. Having a variety of engineering students on a single project can mimic the real world and can allow for creative problem solving and networking.

Having role models or examples of successful Black engineers

There is something to be said for having role models that look like you. If they were able to do it, then why couldn't I do it as well? By being active and taking on challenging roles, we can provide the exposure needed to show that we can, and will, succeed in our chosen field. Past studies have shown that students, particularly Black females, benefitted from having teachers who looked similar to themselves for conceptualizing dreams of higher education, and generally trying harder in school.

We can give them something to aspire to, something they might not even have known they could do. Faculty have a hand in shaping their student's future, this is not only a huge responsibility, but also a huge gift and opportunity. Faculty should be imbued with the ability to capitalize on this opportunity, and programs such as BTE can support that endeavor.

Olivia K. Hernandez

Citizen U.S.A., Born in New York, N.Y.

Department of Integrated Systems Engineering, The Ohio State University

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EDUCATION

PhD 2021 (Requirements completed December 2020, degree will be conferred May 2021)
OHIO STATE UNIVERSITY, Industrial and Systems Engineering. Human Factors and Operations Research
Dissertation Title: *Designing Simulation-Based Active Learning Activities Using Augmented Reality and Sets of Offline Games.*
Co-advised by Theodore T. Allen and Emily S. Patterson
Research funded by Defense Health Administration Phase II STTR with Unveil, LLC

Certification 2014 **HUMAN FACTORS INTERNATIONAL,** Certified Usability Analyst

MS 2009 **OHIO STATE UNIVERSITY**, Industrial and Systems Engineering. G.P.A. 3.81/4.00
Thesis Title: *The Potential for Tele-Presence to Assist and Aid with the Supervision of Medication Self-Management*.

BA 2007 **DENISON UNIVERSITY**, Major in English Writing, Minor in Mathematics

RESEARCH INTERESTS

Clinical informatics, simulation, experimental design, data science, human factors engineering, game-based training, active learning

AWARDS

- Ohio State University Graduate Fellowships for Femtosecond Laser Research (Fall 07-Winter 08) and Safety (Winter-Spring 09), Full Tuition
- Faculty Scholarship for Achievement at Denison University, Full Tuition
- National Achievement Scholarship
- Vinton R. Shepard Memorial Scholarship at Denison University

PUBLICATIONS

1. Hernandez, O. K., San Miguel, C. E., Militello, L., Sushereba, C., Wolf, S., Allen, T. T., Bahner, D., Amin, S., Mansour, L., Chirumamilla, V., & Patterson, E. S. (2020, September). Assessing Whether Recognition Skill Development is Enhanced with Augmented Reality-Based Training as Compared to Traditional Training: A Laboratory Study. In *Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care* (Vol. 9, No. 1, pp. 51-55). Sage CA: Los Angeles, CA: SAGE Publications.

2. Allen, T. T., Hernandez, O. K., Roychowdhury, S., & Patterson, E. S. (2020, September). Practical Optimal Scheduling for Surgery. In *Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care* (Vol. 9, No. 1, pp. 10-14). Sage CA: Los Angeles, CA: SAGE Publications.
3. Allen, T. T., Hernandez, O. K., & Alomair, A. (2020, May). Optimal off-line experimentation for games. *Decision Analysis*, *17(*4), 277-298.
4. Allen, T. T., Yang, M., Huang, S., & Hernandez, O. K. (2020). Determining resource requirements for elections using indifference-zone generalized binary search. *Computers & Industrial Engineering, 140,* 106243.
5. Allen, T. T., Yang, M., Huang, S., & Hernandez, O. (2020). Method to allocate voting resources with unequal ballots and/or education. *MethodsX*, 100872.
6. Militello, L., Sushereba, C., Hernandez, O., & Patterson, E. S. (2019, September). Augmented Reality Adaptive Training Principles. In *Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care* (Vol. 8, No. 1, pp. 72-75). Sage CA: Los Angeles, CA: SAGE Publications.
7. Hernandez, O. K., Allen, T. T., & Samuelson, D. A. (2017). Wargames Illuminate Cyber Threat Discovery. *OR/MS Today, 44(*4*).*
8. Hernandez, O. K., Sommerich, C. M., & Woods, D. D. (2011). Telepresence as an aid for medication self-management. *Ergonomics in Design* (IF:0.47), *19*(3), 15-23.
9. Chin-Parker, S., Hernandez, O., & Matens, M. (2006). Explanation in category learning. In *Proceedings of the Annual Meeting of the Cognitive Science Society* (Vol. 28, No. 28).

WORK EXPERIENCE

The Ohio State University, Columbus, OH
Graduate Research Associate, Spring 2017, Fall 2018 – Fall 2020

- Assessing Augmented Reality-Based training software for teaching medical students how to diagnose tension pneumothorax, airway obstruction, and hemorrhage cases
- Paper at the 2020 Human Factors in Healthcare Symposium (presentation canceled due to COVID-19)
- Presented at the 85th MORS Symposium about Wargaming and Cyber Issues
- Presented at the 2018 Joint Research Conference on Statistics in Quality, Industry and Technology

The Ohio State University, Columbus, OH
Graduate Teaching Associate, Fall 2017 – Spring 2018

- Guest lecturer for ISE 4120, Quality and Reliability Engineering
- Graded and supported statistical quality control and quality management systems
- Co-taught Lean Six Sigma tools and project-related instruction

JP Morgan Chase, Columbus, OH
Business Banking Business Analyst, 2012 – 2016, Assistant Vice President (highest title)

- Liaison between development and business on requirements, reconciling conflicts and implementing changes
- Utilizing knowledge capital to manage complex projects throughout their lifecycles while partnering with key stakeholders
- Defining, validating, clarifying and documenting business requirements with cross-functional teams while managing scope
- Taking ownership of applications, design reviews, and regulatory projects
- Accomplishments: Learning new tools and taking training to supplement hands-on experience; reviewing and documenting new processes while asking questions to ensure understanding; successfully working with a vendor on a first-mover product; meeting tight and dynamic timelines; member of the Business Banking Diversity Advisory Group (recognized for outstanding leadership)

SKILLS

JMP/SAS statistical software, Minitab, statistical quality control, experimental design, usability testing, heuristic reviews

INTERESTS

Expert custom-designed cakes, promoting underrepresented minorities including Blacks, women, and Latinx in engineering and management

College of Medicine
School of Health & Rehabilitation Sciences
Health Information Management
and Systems Division

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January 19, 2021

Dear Chair of the BTE program,

It is with great pleasure that I strongly recommend Dr. Olivia Hernandez for participation in your BTE program. Dr. Hernandez is now beginning a postdoctoral position at Drexel University with an excellent academic mentor and department chair, Dr. Ellen Bass. In December, Dr. Hernandez graduated from our Industrial and Systems Engineering program, which is the same one that I graduated from in 1999. I served as Olivia's co-advisor for her PhD along with Ted Allen. I first became acquainted with Olivia when she was co-advised by Dr. Carolyn Sommerich and Dr. David Woods for her master's program, after which she worked in the financial sector for a number of years. She impressed me then as a student who was highly articulate, professional, organized, competent, and studious.

I was happily surprised to learn that Olivia was open to getting a PhD several years later when I interacted with her at an OSU alumni event along with Dr. Allen. She had become disenchanted with the tedium and unrelenting workload at a financial institution, and had decided that she would become an entrepreneur and start her own business making gourmet cakes for events. She also experienced some problematic situations where her real contributions were undervalued, and on some occasions, actually undermined in order to 'give cover' to others who had made mistakes. Given her considerable talents, intellect, and abilities, both myself and her co-adviser felt that she had much to give as a hybrid PhD student in operations research/analytics and human factors, and that she would be particularly well-suited to academia.

As her co-advisor, I have witnessed her drive, creativity, excellent communication skills and strong analytical skills, a combination that enabled her to achieve excellent results. The word that most comes to mind when describing Olivia is brave. She was able to craft a unique hybrid field and defend her dissertation proposal with Dr. Marc Posner, a true expert in operations research who asked her detailed questions about game theory and Markov Decision Processes, as well as human factors experts such as myself about how the augmented reality technology she was studying could aid the ability to improve sensemaking as a macrocognition function. Her main application domain was education, and her graduate representative from physics, who was assigned in the last few weeks, also quizzed her intensely on the literature relating to generating mental models, active learning, and the use of reflection in learning. She exhibited great poise and maturity, and a learning attitude relating to a commitment to follow up after the defense to expand any knowledge gaps uncovered during the defense.

When I was interviewing her to be a PhD student, one of the choices that she made previously truly impressed me. She had identified that she perceived herself to be weak in receiving rejection and strong criticism. Therefore, she spent several months doing 'cold calling' in a telemarketing position to improve that aspect. At the time she did this, it was a position much below what she could get, but it was important to her to address what she considered a barrier to learning and growing. I think that this mindset is one of the reasons that Dr. Hernandez received a full ride scholarship to Denison University as an English student and a track athlete.

In looking for postdoctoral positions, Dr. Hernandez articulated a clear vision for what she wanted to continue to grow in and what questions she wants to answer for herself before embarking on an academic career. She turned down a few postdoc opportunities without having other opportunities yet available due to her conviction that her top priority was growing in her selected areas and determining the best fit for her in relation to the many possibilities that she had available to her. She knows exactly how she can contribute to the research funding her postdoc position as well as take advantage of one of the best mentors possible to take her to her next step in her career.

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Lacking in her mentorship to date has been a role model of a Black woman or man in STEM who has been highly successful in the extremely challenging funding environments in Tier 1 universities, particularly with healthcare funding. I believe that Dr. Hernandez might benefit from coaching and encouragement that she has the foundation and skills to meet these challenges. I also think that other academic environments might better match her goals, and particularly positions where she can focus on applying augmented reality-based simulations for education. The National Science Foundation and equity-focused educational opportunities seem like an excellent 'first step' for her to learn about in her post-PhD training in order to successfully launch a tenure track (or clinical track) career in academia. For so many reasons, I think that your BTE program is exactly what she needs at this time in her career, and I hope that you will agree that her intellectual potential and personal characteristics earn her a valuable spot in the program.

I am happy to answer any questions at patterson.150@osu.edu.

Sincerely,

Emily S. Patterson, Ph.D.

THE OHIO STATE UNIVERSITY

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September 28, 2020
Re: Olivia Hernandez

To Whom It May Concern:
My name is Dr. Theodore T. Allen and I am writing this letter in support of Olivia Hernandez, my Ph.D. student (co-advised with Emily S. Patterson). I am an associate professor, member of the MIT Election Laboratory, an area editor for *Computers & Industrial Engineering* (IF: 4.1), and a fellow of ASQ. I have advised 21 Ph.D. students to completion and am currently advising nine Ph.D. students and am PI on grants from NSF, the State of Ohio, Honda Manufacturing of America, and the Rosen Group.

Of the 30 Ph.D. students for whom I served as primary adviser; Olivia is the most likely to become a successful professor. This follows because she has excellent personal and writing skills. She also has the demonstrated capability to be an excellent presenter and instructor. Further, Olivia can write her own work and edit and improve existing journal articles. Of our three journal articles together, she was the lead two revisions and wrote and conceptualized key passages. In addition, Olivia has minority status both because she is black and Hispanic. This could help her to serve as an excellent role model for two types of underrepresented minorities in addition to women in engineering.

Olivia is also a pleasant and likable person. If she does not like something you say, she will inform you in a professional and sensitive manner. She is also a good usability analyst who significantly improved our software for election officials with her careful editing and attention to details.

Olivia's research spans both operations research, analytics, and human factors. Our papers on optimal experimentation for offline gaming (*Decision Analysis*) and optimal machine allocation for fair elections (*Computer & Industrial Engineering*) are potentially quite important. These are regarded as top tier journals by many departments. The *MethodX* article may be practically important for election officials. Further, there is much scope for continued research, e.g., sequential games, supporting learning, and faster allocation methods. Olivia's good grades in operations research indicate significant aptitude.

However, Olivia's current passion relates to human factors engineering. Her work running a study for her co-advisor, Emily Patterson, attests to her ability to work and think independently in relation to the complications of running a high technology study involving medical students. I would expect more research primarily in the human factors area.

There are a few reasons why I am excited that Olivia is doing a postdoctoral job at Drexel before starting as faculty. These relate to opportunities for personal growth. She is further developing her own creativity and desire to lead research projects. She is building her network and tuning her vision for what is likely important. Further, while her presentation at the Military Operations Research symposium was excellent, her presentation at a statistical conference on an esoteric topic, is improving.

If any questions arise about Olivia, please contact me. My email address is allen.515@osu.edu and my phone number is 614-668-4769.

Respectfully yours,

Theodore Allen, Ph.D.
Associate Professor