Bassel El Mabsout ◇ Cover Letter

Faculty Search Committee Luddy School of Informatics, Computing, and Engineering Indiana University Bloomington

Dear Search Committee Members,

I am writing to apply for the interdisciplinary faculty position in artificial intelligence and machine learning at Indiana University Bloomington. As a Ph.D. candidate in Computer Science at Boston University, advised by Dr. Renato Mancuso, I am thrilled by IU's initiative to transform our understanding of human and artificial intelligence. My research spans robotics, machine learning, and programming languages, with particular focus on making robotic systems more capable and efficient through novel learning approaches.

My research addresses fundamental challenges in robotic intelligence through an interdisciplinary lens. Even with massive computational resources, current robots struggle with seemingly simple tasks like opening doors or achieving reliable locomotion. My work tackles these limitations by combining insights from control theory, machine learning, and programming languages. For example, I've developed the CAPS regularization technique for achieving robust reinforcement learning based control, becoming a cornerstone reference in efficient reinforcement learning. Additionally, my work on "anchor critics" addresses the critical challenge of sim-to-real transfer, enabling robust adaptation while preventing catastrophic forgetting. I've also built AQS, a domain-specific language that helps roboticists intuitively specify complex robot policies, significantly outperforming state-of-the-art methods in sample efficiency. These contributions have garnered over 100 citations, showing significant impact across robotics and AI communities.

My future research program aligns perfectly with IU's interdisciplinary vision and the Luddy AI Center's mission. I plan to develop new theoretical foundations for reliable and efficient robotic learning, bridging formal methods with learning-based approaches. I see exciting opportunities for collaboration with faculty in Cognitive Science on how human motor learning insights can inform robotic control, with Intelligent Systems Engineering on efficient hardware/software co-design, and with Computer Science on formal verification of learned behaviors. I plan to pursue funding through NSF robotics and AI programs, having already contributed to successful proposals including the GenZero Workshop and BU Technology Development awards.

As an educator, I've developed innovative teaching approaches that make complex concepts accessible to diverse learners. At Boston University, I've been a teaching fellow for Distributed Systems, Embedded Systems, and Data Science, creating hands-on projects that bridge theory and practice. For example, I developed a PyBullet simulation environment that allows students to experiment with control theory before implementing on real hardware. I would be excited to teach courses across departments at IU, from core CS courses to specialized topics in robotics and AI, while developing new interdisciplinary courses that combine cognitive science with machine learning.

I am also deeply committed to fostering an inclusive research environment, demonstrated through concrete actions. I've presented introductory robotics and reinforcement learning workshops at AI4ALL, a program designed to encourage high school girls to pursue AI careers. Through the F1Tenth Racing Team, I've mentored 11 students from diverse backgrounds to second place in competition. I've also mentored top students to publications at top venues like ECCV, and provided recommendation letters to students who progressed to prestigious institutions like UC Berkeley. At IU, I would continue this commitment by actively recruiting

underrepresented students and creating accessible educational resources that democratize robotics and AI education.

I am particularly excited about the possibility of holding a joint appointment between Computer Science and Intelligent Systems Engineering, where my work on efficient and reliable robotic learning would complement existing strengths while opening new directions. My interdisciplinary background would contribute to IU's tradition of research on embodied cognition and help advance the goals of the new AI initiative. I have enclosed my CV, research and teaching statements, and would welcome the opportunity to discuss my potential contributions to IU's mission. I am available for interviews at your convenience.

Thank you for considering my application.

Sincerely,
Bassel El Mabsout