Boston University College of Arts & Sciences

725 Commonwealth Avenue
Boston, Massachusetts 02215
T 617-353-2000 F 617-353-2177
bu.edu/cas

Dear Search Committee Members,

It is with my strongest and most enthusiastic recommendation that I endorse Bassel El Mabsout for the tenure-track professor position at Indiana University Bloomington. Having worked closely with Bassel as his instructor, research collaborator, depth exam committee member, and Ph.D. prospectus committee member, I can attest to his exceptional capabilities as a researcher, scholar, and educator.

Research Excellence and Impact

Bassel's research trajectory demonstrates both remarkable depth and breadth across the AI landscape. As someone who has led research teams at both Boston University and Meta's FAIR Labs, I have come across hundreds of researchers throughout my career spanning MIT, UBC, BU, and industry. Bassel stands among the top 1% of researchers I have encountered.

His systematic research program has addressed fundamental challenges in robotic intelligence:

1. *Foundation Work*: In our ACM Transactions on Cyber-Physical Systems paper, Bassel developed **the first working attitude controller using reinforcement learning**—an achievement many had considered impossible. This breakthrough opened new possibilities for applying RL to real-world control problems.

2. *Efficiency Innovations*: Building on this foundation, our IEEE ICRA paper on CAPS demonstrated how reinforcement learning could be made practical for resource-constrained systems. Bassel's meticulous real-world experiments showed a **dramatic improvement in energy efficiency** without performance degradation. This seminal work has been widely adopted across aerial, ground, and underwater platforms, garnering over 100 citations.

3. *Bridging Theory and Practice*: In our "Anchor Critics" work, Bassel tackled the critical sim-to-real gap that has limited RL's practical deployment. His dual contribution of **theoretical advancement and open-source implementation** (SWANNFlight) exemplifies his unique ability to connect abstract concepts with practical engineering, enabling novel use cases as well as lowering the barrier for other researchers to perform similar experiments.

Throughout this work, a clear pattern emerges: Bassel identifies fundamental limitations in current approaches, develops elegant theoretical solutions, and validates them through rigorous

real-world implementation—precisely what distinguishes the most impactful researchers in robotics and AI.

Bassel has established **an impressive network of research collaborations** across institutional boundaries, working with faculty at MIT, Hong Kong University of Science and Technology, Technical University of Munich, and Boston University. These collaborations span both research projects and grant writing efforts, demonstrating his ability to operate effectively within the broader research ecosystem. This extensive collaborative network, built during his doctoral studies, ensures his future success in establishing productive research partnerships as a faculty member.

Intellectual Depth and Independent Research Leadership

Bassel's Fulfillment Priority Logic (FPL) framework—his "star work" to date—showcases his capacity for **independent research leadership**. This work reimagines how complex behavioral objectives can be specified in reinforcement learning, combining formal specification techniques with reinforcement learning in a novel way.

What distinguishes this work is that Bassel conceived and developed it independently, driving the research agenda himself. During his depth examination, he demonstrated mastery of Control Theory, Formal Methods, and Machine Learning, with an exceptional ability to synthesize concepts across these fields. The FPL framework is a direct product of this interdisciplinary thinking.

His leadership extends beyond research conception to team building—he identified, mentored, and successfully recruited Abdelrahman Abdelgawad to join our PhD program specifically to collaborate on the FPL framework. This **ability to attract talented researchers** to his research agenda demonstrates the kind of academic leadership essential for building a successful research group as a faculty member. Their collaboration has significantly accelerated the development of the FPL framework, showcasing Bassel's ability to not only generate innovative ideas but also to build and lead research teams around them.

His communication skills are exceptional—he presented this complex work with remarkable clarity, making sophisticated logical specification techniques accessible even to those outside his specific research area. The fact that he has established an **independent research identity** while still a PhD candidate confirms his readiness for a faculty position.

Strategic Fit with Indiana University

Bassel is ideally positioned for Indiana University's interdisciplinary environment. His research combines **reinforcement learning theory, programming languages, embedded systems, and practical robotics experimentation**—a rare combination that complements IU's strengths across Computer Science, Intelligent Systems Engineering, and Cognitive Science.

His demonstrated ability to build bridges between research areas and inspire collaborative work across traditional boundaries is exactly what's needed to foster the collaborative research environment that distinguishes leading institutions. His focus on explainable and adaptive machine learning systems represents **a cutting-edge direction** that would position IU at the forefront of responsible AI development.

Conclusion

In my assessment, Bassel El Mabsout ranks among the most promising young researchers I have encountered in my career. His combination of technical depth, research creativity, and practical implementation skills is truly exceptional. Based on my direct experience with him across multiple contexts, I give him my strongest possible recommendation without reservation. His appointment would be a significant win for Indiana University.

Sincerely,

Kate Saenko

Professor of Computer Science
Director, Computer Vision and Learning Group
Boston University