November 13, 2025

C/O The President, ETH Zürich,
Department of Mechanical and Process Engineering,
ETH Zürich

Re: Assistant Professor of Dynamical Systems and Control

Dear Prof. Dr. Joël Mesot,,

I am pleased to apply for the open faculty role for professor of dynamical systems and control within the department of mechanical and process engineering at ETH Zürich. I am currently a research scientist and a practicing engineer hybrid in the U.S. Technology industry. I was previously a a Senior researcher at Microsoft Research New York, and before that a postdoctoral scholar at the University of Pennsylvania.

My research portfolio straddles *model-based and learning-enabled control for embodied physical systems* and *online, interactive decision-making in situated, virtual agentic systems*. I take a two-pronged approach to my research philosophy and thrusts: (i) in scientific elegance, I build mathematical foundational tools for robust, verifiable modeling and *safety-critical learning-enabled control* of embodied physical systems (soft and rigid robots, and other autonomous systems); and (ii) in practical impact, I exert my theoretical innovations in rigorous numerical and physical evaluations, often with a specialized focus on safety and verifiability.

I have an interdisciplinary research background — spanning a training in control theory at Sheffield, PhD in electrical and computer engineering with a robotics focus, and the theoretical and large-scale practical impact of machine learning in industrial applications at Microsoft corporation. Hitherto, my research has covered (i) the modeling, control, and design of soft robot mechanisms — inspired by embodied intelligence in nature — with applications in healthcare automation; (ii) the effective representation learning building blocks for modular reasoning about the physics of interconnected moving components in complex autonomous systems; (iii) interactive learning through online physical interaction by agentic systems; and (iv) a thread of safety-critical learning and control run through all of my research thrusts – beyond empirical evaluations to rigorous, quantifiable performance guarantees.

To date, my work has made practical impact at (i) the University of Texas Southwestern medical center (UTSW), where my efforts on automating the beam orientation treatment planning problem reduced the lead time to generate patients' cancer radiation therapy dose volume from weeks to minutes; (ii) Microsoft corporation (MSFT), where the representation learning algorithm I helped invent was presented in a recent disruptive technology review (DTR) to the company's senior leadership — this earned me a Microsoft patent award; (iii) the University of Pennsylvania center for advanced medicine (PCAM) and at the University of Chicago Duchossois center for advanced medicine (DCAM), where my efforts on developing a robotic head immobilization device during cancer radiation therapy now drives improved radiation delivery in the fractionated treatments of head and neck cancers in clinics. Outside of these venues, other auxiliary impact of my research efforts include numerical-based geometric reasoning for safety of autonomous vehicles, robot-based patient immobilization in cancer radiation therapy, interactive machine learning for *reliable, large-scale* online decision making (with collaborators at Microsoft Research New York), generalized non-cooperative games for fairness in emerging human-robot healthcare applications (with collaborators at Cornell Tech and Weill Cornell Medicine).

As I plan and execute, my goal is evolve these lines of research inquiry within the framework

of emergent vision-language-action (VLA) foundation models, agents, tools, and their orchestrations to drive our shared global autonomy ecosystem towards self-automation, reliability, and safety in everyday applications. Focusing on the uncertainties and non-determinism of orchestrated and standalone emergent AI-based decision-making systems within safety-critical autonomous systems applications. I intend to continue to develop the next generation embodied intelligence tools for **guaranteed runtime assurance of mission- and safety-critical embodied AI applications**. This is informed by my experience in the "big tech" industry where these mechanism's safety assurance strategies are broadly set for concepts such as decision-making fairness, data privacy, security, economic inequality, and ethical considerations — without embodied physical safety in mind.

Key thrusts in my emerging research thrusts include scaling formal verification methods to high-dimensional VLAs, engineering compatible architectures with emergent AI systems for safe integration of complex multimodal sensory inputs. My goal is to move beyond empirical successes to establish rigorous, quantifiable performance guarantees for general-purpose physical autonomy.

I am strongly committed to the training of the next generation of researchers and engineers. During my research career, I have had the privilege of working with students, postdocs, and interns who have gone on to independent research careers in industry and academia. I can count among my former mentees (including MSR postdocs, interns, and external PhD candidates) individuals who have become assistant professors at Université de Montréal and the University of New Mexico, research scientists at Meta, Amazon, and LinkedIn, a postdoctoral scholar at MIT, and PhD students at Yale and Caltech. Furthermore, my trainees are driving innovation in industry as an Embodied AI Engineer at Wayve Technologies Ltd. and a Research Scientist at Apple Robotics. I am eager to contribute to ETH Zürich's mission through teaching and service. My commitment to service to the field is demonstrated by my extensive reviewing and editorial records for top venues like ICLR, IEEE LCSS, ACC, CDC, TMLR, ICRA, IROS, RSS and **ICML**.

I believe that my talents, experience, and academic background in bridging foundational theory, verifiable control, and emergent AI for embodied physical systems aligns perfectly with ETHZ's vision for the future of dynamic systems and control. Alongside the collaborative research ecosystem in the Switzerland engineering and research science scene, I believe that being a part of the research efforts within the mechanical and processing engineering department will stimulate a rapid growth in career path. I look forward to the opportunity to discuss how my research, teaching, and service can contribute to your distinguished department and the wider university community.

Sincerely,

Lekan Molu