Technical University of Munich
Georg-Brauchle-Ring 60-62
80992 Munich, Germany
+49 (89) 289 - 29409
fernando.diaz@tum.de

Dr. Rosamund Daw
Chief Editor, Communications Engineering

November 9, 2023

Dear Dr. Daw,

I am submitting our manuscript, "Addressing AI Sustainability: Collective Learning for Energy Efficiency," for potential publication in Communications Engineering, as recommended by Dr. Yann Sweeney, an editor at Nature. Co-authored by Professor Sami Haddadin, this work aligns with the journal's scope.

Our research focuses on the energy demands of embodied artificial intelligence (EAI) systems, which physically interact with the world. We examine their energy requirements within the context of the rapid proliferation of operational units, emphasizing their need for continuous interaction with the physical environment for learning. Our study evaluates the limitations of current learning paradigms, specifically the computational energy needed for EAI system learning processes akin to purely computational AI. We find a significant increase in energy demands with conventional learning approaches involving large groups of EAI agents learning multiple skills without effectively using accumulated knowledge.

We advocate collective learning as the ideal paradigm for networked EAI agents. Capitalizing on the growing population of EAI systems, collective learning enables efficient sharing, aggregation, and utilization of past and current knowledge. By employing a model of the idealized target dynamics of knowledge exchange, our research reveals the substantial benefits of collective learning in reducing energy and time requirements for acquiring multiple skills. We position it as the natural solution to the energy challenges of EAI.

I confirm that this manuscript has not been previously published and is not under consideration by any other publisher.

For correspondence, please contact me at fernando.diaz@tum.de.

Thank you for your consideration. Please inform me of your decision at your earliest convenience.

Sincerely,

Fernando Díaz Ledezma
Research Associate
Munich Institute of Robotics and Machine Intelligence