UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG | MIND Machine Intelligence and Neural Discovery Institute

Reinforcement Learning: Embodied AI

Wits MIND Postdoctoral Fellowship Framework

Host(s)	• Dr Steven James, School of Computer Science and Applied Mathematics. • Dr Sahba Besharati, School of Human & Community Development, University of the Witwatersrand.
Funding	• The fellowship provides R350,000 per annum (tax-free) for a fixed, consecutive two-year period. • The fellowship is administered by the MIND Institute, funded by the University of the Witwatersrand Research Council. • The fellowship is based in Johannesburg and is conducted in person on the University of the Witwatersrand campus. • Subject to standard University rules and requirements, as well as research achievements.
Eligibility	• PhD awarded within the past five (5) years. • Must be 35 years or younger. • May not hold full-time salaried employment during the tenure of the fellowship.
Closing date	Open until the postdoctoral fellowship is filled.
Focus	The project will examine the role of embodiment in how human and machine agents form representations of the self and their environment. It will investigate how agents can learn useful, flexible knowledge from their own physical interactions so that they can reason about cause and effect and adapt to new situations; what internal structures and mental models enable efficient skill acquisition with less data and computation; and how insights from cognitive neuroscience can inspire better predictive models of the world. It will also explore how findings on social behaviour and emotion can guide more human-like decision making, and whether agents that monitor internal states (such as energy use or effort) can plan more reliably, echoing interoception and homeostasis. Alongside effectiveness, the work will emphasise understandability, trustworthiness and safety. Overall, knowledge from brain and behavioural sciences will guide what agents should learn, how they learn it, and how their behaviour is evaluated across different areas of AI.
Research Experience	Demonstrable research experience in relevant areas of AI, which may include any of the following: • Advanced algorithm development: demonstrated experience designing and implementing novel machine-learning methods for autonomous decision-making, planning, reinforcement learning, or robotics. • Structured representations and decision-making: research experience in state or action abstraction, causal reasoning, and predictive modelling for planning and control; exposure to multi-modal perception and long-horizon tasks is advantageous. • Cognitive and psychological modelling: ability to translate insights from cognitive science and psychology into machine-learning methods; experience designing representation-

	learning approaches grounded in human and animal perception and reasoning. • Collaborative and interdisciplinary research: experience working in teams that combine AI with neuroscience, psychology, or cognitive science, with evidence of successful collaboration. • Publication and dissemination: strong, peer-reviewed record in leading AI conferences and journals; experience presenting at international venues and engaging the wider research community. • Project and resource management: demonstrable experience in planning and delivering research, including budgeting, timelines, and coordination. • Student supervision: experience supervising postgraduate students.
Expectations	• Conduct original, high-quality research in the field, working both independently and within interdisciplinary teams, and collaborating proactively with colleagues across MIND and other Schools. • Publish in accredited journals and leading conferences, targeting an average of at least two peer-reviewed outputs per year, preferably in international, indexed venues. • Mentor and co-supervise Doctoral and Master's students, contributing to a supportive and rigorous research training environment. • Drive innovation by proposing and testing new ideas; contribute to the MIND Institute's research culture through seminars, discussion groups, and academic service. • Support the operation and sustainability of MIND laboratories and facilities where appropriate, including good research practice, documentation, and safety. • Contribute to the University's strategy to sustain its standing as an internationally acclaimed, research-intensive institution. • Contribute to the sustainability and fundraising efforts of the MIND Institute through grant and funding applications, as well as partnerships and stakeholder relationships. • Build your research profile and that of the MIND Institute through presentations, outreach, media opportunities, and a professional online presence.
Benefits	• Mentorship and professional development: structured mentorship, training and guidance from experienced researchers to build research independence. • Research profile: strengthen your CV through targeted, high-quality research outputs. • Academic experience: gain experience in teaching, supervision, mentorship and related academic activities. • Project leadership: develop skills in project conception, experimental design and research management. • Impact: engage in cutting-edge research and contribute to the growth of African-led AI.
Queries	Dr Steven James, Steven.James@wits.ac.za MIND Grant Manager info.mind@wits.ac.za