

A Multi-Agent System for Safe Human-Machine Interaction

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Objectives

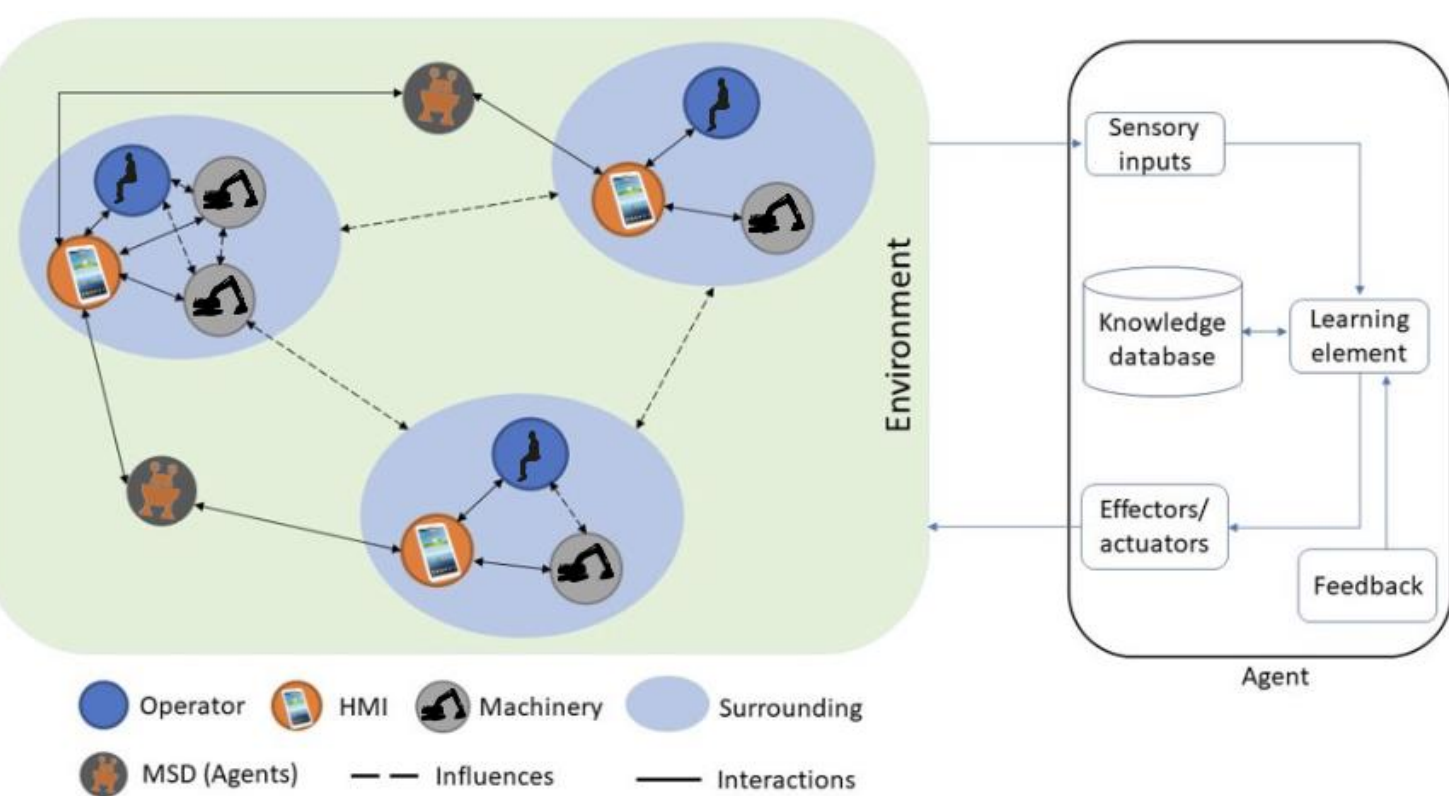
The objective of this research aims to implement algorithms that can effectively handle **complex, dynamic environments** and ensure **safe, cooperative behavior** among multiple agents including machines, humans and robots.

This context represent heavy machines, humans, other machinery, sensory equipment and human-machine interfaces.



Background

Construction industry accounts for more than 20% of fatal work-related injuries in the UK. Hence safety around the machinery in construction has to be improved.



Components in the proposed concept simulate complex environment dynamics in construction environments

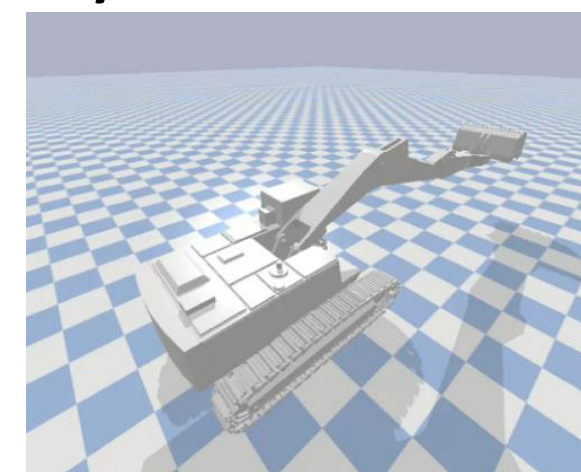
- This creates a platform for humans and machines to interact with each other effectively and safely.

Research Outcomes

- Recognising algorithms which are effective for complex work environments



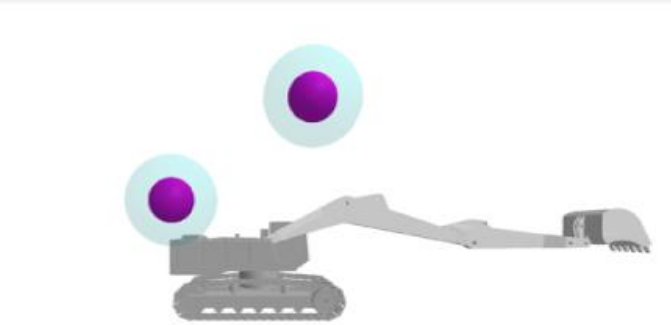
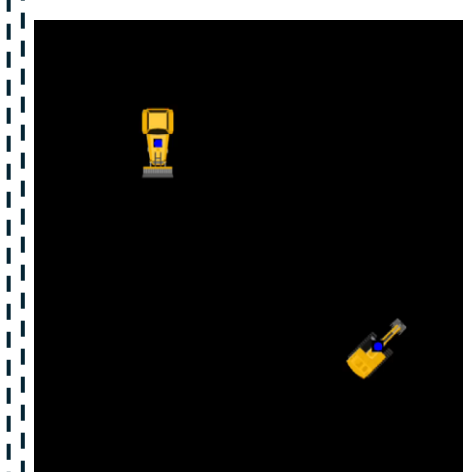
- Simulation of dynamic environments with priority to safety and machinery



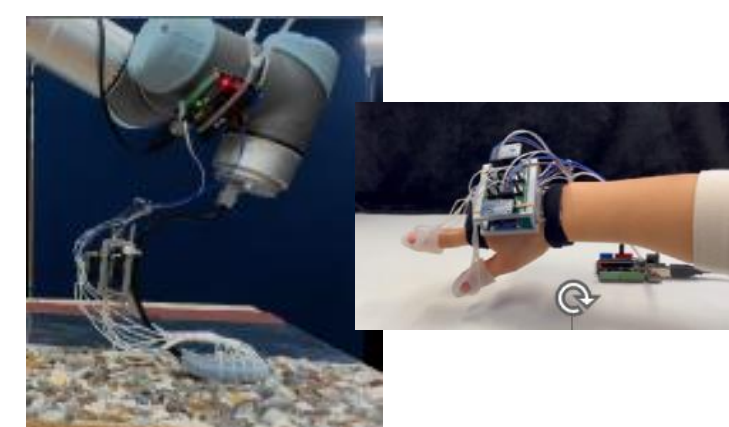
- Recognising human aspects in machine safety and construction environments



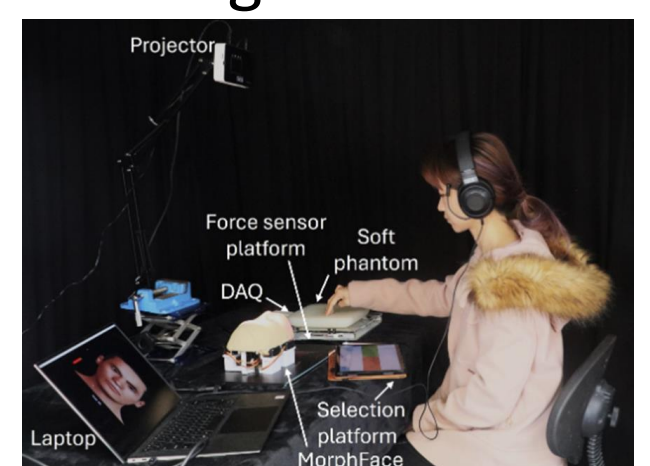
Current Progress



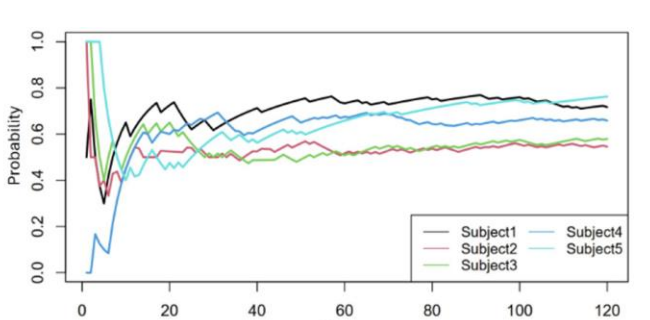
Machine Simulations including information transfer, sensor coverage and machine dynamics



Data collection through hardware



Human multi-robot teaming-implementation with robots



Human-robot co-optimisation approaches

What next?

The upcoming 3 months will be spent on

- Testing the possibility of moving from TRL-4 to TRL-5
- Completion of research visits and secondments that will facilitate this transition
- Follow up actions after the completion of the project

Acknowledgements

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References

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- Kurinov, G. Orzechowski, P. Hämmäläinen and A. Mikkola, "Automated Excavator Based on Reinforcement Learning and Multibody System Dynamics," in IEEE Access, vol. 8, pp. 213998-214006, 2020.