Animation Script

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Can robot teams work together and adapt to solve problems and save lives?
Dr Hao Zhang

To make the most out of this script, you could:

· Stick it in your notebook as a record of watching Hao's animation
· Pause the animation and make notes as you go
· Add your own illustrations to the sheet
· Create your own animation to accompany it
· Add notes from classroom discussions
· Make notes of areas you will investigate further
· Make notes of key words and definitions
· Add questions you would like answered – you can message Hao through the comments box at the bottom of his article: **futurumcareers.com/can-robot-teams-work-together-and-adapt-to-solve-problems-and-save-lives**

SCRIPT:

Robots provide many services for us, from delivering packages to exploring other planets; however, many tasks are too complex for a single robot to handle alone. Teams of robots, on the other hand, could tackle bigger challenges in a range of situations and environments.

For example, in the aftermath of a natural disaster, such as an earthquake, teams of robots could search areas that are too dangerous for humans to enter. Drones could scout an area from above, ground robots could navigate through debris or rough terrain, and specialised robots could manipulate objects or access confined spaces.

Robot teams can offer efficient, robust and adaptive solutions to societal challenges, not just in disaster response but also in space exploration, agriculture, manufacturing and infrastructure inspection.

To develop successful robot teams, Dr Hao Zhang from the University of Massachusetts Amherst in the US is drawing on key insights from social psychology. Humans are the most adaptable species on Earth, and collaboration, shared effort and internal competition allows human teams to adapt swiftly to unexpected changes in their environment or composition. Whether in sports teams, multi-national companies or academic research groups, having a range of skills and abilities within a team enables people to tackle complex tasks effectively.

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As strange as it may seem, a healthy level of competition within a team can improve teamwork. Cooperative competition – or coopetition – allows robots to collaborate toward a shared goal while simultaneously competing to pursue individual objectives and optimise their own performance.

Hao's research aims to help robots reflect on how well they are working together as a team. Autonomous group introspection refers to the ability of a team of robots to collectively monitor, analyse and understand their own behaviours, roles and performances without human intervention.

By sharing what they see, what they are doing and how their tasks are progressing, robots can collectively figure out if something is not working, adjust their roles and come up with new plans. For example, if one robot malfunctions, group introspection would allow the team to replace the broken robot with another teammate that has similar capabilities. This kind of shared awareness enables resilient, flexible and efficient teamwork, allowing robot teams to work together effectively on complex tasks in the real world.

Hao hopes to develop collaborative perception, enabling robots to use their own sensors to monitor the health and abilities of their teammates in real time. His project will also explore human-robot teaming, allowing people and robots to work together safely by combining their unique strengths.

What could you achieve as a roboticist?