# Creating Science – Robots

*Intro* ***#CreatingScienceRobots***

## DANGERS!

*This section cannot explain every possible danger in this activity. Adult care and surveillance is required at all times. Please exercise all appropriate caution at all times.*

## Suggested Outcomes

(NOTE: This is by no means an exhaustive list of possible outcomes, neither is it intended that ONLY these outcomes can or should be met. Science is a deeply interrelated activity, and you may find cross curriculum links you can and should use.)

### Science understanding

As students learn about the limits and abilities of certain materials such as gold and silicon in robotics and electronics, they learn that;

- Chemical sciences 4: Natural and processed materials have a range of physical properties that can influence their use (ACSSU074)

### Science inquiry skills

As students explore robots and discuss their interactions with them, they can see that;

- Communicating 5: Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multi-modal texts (ACSIS093)

### Science as a human endeavour

As students study and explore robots, they can see that;

- Use and influence of science 5: Scientific knowledge is used to solve problems and inform personal and community decisions (ACSHE083)

### Cross curricular outcomes

Digital Technologies Knowledge and Understanding F-2: Recognise and explore digital systems (hardware and software components) for a purpose (ACTDIK001)

Such as;

- Recognising and using hardware and software components of digital systems and experimenting with their functions, for example playing with interactive toys and robotic devices to determine which ones can work with other devices
- Recognising that a digital system follows instructions or commands, for example instructing robotic toys to perform a function such as a dance movement

# Appendix: Dr Joe's laws of robotics –

1. Robots don't have minds, use your own!

Robots still cannot think for themselves or move beyond their original programming – marketing hype and science fiction stories notwithstanding. They have no idea if they're being safe or unsafe, they just do the job they were designed to do. So be careful! Robots are just complex machines that simply do their job, and if that job is 'unsafe' or 'unkind', they will do it anyway.

2. Robots don't have emotions, use your own!

I hear a lot of people say, 'this robot hates me' when they can't seem to get it to work. But we understand that robots don't have emotions; they don't hate or love you. They're not out to get you, they are never 'stubborn' or 'unkind'. All these are feelings we feel that we are transferring onto the robot. So don't worry, a robot will never hate you. Robots are machines that just do their job.

3. The more parts a robot has, the greater chance it has of breaking down!

Even if every part in a quality robot only has a 1 in one million chance of breaking down in a year, if your robot is built out of 1 million parts, you can expect it to break down at least once a year. The more parts a robot or a machine has, the more often one of those parts will stop working and the entire robot will be compromised.

# Isaac Newtons 3 laws of 'intelligent' robotics

The Three Laws of Robotics (often shortened to The Three Laws or known as Asimov's Laws) are a set of rules devised by the science fiction author Isaac Asimov. The rules were introduced in his 1942 short story "Runaround" (included in the 1950 collection I, Robot), although they had been foreshadowed in a few earlier stories.

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

[From Wikipedia 'Three_Laws_of_Robotics', 13 may 2019] In the July/August 2009 issue of IEEE Intelligent Systems, Robin Murphy (Raytheon Professor of Computer Science and Engineering at Texas A&M) and David D. Woods (director of the Cognitive Systems Engineering Laboratory at Ohio State) proposed "The Three Laws of Responsible Robotics" as a way to stimulate discussion about the role of responsibility and authority when designing not only a single robotic platform but the larger system in which the platform operates. The laws are as follows:

1. A human may not deploy a robot without the human-robot work system meeting the highest legal and professional standards of safety and ethics.
2. A robot must respond to humans as appropriate for their roles.
3. A robot must be endowed with sufficient situated autonomy to protect its own existence as long as such protection provides smooth transfer of control which does not conflict with the First and Second Laws.[55]

Woods said, "Our laws are little more realistic, and therefore a little more boring" and that "The philosophy has been, 'sure, people make mistakes, but robots will be better – a perfect version of ourselves.' We wanted to write three new laws to get people thinking about the human-robot relationship in more realistic, grounded ways."[55]

In October 2013, Alan Winfield suggested at an EUCog meeting[56] a revised 5 laws that had been published, with commentary, by the EPSRC/AHRC working group in 2010.:[57]

1. Robots are multi-use tools. Robots should not be designed solely or primarily to kill or harm humans, except in the interests of national security.
2. Humans, not Robots, are responsible agents. Robots should be designed and operated as far as practicable to comply with existing laws, fundamental rights and freedoms, including privacy.
3. Robots are products. They should be designed using processes which assure their safety and security.
4. Robots are manufactured artefacts. They should not be designed in a deceptive way to exploit vulnerable users; instead their machine nature should be transparent.
5. The person with legal responsibility for a robot should be attributed.