Have you ever met a robot?

From the robots we know and love, to the robot in your pocket, explore the fascinating future of robots at work, at home and in the blurring boundaries between human and machine.

With new technological developments being made every day, it has never been more important to explore our relationships with robotics.

Explore the influence of robots through four galleries that draw you into a conversation with simple but thought-provoking questions.

Trace our fascination with the science and fiction of robots before delving into an evolving world of industry and work. Consider the role of robots as companions and helpers and explore what the future may hold as we find new ways to tackle social and environmental problems. Would you live in a robot? And can they make us better than nature intended?

The exhibition is a cooperation between the Vitra Design Museum, MAK – Österreichisches Museum für angewandte Kunst/Gegenwartskunst, Wien, Vienna, and Design museum Gent. The curators of the exhibition are Amelie Klein (Vitra Design Museum), Thomas Geisler and Marlies Wirth (MAK Vienna), and Fredo de Smet (Design museum Gent, advising curator).

Curricular Links

• I can explore the latest technologies and consider the ways in which they have developed. *TCH 1-05a*
• I can use exploration and imagination to solve design problems related to real-life situations. *EXA 1-06a*
• I can investigate how an everyday product has changed over time to gain an awareness of the link between scientific and technological developments. *TCH 2 - 01b*
• Through research and discussion, I have an appreciation of the contribution that individuals are making to scientific discovery and invention and the impact this has made on society. *SCN 2-20a*
• I can explore the impact, contribution and use of various software applications and emerging hardware in business. *TCH 3-08a*
• I can evaluate the implications for individuals and societies of the ethical issues arising from technological developments. *TCH 3-06a*
‘Hello, Robot’ has travelled all over Europe, but V&A Dundee is the only venue it will visit in the UK. The show examines how design shapes the relationship between human and machine, and how new technological developments being made every day are changing the nature of that relationship. ‘Hello, Robot’ will take you through four stages of robot influence and evolution, asking seemingly simple questions along the way.

On the wall outside the exhibition is an illustration by Jay Cover which playfully shows robots at work.

*Ask pupils to look at the wall and see how many different robots they can find in the illustration.*

![Raising Robotic Natives, Stephan Bogner, Philipp Schmitt and Jonas Voigt, 2016](image)

**Robot Lounge**

**Douglas Coupland - ‘Slogans for the Twenty-First Century, 2011’:** In this art project, Coupland collects slogans and thoughts to try and understand the ways that life today is already very different from the latter years of the twentieth century. The slogans focus on how we live life alongside digital technology - some of the statements are unsettling.

- *Before entering the exhibition, point out some of the slogans to pupils. Ask them to think about what the slogans really mean, and whether they think evolving technology is a good thing or a bad thing?*

- *‘What is a robot?’ Discuss this question before entering the exhibition and encourage pupils to give their ideas of what a robot is. You’ll ask this question again at the end to see if the pupil’s answers have changed.*
Science & Fiction

Question 1: Have you ever met a robot?

**Vintage Toy Robots, 1956 - ca. 1980:** In the 50’s & 60’s, children all over the world were fascinated with toy tin robots. Originally made in Japan, the robots were seen as peaceful helpers to humans. As western ideas of space and spacemen became more common, the design of the robots changed to include them carrying weapons.

- This room focuses on robots in popular culture and encourages us to think about our first experience of a robot. Ask pupils if they ever had robot toys - or if they can name any example of robot toys.
- Look at the vintage tin robots. What features of these toys are typical of what we first think of when we hear the word ‘Robot’?
- Why do you think interest in robots began to increase in the 1950’s and 60s?

Question 2: What was your first experience with a robot?

**R2D2 film prop from Star Wars, George Lucas, 1977 & Metropolis film poster, 1926 (private collection):** This is an original prop from Star Wars Episode IV: A New Hope. It’s 96cm in height and was played by actor Kenny Baker, although in some scenes R2-D2 was moved by remote control.

Metropolis was an early Science Fiction film by Fritz Lang set in a future where people are suffering because of machines. It tells the story of Maria, an activist who is replaced with a robot (shown in the poster) - one of the first robots ever shown in cinema.

- R2D2 and ‘Maria’ from Metropolis show two very different ideas of how robots are portrayed in film. Ask pupils to look closely at both robots. What differences in the design and appearance can they see between them?
- Which robot – R2D2 or Maria – best fits with the pupil’s initial idea of what a robot like?
- What other robots from films and TV can pupils think of? Are they more like R2D2 or Maria?
Robo Wunderkind: Interactive Exhibit

This brightly coloured robot kit, designed for children aged 5 years and up, allows the user to build their own robots and develop basic coding skills. Compatible with Lego, the Robo Wunderkind can be easily programmed on a smartphone or tablet to avoid obstacles, solve mazes and even provide a basic weather forecast.

Encourage pupils to use the torch and interact with Robo Wunderkind. Robo will ‘run away’ from light coming directly from above.

• Why do you think Robo Wunderkind is designed to look the way it is, instead of looking like R2D2 or Maria?

Question 3: Do we really need robots?

REMOVED – Eric Pickersgill: In this series of photographs the artist takes photos of typical scenes, but removes the technology to highlight the reliance we have on our personal devices. The three pictures show people ignoring their immediate surroundings and effectively demonstrates our addiction to technology.

• Have you ever walked into something or missed what someone was saying because you were too busy looking at your device?
• Look at the photographs – what possible dangers can you see because the people in the pictures aren’t paying attention?
• Do you think people today are too addicted to their phones and tablets, or are they just keeping up with technology?
• Who do you think is in charge – the person or the device?
  (Ask pupils to think about this before moving to the next object)

Mobile Relationship – Manu Cornet: This cartoon demonstrates the relationship between humans and their smartphones. Manu Cornet suggests that, rather than humans controlling their phones, they are in fact slaves to them. Who controls whom?

• Ask pupils if they’ve ever done any of the things shown in the cartoon. Ask them the question again: Who do you think is in charge – the person or the device? Have any of the answers changed?
Question 4: Do you trust robots?

**Bladroid – Alexander Reben:** This small, wide-eyed robot is programmed to start by asking questions like ‘What’s your name?’ and ‘Do you find me cute?’ to build your trust, before encouraging you go on to spill your secrets and tell it embarrassing stories. With its wide eyes, slight smile, and the voice of a seven-year-old boy, the bladroid’s deliberate ‘cuteness’ makes it very easy for people to open up to it.

- What about the design of the Bladroid do you think makes it easy for people to trust it?
- If it looked different - like R2D2 or another robot – do you think people would be as happy telling it their secrets?
- Would you trust a robot with your secrets?

Question 5: Are robots our friends or enemies?

**What’s flying there? – Next Nature Network:** A colouring book for both adults and children, the story is of a little bird that lives in a warzone and is hunted and attacked by military drones. Avi escapes to see the rest of the world where drones can be used for good- helping with farming, fighting disease etc. In the end, Avi realises that the whole world is basically a drone. This book helps to explore the differences in how drones are seen and used – from killing machines to helpful assistants.

Point out the image of the drones in the colouring book and then the drones hanging from above. Ask pupils to look at the differences.

- Do they think the drones look friendly or sinister?
- Do you know what kind of things drones are used for?
- Can you think of any other ways’ drones could be used to solve problems and help humans?

Glossary

**Robot**
A robot is: 1. An artificial device that can sense its environment and purposefully act on or in that environment; 2. An embodied artificial intelligence; or 3. A machine that can autonomously carry out useful work.

*Alan Winfield, Professor of Robot Ethics. Director of the Science Communications Unit at the University of the West of England/Bristol, and author, 2012*

**Android**
A robot which functions like a human.

**Humanoid**
A robot which looks like a human.

**Cyborg**
A human whose capabilities are enhanced beyond normal biological function by mechanical technology built into the body.
Question 6: Could a robot do your job?  Interactive Exhibits

MANIFEST – Robotlab (ZKM): This scribe robot automatically writes unique texts each consisting of eight statements selected from its memory. The robot is programmed with dictionaries relating to art, philosophy and technology which it uses to write manifestos. The statements are random and have no real meaning, and each one is unique.

YuMi – Robotlab (ZKM): YuMi is a robot designed to work side by side with humans without the need for safety barriers, to help carry out repetitive tasks such as manufacturing and assembly. The robot has two lightweight padded magnesium arms equipped with cameras and sensors to help it complete its tasks, and the arms move on 14 rotational axes. The arms are soft to prevent injury in a collision, and the robot is light enough to be picked up and moved by one person. The name ‘YuMi’ comes from the words ‘you’ and ‘me’, emphasising its purpose to work closely with humans.

Both MANIFEST and YuMi are operational – allow pupils to watch the repetitive nature of their tasks and movements.

- What kind of jobs do you think these robots could take over from humans in the future?
- What might be the barriers to more robots taking on certain jobs?
- Compare both robots. How does the design of YuMi make it better for working with humans compared to MANIFEST?
Question 7: Do you want to become a producer yourself?

**MX3D BRIDGE – Joris Laarman (Large wall image & smaller components):** This project by Dutch designer Laarman takes 3D printing to a new level, using a fully robotic manufacturing technique to build a bridge across a canal in Amsterdam. 3D printed in steel by six-axis industrial robots, this is a breakthrough in the world of architecture and construction and moves 3D printing away from smaller, delicate objects onto larger scale projects.

- Would you feel safe crossing a bridge that had been constructed by robots?
- What types of things do you think robots could build in the future?
- Can you think of any examples where using robots in building and construction might be better than using humans?

**Glossary**

**Automation**

Automation is the transfer of human work to automats as technology progresses. Since the early abacus and watermills, automation has increased. From the invention of engines and sophisticated mechanisms that spurred the industrial revolution, all the way to the computer technology of today.

**Rapid Prototyping**

The term refers to techniques for the physical manufacture of components or models using virtual computer-aided design data. The shapes are formed virtually by a designer using simple online platforms or downloaded ready-made designs from internet libraries. This means that the manufacture of objects has never before been so accessible, since knowledge of programming or coding is not required. Manufacture is relatively quick and does not require additional manual work. Rapid proto-typing generally makes use of additive forming techniques in which the object is constructed from shapeless material layer by layer, as in 3D printing or laser sintering.

**Industry 4.0**

This keyword frequently appears in the world of business and economics, and first appeared in a strategy paper by the German Federal Government. It is used to refer to the current revolutions in industry brought about by a boom in networked information and communication technologies. The first industrial revolution was when farming became mechanised, later followed by the appearance of machines on factory floors which became known as the second industrial revolution. The third revolution is also frequently referred to as the Computer Age and was when the first super computer and the internet marked a new horizon of possibilities. In this fourth revolution, machines, robots, logistics, and products are now potentially able to communicate and collaborate directly with each other, which ultimately could lead to production that is largely self-organised and autonomous, i.e. smart factories.
**Friend and Helper**

Standing at the entrance to room 3, ask pupils if any of them have a robot at home. This will introduce the idea of technology playing a significant role in our lives. The next object – an Amazon Echo (Alexa) - can be seen from this point.

**Question 8: How much do you want to rely on smart helpers?**

**ECHO – Amazon:** An Amazon Echo contains a loudspeaker, a computer with voice control and recognition, and Wi-Fi and Bluetooth. Answering to ‘Alexa’, the Echo can access internet services, play music on request, give updates on the weather and traffic and read an audiobook. It can also control smart home technologies such as heating, lighting and home security. The Echo responds to its name ‘Alexa’ and, in order to do so, listens to every discussion within its hearing distance while connected to the internet. This has caused some to question whether the Echo is secure or if it’s a violation of people’s privacy.

- Does anyone have a ‘smart helper’ at home – the Echo (Alexa) / Siri / Google assistant.
- What other parts of home life might ‘smart helpers’ begin to get involved with in the future?
- Do you think it’s okay that your conversations are listened to? Would you be happy with your conversations being listened to and information shared?
  (Link back here to Bladroid – do you still trust robots?)

**Question 9: Do you want a robot to take care of you?**

You may wish to walk pupils past the next object and then sit on the large round seat to talk about.

**RAISING ROBOTIC NATIVES – Schmitt, Bogner and Voigt:** This design project explores the idea of using robots from birth to help familiarise new generations with their presence amongst us. This, the ‘Robot Baby Feeder Toolhead’, has an industrial arm robot with a baby bottle attached suggesting its use as a parenting assistant. This project opens questions about how far we want robots to play a part in our lives, and whether some tasks should still be reserved for humans only. The dragon costume can be placed over the robotic arm to make the robot seem more approachable.

- Ask pupils if they think this robot would be a good idea or not?
- Can you think of any problems that might arise from a robot feeding a baby?
This object may be suitable for senior pupils only

END OF LIFE CARE MACHINE – Dan Chen: Dan Chen uses this installation to highlight societies dependence on technology in areas previously considered to be personal and intimate. This robot is designed to stroke the arm of someone in their last moments of life, while comforting them with phrases such as ‘I am here to help you and guide you through your last moment on earth.’ and ‘Your family and friends love you very much, they will remember you after you are gone.’ Although only designed as a project to stimulate discussion and not for sale, the designer has had requests from strangers asking to buy one.

- Do you think this technology should be available or not?
- If it was available, would it encourage people to leave family members alone at their time of death?
- Can you think of any situations where this robot would be a benefit or comfort to someone who was dying?

![Paro, Takanori Shibata, 2001](image)

This object may occasionally be out for display with a Visitor Assistant at certain times.

PARO – Takanori Shibata: Paro is a robotic baby seal designed to give comfort and affection to elderly people and those suffering from dementia. The robot weighs roughly the same as a small dog or cat and will coo, purr and move its head and eyes when petted. With all-over microphones and sensors, the robot will respond to and remember voices and names and act accordingly. With its warm, soft fur Paro is deliberately designed to look cute but the designers avoided making the robot appear as a dog or cat to avoid any unpleasant memories of lost pets. Paro is currently being used in more than 30 countries for medical purposes.

- Do you think using Paro to help people find affection and comfort is a good thing?
- Can you think of any problems people might have with creating an emotional relationship with a robot which isn’t real?
- Is Paro any different from a child building an emotional relationship with a favourite toy?
Question 10: How do you feel about robots having feelings?

Interactive Exhibit

**KIP – Hoffman & Zuckerman**: Kip was developed to increase people’s awareness of their behaviour by detecting and reacting to the tone of a discussion. Kip cannot understand what a person is saying, but it does evaluate the tone of a discussion and responds accordingly. If the tone is friendly, kip will lean in and show interest. If the tone becomes aggressive, Kip will draw back and begin to shake. The designers hope prompting people to feel empathy for Kip will encourage us to think about how we speak to each other and lead to more positive verbal interactions between humans.

Pupils can speak through the microphone in different tones to see Kip respond in different ways.

- Do you feel sorry for Kip when he shakes at negative tone? Do you feel bad when you make him do this?
- How could Kip be used on a day to day basis to help improve how humans speak to each other?
- Although Kip seems to show emotion, it can never actually feel emotion. Does this make it ok to treat a robot badly?

**PARO can also be discussed under this question as many pupils will ‘feel’ for it**.

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Question 11: Do you believe in the death and rebirth of things?

**AIBO – Sony:** AIBO was an award-winning electronic pet which was manufactured by Sony until 2006. First produced in 1999 AIBO, meaning ‘friend’ or ‘companion’ in Japanese, is a robot dog which can respond to people and objects, as well as acting on its own judgement. The robot was trainable and could be programmed with individual skills and abilities. In July 2014, Sony suspended all support for AIBO products, meaning they would eventually be irreparable. Many owners held funerals for their beloved ‘pet’ which they had built relationships with over many years.

- Do you think having a funeral for a broken piece of technology is strange, or do you understand why the owners did it?
- Is a robot pet any less ‘real’ than a living pet in the mind of its owner?
- What would be the advantages and disadvantages to having a robotic pet?

**Glossary**

**Bot**
A bot is a semi-autonomous agent in computer systems and the Internet is designed to perform a specific task. In some instances, it is even capable of learning. Bots include chatbots, with which users can converse (such as Apple’s Siri or Amazon’s Alexa) and Twitterbots that compose their own Tweets on specific subjects for advertising or political ends.

**Deep Learning**
The method of deep learning is applied to teach machines a certain specialised way of thinking that mimics the functioning of the human brain. Artificial, multi-layered, neural networks allow many calculations to be made simultaneously. In this way, robots acquire the ability to interpret images, or to recognise and process language, including various dialects.

**Internet of Things (IoT)**
The IoT refers to the growing number of digitally networked devices, vehicles, buildings and other objects. This inter-connected web of information makes up society’s physical infrastructure, although to most people this is invisible. Equipped with miniature computers as well as sensors and actuators, these networked objects are set to play an ever-greater supportive role in our every-day lives, like the fridge that orders milk autonomously. Experts estimate that the IoT will comprise some 50 billion objects by the year 2020.
**Question 12: Do you want to become better than nature intended?**

**EKSO GT Robotic Exoskeleton – Ekso Bionics:** The Ekso GT is the first licensed motor-powered robotic exoskeleton designed to help people who have been paralysed learn to walk again. The wearer controls the exoskeleton by shifting their weight, allowing them to stand and walk again with support. A newer version of the exoskeleton is now available which involves the wearer having a chip implanted, allowing them to control it with their thoughts. Data is recorded while the wearer is using it, and the information fed back to doctors to allow them to measure the wearer's progress.

- Do you think this robot is a good idea?
- Can you think of any other robots that help us medically to recover from accidents or injury?
- If a wearer is using this and controlling it with an implant, at what point do they stop being just human and become part robot?

**Question 13: Would you live in a robot?**  

**HYLOZOIC GROVE – Philip Beesley:** This object is 'living architecture' which causes us to think about the blurring of lines between nature and technology. Instead of manmade objects and structures being inanimate and 'non-living', this installation considers them as living systems capable of evolving and growing in their environment. This installation uses motion sensors to react and adapt to the movements of people passing them.

This exhibit will move as pupils walk past and will respond to their movements. The exhibit should not be touched.

- Watch the exhibit for a while – what does it do when you move?
- Are you watching the exhibit, or could you say that it’s watching you?
- What uses can you think of for this kind of robot, and how could it be used to help humans?
Question 14: Are robots advancing evolution?

SPIDER DRESS 2.0 – Anouk Wipprecht: This ‘dress’ by Dutch hi-tech fashion designer Anouk Wipprecht explores how robotics and technology can be incorporated into fashion. This ‘smart clothing’ has sensors, microchips and LED’s integrated into the fabrics which are 3D printed. The spider Dress 2.0 registers the speed with which someone is approaching you. The robotic spider legs on the dress then reach out if someone gets too close and marks the wearer’s personal space.

- Would you ever wear robotic clothing? Is this just the same as wearing a smart watch or other wearable tech?
- Can you think of what the disadvantages to wearing robotic clothing might be?
- How might the design of this dress link to current topics today’s society – e.g. The Me TOO movement?

Glossary

Biohacking
In order to endow the human body with capabilities beyond its natural ones, computer chip implants are inserted and magnets, sensors, or measuring devices are placed under the skin. In addition, genetic engineering is used. The conceptual boundary between bodies changed via biohacking and the idea of a cyborg is fluid.

Singularity
The term singularity has been used by a number of influential thinkers (John von Neumann, Hans Moravec, Ray Kurzweill) since the 1950s to describe an event predicted to result from technical evolution. This event marks the moment at which technological capabilities and intelligence overtakes humanity. Both utopian and dystopian future scenarios are based on this concept.

Smart Home
The smart home describes a household in which devices and home utilities are automated with computers, sensors, software, and actuators and networked with one another. This enables the devices to exchange information with their surroundings as well as with other devices, users, and producers. The communication is often done by means of an external cloud service. The smart home can be controlled and programmed from anywhere.
Up-Sticks – Gramazio Kohler Research

This large-scale structure by robotic architecture practice Gramazio Kohler was
commissioned specifically for V&A Dundee, to be displayed in this space. The structure
is built using spruce wood planks and birch dowels; however, the planks are not held
with any nails or glue but rather the tension of the dowels. Inspired by historic
traditional Scottish building techniques, the term ‘up-sticks’ comes from the informal
19th Century phrase meaning to leave your home quickly. Many tenants owned their
homes, but not the land they lived on, and so would physically take what parts of their
house they could and move to another location to start again.

‘Up-Sticks’ is the result of a collaborative robotic fabrication process, where the robots
created the dowels and drilled the holes, but where humans manually constructed
them. As sustainable living becomes more and more important for our future, looking
back to traditional construction techniques, and combining them with digital and
robotic technologies, has the potential to change the course of the building industry.

Pupils can walk around and through the ‘Up-Sticks’ installation to explore it – it
should not be climbed. Pupils can gather in the large round space to consider the
final questions.

- Do you trust this structure? Is this any different from the MX3D Bridge?
- Can you think of any other benefits of this kind of construction method?

Ask pupils to think about their answer to the question ‘What is a robot? ‘which was
asked at the start of the tour.

- Now, after visiting ‘Hello, Robot’, ask yourself again ‘What is a Robot?’ Has
  your answer changed?
- Do you think the design of robots are important to their intended purpose?
- What role do you think Robots might play in society, and how will they look in
  100 years?

Pupils can now take turns to complete the
‘letter to a robot’ and pin it to the wall.

Robots of Brixton film, Kibwe Tavares, 2011
Metropolis, film poster, 1926 (private collection)

Björk music video All is Full of Love, Chris Cunningham, 1999

Molecule Shoe, Francis Bitonti Studio Inc., 2015