# Robot Applications in the Real World

## Description

It is recommended that this be one of the first activities to be tackled as a part of the Electronics and Robotics Module within Skills Exploration 10–12.

In education and entertainment robots are often viewed as mobile and autonomous. Although there is definitely an exciting future for mobile robots, the vast majority of robots in use around the world are stationary machines performing mundane tasks. In order to give a broader understanding of the current state of robotics, students will research the diversity of robots and the breadth of their application in the real world.

## Lesson Outcomes

Students will:

* Be able to effectively communicate and collaborate with others
* Expand their background knowledge of the robotics field
* Gather information on a robotics category and present it to other students

## Assumptions

Students will:

* Have little experience working with robots
* Know how to conduct research using the internet
* Are able to evaluate web pages for relevance

## Key Terminology

**Autonomous**: the ability to act independently; being able to perform an action without human intervention.

**Industry**: the process of manufacturing goods by using raw materials or related services.

**Manufacturing**: to make something with machines.

**Robot**: a machine that can be programmed to execute instructions, perform tasks repeatedly and interact with the world around it.

## Estimated Time

60–120 minutes, depending on the depth of the research assignment



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## Recommended Number of Students

Up to 30 students working in pairs, based on the *BC Technology Educators’ Best Practice Guide*

## Facilities

Students will need access to the internet through mobile devices, tablets, or computers.

## Materials

The included Research Organizer

## Resources

A webpage that outlines the various types of robot applications. for example, *All on Robots* lists a few different types of robot configuration:

<http://www.allonrobots.com/types-of-robots.html>

British Columbia has many world-class robotics companies: <http://www.inuktun.com/>is located in Nanaimo.

<http://www.oceanworks.com/>is located in Burnaby. <http://www.actuonix.com/>is located in Victoria.

<http://www.bctia.org/Member-Network/Member-Network-Directory>lists the members of the BC Technology Industries Association. Search for “robot.”

Adrienne LaFrance of The Atlantic magazine published an interesting article entitled “What Is a Robot” on March 22, 2016. Although the length (and some language) may not be suitable for unedited use in class, it is an interesting read in preparation for this lesson. <http://www.theatlantic.com/technology/archive/2016/03/what-is-a-human/473166/>

The Tesla car factory uses many industrial robots to build their cars. This excellent five-minute video might help start your discussions:

https://[www.youtube.com/watch?v=8\_lfxPI5ObM](http://www.youtube.com/watch?v=8_lfxPI5ObM)

Of course robot arms aren’t always used for making cars: https://[www.youtube.com/watch?v=CoA-m5iHG9s](http://www.youtube.com/watch?v=CoA-m5iHG9s)

If that looks like fun, students may want to check out Dynamic Attractions, a BC-based company leading the world in robotic amusement park rides:

<http://www.dynamicattractions.com/our-adventures/>

Or West Coast Robotics, which installs agricultural robots. Yes, they even have a robot for shovelling cow poop:

<http://www.westcoastrobotics.ca/>

## Demonstration

Start by asking students to define robot. A typical definition might be “a machine that performs a task.” There are no “right or wrong” answers… there is definitely a lot of ambiguity in what, exactly, a robot is. This is a great opportunity to encourage debate and discussion.

Areas of discussion might include:

* Does it have to be autonomous, or can it be controlled by a person?
* Does it have to detect and respond to changes in its task or environment?
* Does it have to be able to move? Are there stationary robots?

Based on the discussion, which of the following would the students class as “robots”? Why?

* A 3D printer
* Elevators
* A washing machine or dishwasher
* Quadcopters and other “UAV” (Unmanned Aerial Vehicles)
* A tablet or phone with Siri or Google Voice
* IBM’s “Watson,” the computer that won at “Jeopardy”
* A PC that wins at chess
* A pre-programmed arm on an assembly line
* A self-driving car
* A vending machine
* A rice cooker or bread machine

## Procedure

1. Ask students to pair up and brainstorm for 2 minutes about the types of robots they would like to research.
2. Share the categories with the class and fill in any that they might have missed. This is a nice list to work from:

<http://www.allonrobots.com/types-of-robots.html>

1. Students can decide which category most interests them. They will then conduct research on their chosen category to find information using the research organizer provided.
2. Allow for at least 40 minutes for students to conduct their research so that they get a sense of the breadth of the world of robotics.
3. Have students share their findings either through small-group presentations or concentric circles (inside/outside circle). The following pages give a description of the concentric circle technique:

<http://www.movingbeyondicebreakers.org/includes/activity.php?video=concentricCircles> <http://www.theteachertoolkit.com/index.php/tool/inside-outside-circles>

If concentric circles are used, it is recommended that anywhere from 3 to 5 minutes per turn would be sufficient.

## Assessment

The evaluation of this lesson is based on the three learning outcomes outlined above.

Prior to teachers using the evaluation grid it is recommended that students perform some form of peer-assessment and self-assessment.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Outcome To Be Assessed** | **6** | **5** | **4** | **3** | **2** | **1** | **0** |
| **Outcome 1** | **Be able to effectively communicate and collaborate with others.** | | | | | | | |
| **1.1** | Identifies and shares relevant information and remains “on topic” during discussion and presentation. |  |  |  |  |  |  |  |
| **Outcome 2** | **Expand their background knowledge of the robotics field.** | | | | | | | |
| **2.1** | Able to describe a variety of robotics applications. |  |  |  |  |  |  |  |
| **2.2** | Separates fictional robots from “real” robots. |  |  |  |  |  |  |  |
| **Outcome 3** | **Gather information on a robotics category and present to other students.** | | | | | | | |
| **3.1** | Performs quality research to gain information. |  |  |  |  |  |  |  |
| **3.2** | Presentation was accurate and in-depth. |  |  |  |  |  |  |  |

### Total Points:

|  |  |  |
| --- | --- | --- |
| 6 | Completed successfully at the exceptional level | Exemplary |
| 5 | Completed successfully at higher than the expected level | Accomplished |
| 4 | Completed successfully to the expected level | Emerging |
| 3 | Attempted successfully at the minimum level | Developing |
| 2 | Attempted - Unsuccessful - Close to Successful | Beginning |
| 1 | Attempted - Unsuccessful | Basic |
| 0 | Not Attempted | N/A |

**Comments:**

**Extension Activities**

Fictional robots often demonstrate Artificial Intelligence. With computers and software continuing to advance, there may be real breakthroughs in AI during the student’s lifetime.

Students may wish to conduct further research into Artificial Intelligence. Is it possible for a machine to be “alive”? How would they know the difference between a human and an AI? Would it matter?

At a more basic level, how will intelligent machines affect the economy? What do self-driving vehicles mean for the job market? What if someone made a machine to flip burgers and serve fries?

**Electronics and Robotics Robot Applications in the Real World**

# Robot Applications in the Real World Research Organizer

Name:

Robotics Category:

Robotics Category:

Robotics Category:

What is it?

What is it?

What is it?

What does it do?

What does it do?

What does it do?

Benefits:

Benefits:

Benefits:

Estimated cost to build and operate:

Estimated cost to build and operate:

Estimated cost to build and operate:

What is the most beneficial robotics category of these three and why?