



# Introduction to Robotics

Session 1: What is a Robot

# Session Objective

- In this session, we are going to discuss about Introduction to Robotics?

# What is a Robot

Is a Phone  
a robot



is Asimo  
a robot

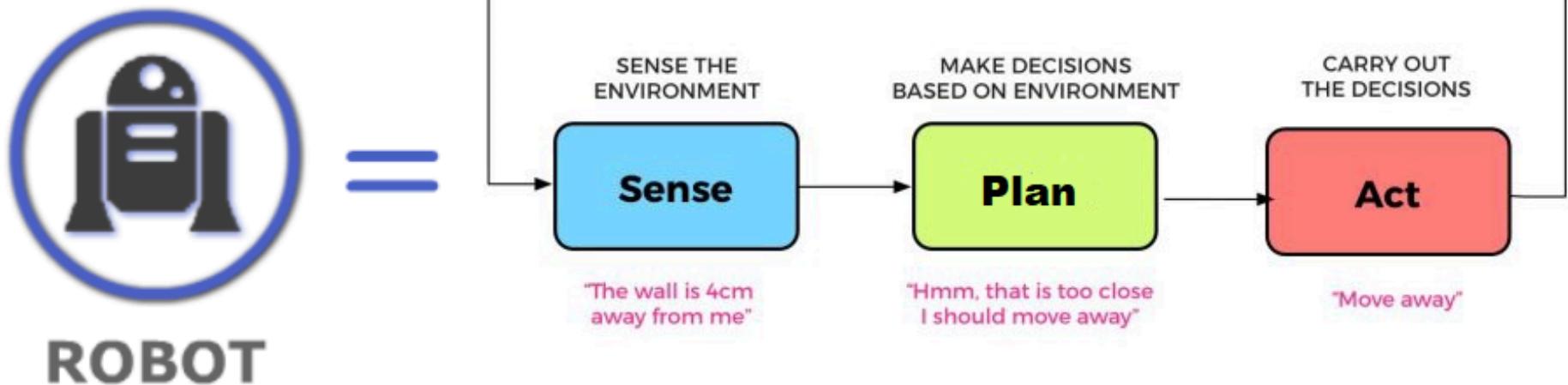


Is a Microwave  
a robot



# What is a Robot

- A **robot** is a goal oriented **machine** that generally can **sense**, **plan** and **act** all on its own without a human controlling them.
- The goal of the robot is its “**purpose**”, which can be moving around without hitting things, moving other things between places, cleaning, cooking, exploring etc.

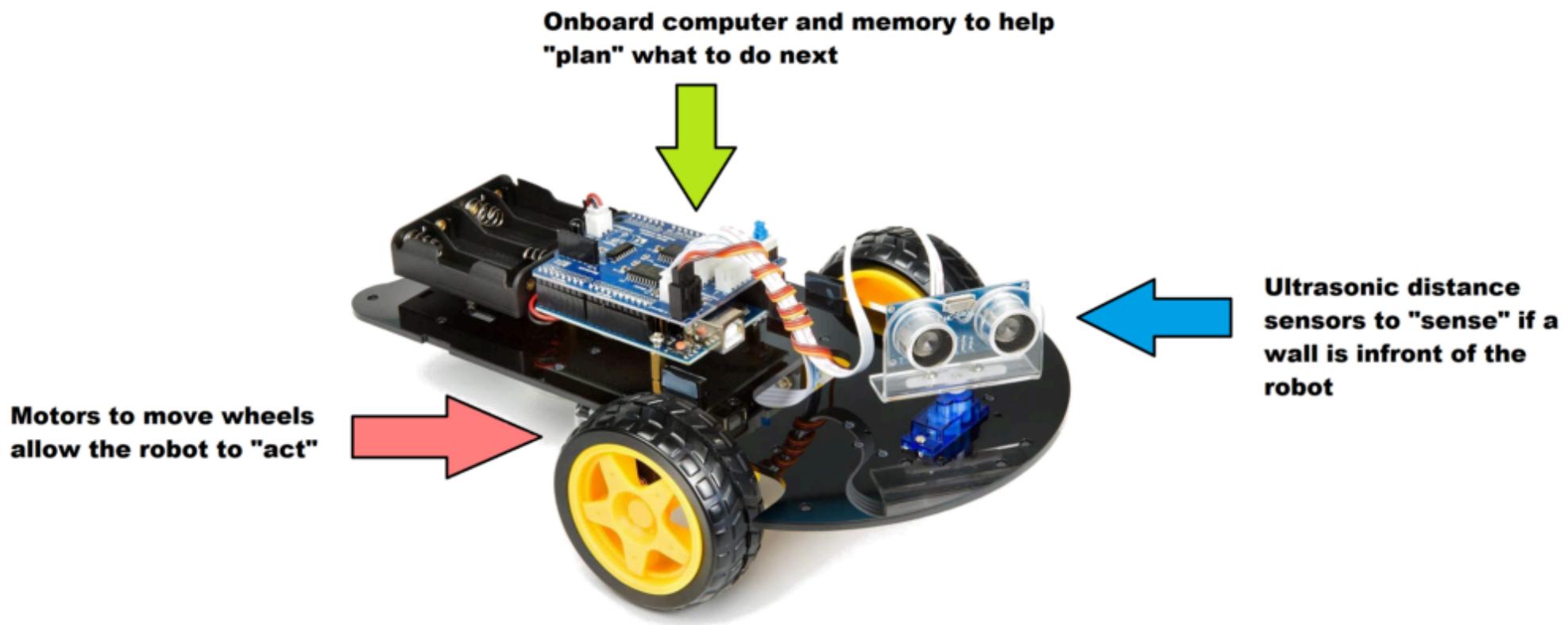


# What is a Robot

- **Sense:**
  - The robot can “see” its environment, for example a self driving car can see the road and cars in front of it. It needs to understand its environment to perform the correct actions in its plan.
- **Plan:**
  - The robot can decide what to do given what it has seen to achieve the goal it has been instructed (programmed) to do, such as a self driving car turning on the road based on its location.
- **Act:**
  - The robot can move (actuate) on its own, whether propellers (drones), legs (humanoids), wheels (mobile robots), arms (robotic manipulators) etc. A self driving car can regulate throttle and press the gas pedal or break automatically based on its plan.

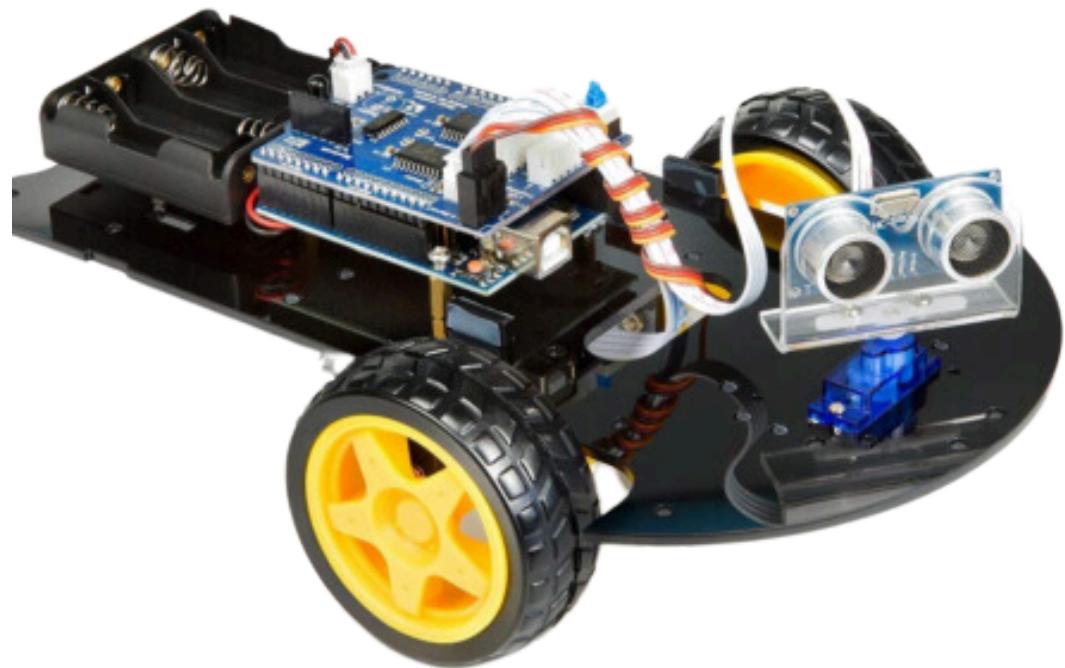
# What does it mean to sense?

- In order to sense a robot has sensors, and in order to plan a robot generally has a computer somewhere, and finally to act a robot will have a movable part (wheels, arms, ect)



# What does it mean to sense?

Consider the electronic car on the right. How would this car know if it would run into a wall? It needs to know about(sense) its environment.



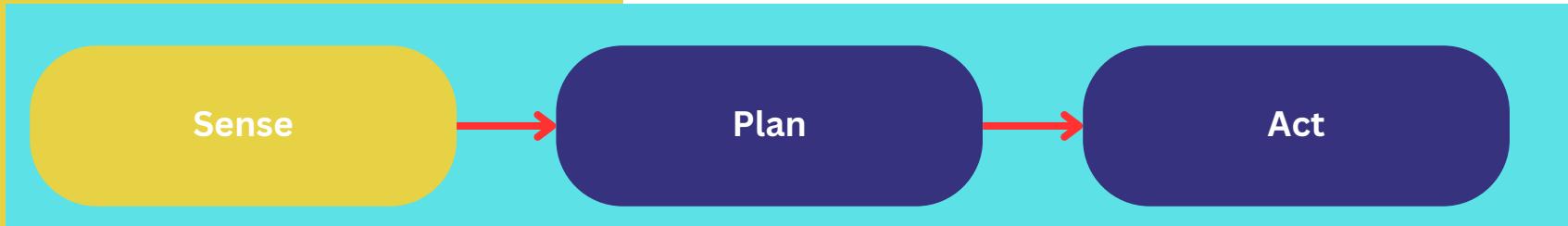
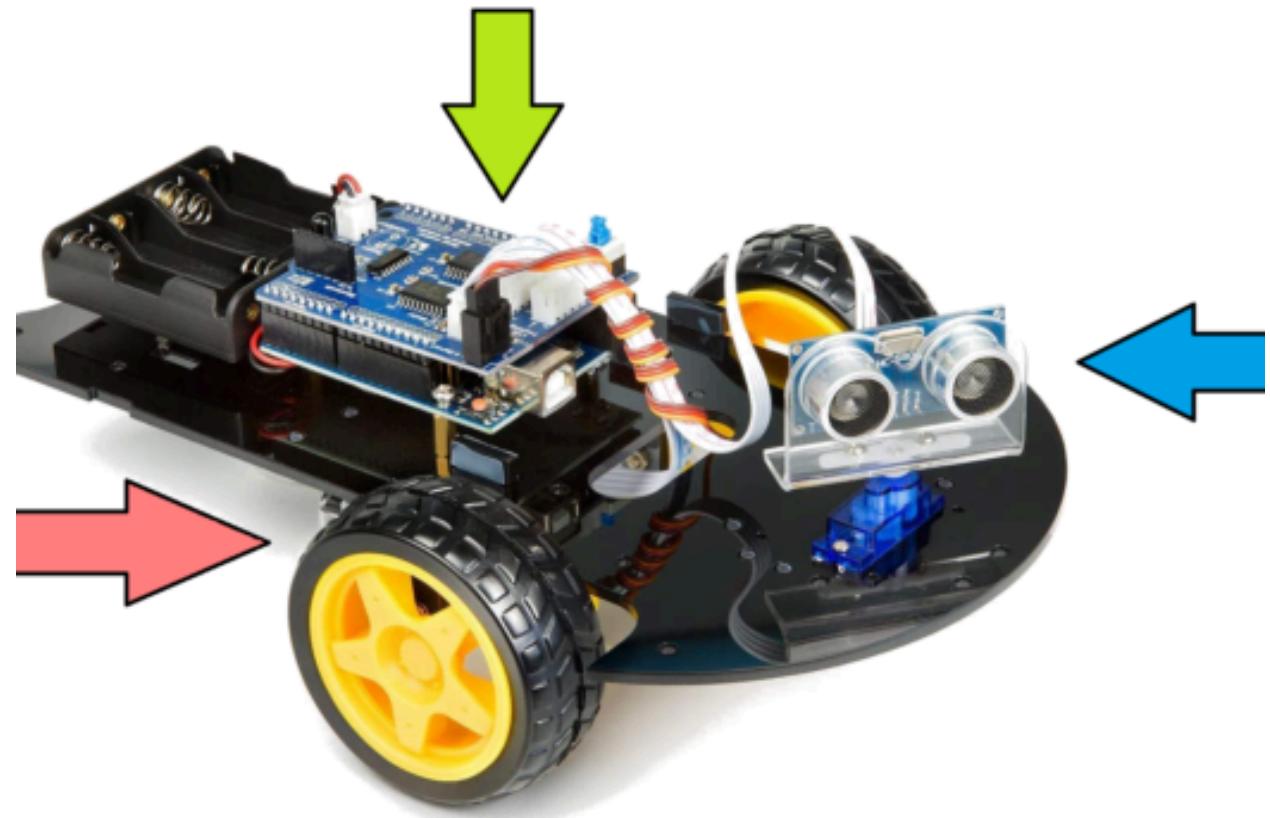
Sense

Plan

Act

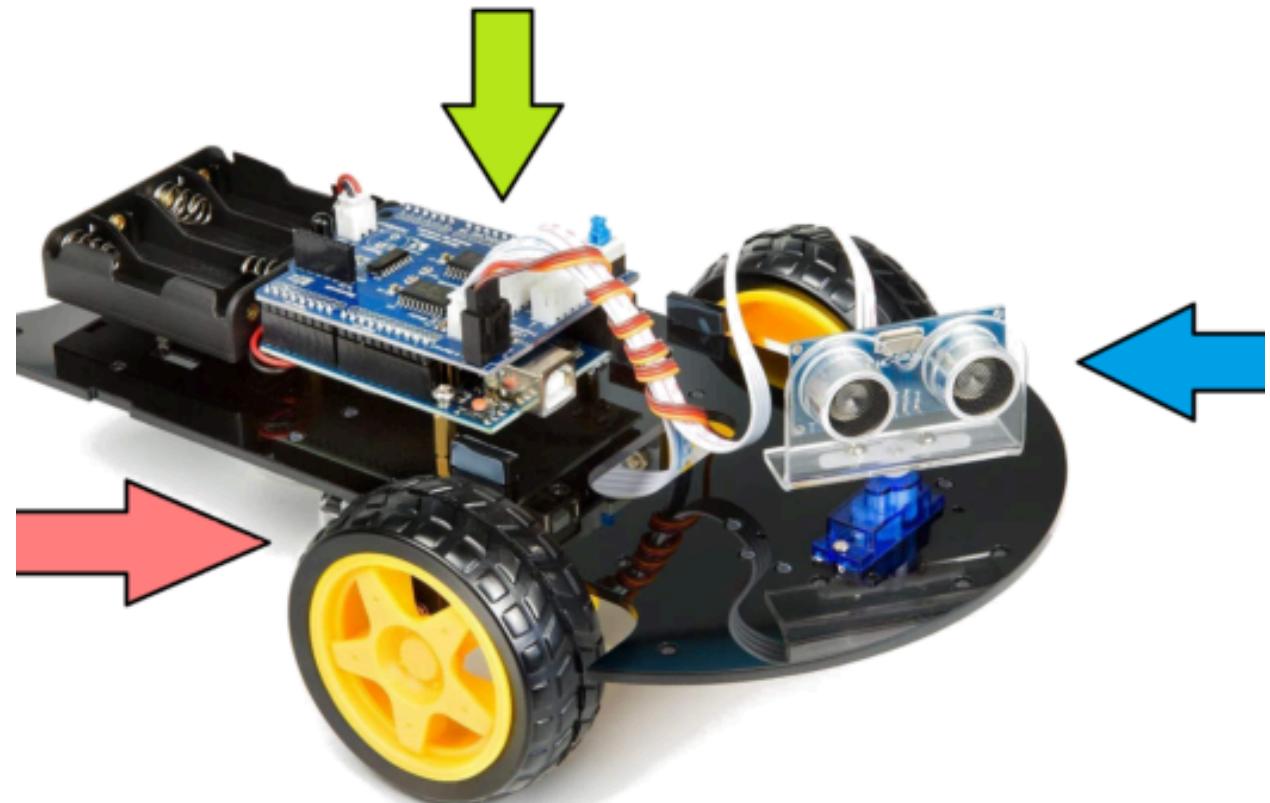
# What does it mean to sense?

The car has “eyes” in the form of ultrasonic sensors which let it “see” what is in front of it by sending sound waves out and measuring how long it takes for the sound waves to return (the quicker the return, the closer the call”



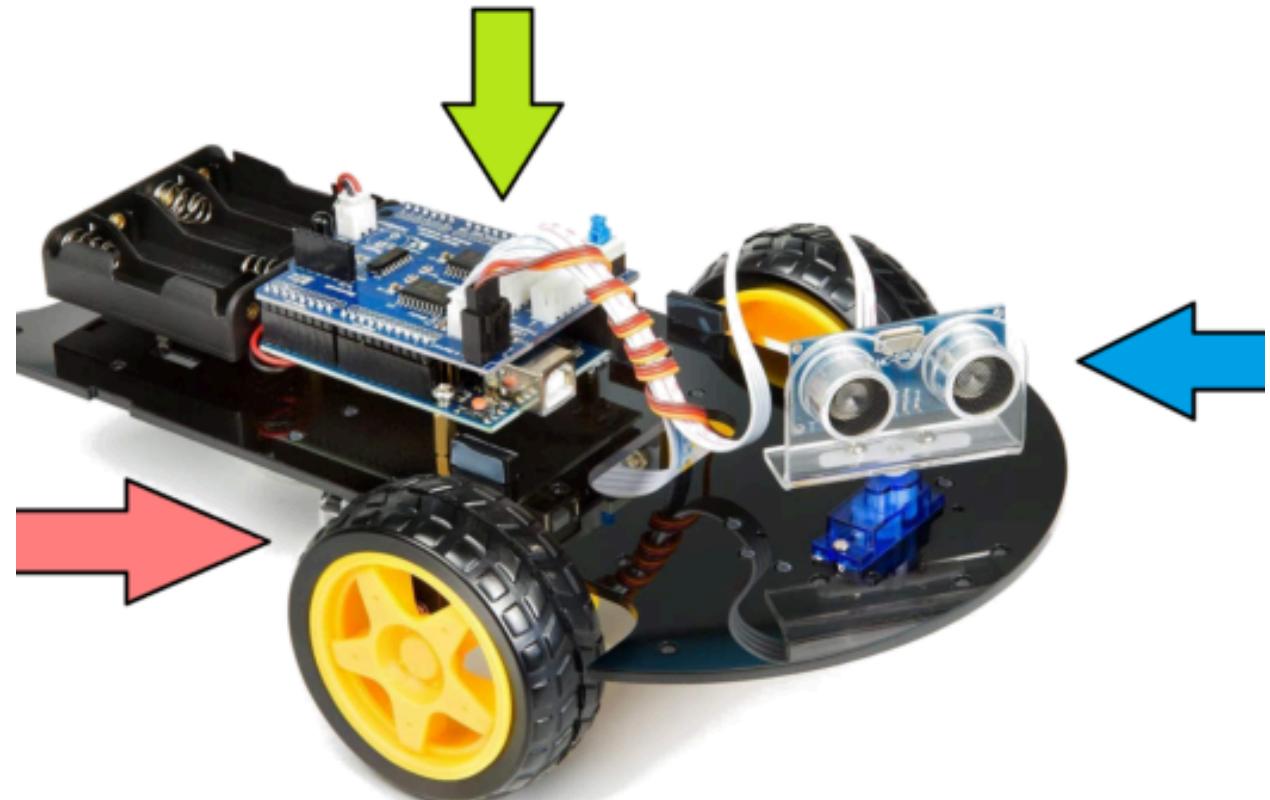
# What does it mean to Plan?

Consider the car on the right. It may have a **goal** to drive around without hitting a wall. It could then **plan** to only drive forward if there is no wall in front of it.



# What does it mean to Plan?

Software running onboard arduino computer is used to “decision making” to control how the car drives based on what it “sees” (senses). The plan (turn when you see a wall) helps achieve the goal (don’t drive into a wall).



# Sense - Plan - Act

Now it is your turn! Can you figure out how to determine these popular movie characters are robots?



# Sense - Plan - Act

Now it is your turn! Can you figure out how to determine these popular movie characters are robots?



# Robots in the world today?

- Robots are great for things people can't do (in harsh environments such as space, the deep sea), won't do (boring, dull), or shouldn't do (dangerous, unhealthy).
- Robots come in all shapes and sizes, designed to be good at the job they perform. Let's look at some robots in existence today

# Robots in the world today?

Softbank robotics have created robots called Pepper and Nao. These robots are used in hospitality to greet and help check in guests, and in educational settings to teach kids robotics and basic educational principles



# Robots in the world today?



Boston Dynamics have created a variety of robots, known most famously for their Spot robot dog, that can be found at Disneyland, or walking around and take pictures of dangerous areas such as chemical plants.

# Robots in the world today?

Brain Corp has created a **robotic brain** to automatically drive scrubbing robots around public stores that keep floors clean.



# Robots in the world today?



Toyota has worked on a robot to help out in the home, from folding laundry to organizing shelves and moving things throughout the house.

# Robots in the world today?

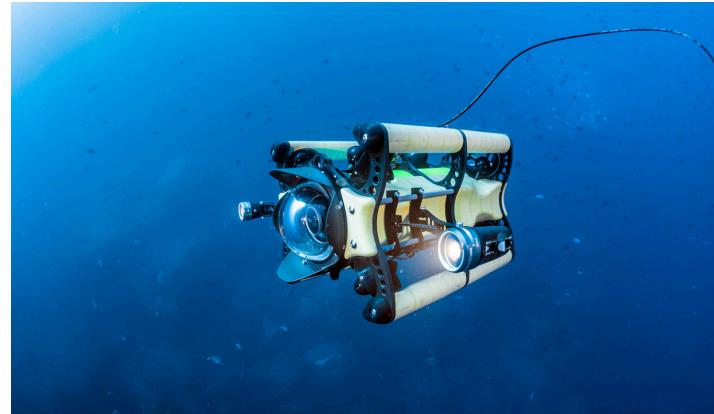
Sony has created its own robot dog aibo, and example of human robot interaction research. Robot companions are commonly used to provide low maintenance pets that can still react to interactions from their owners!



# Where can we find robots today?

Robots in real life aim to do dull, dirty or dangerous jobs that make them better option than humans including:

- Agriculture robots for farming
- Warehouse robots to move things
- Cleaning robots to clean floors
- Robots for exploration



**Have you seen any  
robots around you?**