

# **Robotics**

## **Group 2 - CARTEO Smarteos**

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Exceeding the limits, crossing the boundaries, discovering the impossible, and continuously keeping the human mind thinking and pondering each and every moment of everyday life: these extraordinary man made creations are robots. There are hundreds, maybe even thousands of types of robotics to study, but we will be covering animatronics, space robots, prosthetics, robotic animals, maid robots, and cognitive robotics. Many of these robots are some of the greatest achievements of mankind.

### **Animatronics**

Animatronics are robotic technologies usually used for movies, theme parks, and other forms of entertainment. Animatronic devices are mechanized puppets. They can be pre-programmed or remotely controlled. The use of animatronics is decreasing due to computer generation and visual effects. In most circumstances the robots have a limited selection of movements. In some cases, though, the robots can be very skilled and high functioning. Before any of these robots are actually made, they are sketched onto paper. Then, the creator of the robot makes a maquette, most likely fashioned out of clay. If there are problems or difficulties they are corrected and a new one is created. The next maquette is larger and the final project is created from there.

### **Robotic Animals**

Dogs, cats, fish, lizards, bugs, sloths, dinosaurs, and birds are only few of the extraordinary animal robots that exist in the world today. Animal robots are very useful

creatures. They allow people to have a loving pet when they might be allergic to dogs, cats, and other lovable animals. Perhaps they can guard your door, make you laugh, teach you something, and let you just have fun with them. Animals are such cool creatures, now there are robotic animals that can make your day!

First of all, robot animals need to be researched and studied before they can have owners. Many robotic animal companies take high quality technology from laboratories and put it in people's houses. Aibo is one of them.

Are B.I.O bugs better than robot dogs? Did you know that B.I.O Bugs are the first toy that has advanced "nervous network" technology? Well toy expert Christopher Byrne is impressed with technological sophistication. He said, "They're wired to learn. You can put it in a box, and it can stymied, then learn to climb out, and it will remember the next time." Byrne states that he found them "more fun" than Aibo (robot dog). Byrne is obviously impressed by the B.I.O Bugs.

G-Dog, Wrex the Dawg, and robuDOG are nice to have around. G-Dog takes commands from a wireless remote to preform a basic set of dogs commands. One con is that it lacks the autonomy of a real dog. However, Wrex the Dawg is built to look like a junkyard dog. Wrex is a cartoon dog brought to robotic life. He walks, talks, farts, and performs all matters of dog tricks. The cartoon dog has infrared sensors that allow him to roam free and can be programmed to perform up to 80 operation steps using remote control. Wrex's mood shifts between happy, angry, or crazy. On the other hand, robuDOG can dance, play soccer, and take color photos. Plus he can interface with Windows.

BJ is another sweet pet to have around. He is a fully programmable pooch with a movable jaw, neck, legs, and tail. His ability to sense distances, the proximity of people, and animals is unbelievable. Pleo, on the other hand, is an autonomous robotic dinosaur. He has the ability to recognize sounds, sights, and touch. Also Pleo expresses hunger, craves affection, explores his environment, and displays a wide range of emotions.

Paro is a very adorable baby harp seal. Apparently, Paro responds to petting by moving its tail, opening its eyes, and making seal-like noises. He/she responds to sounds, learns names, and shows emotions. Mio pup is a cool pup. She's an interactive toy that accepts petting, plays music, and flashes emotions in its eyes to signal its mood. Robopet is also a cool pup. The bio-mechanical pup performs the full array of dog tricks. It also responds to sound and human movement. It can be trained to perform tricks on command through positive and negative reinforcement.

Japanese robot Dacky the Healing Partner is your dream come true. For people that don't know Japanese, Dacky might be a nightmare. It responds to petting, thanks to its internal sensors, asks about your day, sings karaoke, and learns up to 650 words in Japanese. Sakadachi-Lucky, on the other hand, only knows 13 words in Japanese, but it'll still be a nightmare for non-Japanese-speaking people. Now here comes the exciting dog, Big Dog. Big Dog was billed as "the most advanced quadruped robot on earth." It can maneuver all manner of terrain, run, jump, climb stairs, and recover from a fall, which is quite amazing!

So now you know all that about robot animals. Perhaps robot animals can guard your door, make you laugh, teach you something, and let you just have fun with them. Plus you'll always know that you have a loving, robotic animal by your side.

## **Prosthetics**

Prosthetics are amazing inventions that help out around the world every day. It is one of the ways technology helps in the daily life. In this section, you will explore what prosthetics are, how they benefit everyone who uses them, and how prosthetics were invented.

In a nut-shell, prosthetics is a branch of medicine and technology that supplies an artificial part of the body. You receive prosthetics because of birth defect, injury, or disease. So you can remember it as a substitute part of your body.

Prosthetics can assist your life in many ways:

- It will copy the functions of the missing body part

- It will assist the remaining tissues
- It will improve your appearance

The man who invented prosthetics wasn't really looking for a way to save the world. It started out as a school project when he was younger. Little did he know that his project would be the start of what would help people for a long time. He started out with a prosthetic arm. He knew a little girl who was born without any arms. He made arms that looked like her cousin's and put a molded latex texture over to make them look real, then added finger nails and a coloring to make it look like her real skin. After that, he added a net-like material with padding to protect the wires underneath. This was the first prosthetic arm.

You have explored what prosthetics are, how they benefit everyone who uses them, and how prosthetics were invented. I hope you learned something about prosthetics.

### **Space Robots**

Space and robots have always gone together in science fiction, from Rosie the maid in the 1960s cartoon *The Jetsons*, to R2-D2 and C3-PO in the *Star Wars* movies. But what about robots in space in real life?

In 1958, Congress formed the National Aeronautics and Space Administration (NASA). Early on, the focus was on manned space missions, with President John F. Kennedy saying in 1961 that the nation's goal was "landing a man on the moon and returning him safely to the Earth." But since 1972, human space missions have been in low Earth orbit only and other space exploration has been robotic.

NASA's Jet Propulsion Lab has about 100 engineers working on robotics for space exploration. At the JPL, they are working on software that controls Mars rovers, instrument placement and sampling arms, atmospheric airships for Titan and Venus, and drills and probes for Mars and Europa. They are also working on the Axel rover system for planetary surfaces. The space shuttle Discovery recently launched with humanoid robot called Robonaut 2 or R2. R2 is headed to the International Space Station. He will help people who go into space with

their tasks and cleaning. R2 can do everything from climb walls to work a console, and he went through “training” just like the other astronauts.

NASA is looking at three projects for next robotic mission. One is a mission to Venus to study the atmosphere and rocks. The second is a robot lander to land on an asteroid and collect materials to look for molecules needed to produce life. The third is a lunar lander to test the material from the moon’s mantle. NASA will decide this year which of these robotic missions to proceed with.

Robotic missions to asteroids would allow humans to learn more about the surface before sending astronauts there, allowing the astronauts to do more useful work once they arrive. Scientists say that a robotic mission to an asteroid could be as early as 2014.

The third option, called Moonrise, is based on discoveries made recently by NASA’s Lunar Reconnaissance Orbiter and India’s lunar orbiter Chandeyaan-1. These missions are studying water found on the moon.

Most lunar scientists agree that the best way to study water on the moon is to send robotic landers to the moon. These robots would likely be rovers with equipment to study water. For the next 10 or 20 years, the only Earthlings on the moon will likely have silicon brains, or in other words, be robots.

President Barack Obama in his statement on the New National Space Policy in June of 2010 stated that one of the goals was “ramping up robotic and human space exploration, with our sights set on Mars and beyond.”

In the future, human and robotics will most likely continue working together on space exploration. The benefits of this interaction include: Robots can go places that humans can’t, such as places with extreme temperatures or toxic environments, they can go farther than people can now with our current propulsion systems, and they can go on missions from which return may not be possible. As seen from the current R2 mission, the science fiction fantasy may be closer to reality than most think.

## **Cognitive Robots**

When people think of robots, they generally think of really anything along the lines of an automated machine that is programmed to perform certain mechanical functions or tasks that either may or may not be within the manner of mortality, like in a factory or industrial plant. These robots are typically run by a human operated control panel or the settings for its actions may have been prearranged. Another thing that comes to mind is a machine resembling a human that follows certain verbal or physical instructions on command. Many times these types of robots are very susceptible when it comes to their surroundings. For example they can maneuver around obstacles without any human assistance. One type of this robot is a cognitive robot. Cognition is the process of acquiring and using knowledge about the world for goal-oriented purposes.

Cognitive robots are complex variations of what a more developed human being could be. By information attained from their surroundings, the Internet, and all over the world, these robots are capable of answering almost any question they may be asked. Some cognitive robots are able to perform human tasks if equipped with the correct implements needed like sensors and physical hardware. By using the sensors, the robot monitors a human performing a task, and then proceeds by imitating the same movement. These specially designed robots can use their sensors to create a three-dimensional image of its surroundings and identify objects within the three dimensional image. This learning technique is called "learning by imitation". One of the biggest challenges within this technique is how the robot interprets the scene to distinguish the needed objects from the unneeded objects. To add to this learning procedure, a more elaborate way to look at this is "autonomous knowledge acquisition". In this, the robot is now using its sensors and collected knowledge about physical properties of the world to explore its new environment and discover its capabilities by itself. Cognitive robots are becoming more successful everyday like "Watson" from Jeopardy or "Cogniron" a robot created to serve

humans in their daily life. These types of robots can help many people and possibly become some of the world's smartest robots ever invented.

### **Roombas**

Roombas are robotic vacuum cleaners. They are 13 inches in diameter, and 3.5 inches tall. Since they are so flat and small compared to regular vacuum cleaners, they do a better job of getting under furniture. Roombas run on a rechargeable NiMH battery. It takes about seven hours to charge the 18 volt battery. The battery is rated at three amp hours, so the Roomba can clean for up to two hours. It is also motor-driven on tracked wheels.

The Roomba consists of many sensors. The first sensor is called the cliff sensor. The cliff sensor is a big part of the Roomba. The cliff sensor detects if it is approaching stairs or another type of drop off. The second sensor is the object sensor. When the bumper hits something, the object sensor tells the Roomba to try to find another path for it to go. Wall sensors are another sensor that are really similar to an object sensor. If it runs into a wall, then it finds another way to go. The nice thing about the wall sensor is that you can get virtual wall units. The virtual wall units send out a signal to the vacuum where the boundaries are.

Some things that the Roomba is good at doing is getting pet dander and knowing when its battery is getting low. They even make special Roombas for special cleaning purposes. Like if you have a dog or cat that just sheds, then there is a special kind of Roomba made just for you. New types are really good about knowing when its battery is getting low. After the battery gets low, then the Roomba rolls back to its charging dock to begin charging until it can start cleaning again.

The Roomba is helping people in many ways. They're starting to become popular, and people love them because they don't vacuum manually. Researcher Ja-Young Dung says, "Our findings suggest that, by developing intimacy to the robot, our participants were able to derive increased pleasure from cleaning, and expanded effort to fit Roombas into their homes, and

shared it with others." Who wouldn't want a break from vacuuming? Let the Roomba do its work!

Overall, robots are a great addition to our daily life and have helped with many discoveries over the years. Without the creation of robots we wouldn't have the developed technology or advanced knowledge we do today. Life wouldn't be the same without animatronics, space robots, prosthetics, robotic animals, maid robots, and cognitive robotics. Robots greatly affect the world as we know it today in many different ways. Over time they have evolved into something much greater than we expected. Even now robotic engineers are developing new inventions every day. Who knows what these inventions may bring.

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