

# AN INTRODUCTION TO ROBOTICS AND AUTOMATION

So, ever wondered what is this 'Robotics and Automation'? Okay, let's break it down to 'Robotics' and 'Automation'.

## What on earth is Robotics?

'Robotics', cool word, eh? Well, yeah, it's quite cool... not because of its name, but because you make and work with cool stuffs here, like *robots*. Okay, let me ask you one question. *What is it that comes to your mind immediately after hearing the word 'robot'?*

Is it something...

- that does your task
- that obeys you (and sometimes disobeys) :)
- that can perform stuffs that we humans cannot

Or, is it something like this...



Is this a robot?

Or this...



Now, in the pictures shown above, you can see a few cars, tanks and moving vehicles. Yes, *they* are robots. You can also see a fish. For your information, it's a mechanical (artificial) fish that has been developed by engineers. Yes, *it* is a robot. You can also see a few humanoids (one of them is ASIMO).

But what about the pictures of a gorilla, mosquito, bacteria, humans, etc.? Well, *even they* are robot, *biological robots!*

Okay, so now, can you define a robot? Think hard and try to come up with your own unique answers. By the way, there are many definitions of a robot, the simplest one as follows:

***“Any matter which has at least one degree of freedom is called a robot”.***

Confused regarding degree of freedom? Well, you should be ;-). Degree Of Freedom (DOF) represents the direction in which a robot can make movements. Say, one DOF means that the robot has only one moveable part and can move only in one direction. Two DOF means that the robot is free to move its parts in any two different directions. For example, the following robotic arm has 3 DOF as marked. Please note that all the three degrees of freedom are rotatory, not translatory.



3 degrees of freedom robotic arm

So, this proves that each and every pic that is shown above *is* a robot! Convinced? If not, please comment below so that I can convince you. ;-)

And to your surprise, there are also laws governing robotics! The Three Laws of Robotics :

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

So, by now, you can easily say what on earth is Robotics? What do you think? Well, it's all upto you the way *you* want to define robotics. It can be

- study of robots
- making of robots
- playing with robots :)
- practical use of robots
- artificial intelligence (AI)

So, any idea what is this “AI”, or Artificial Intelligence? Well, I ain't gonna tell ya, google it out yourself... ;)

## What on earth is Automation?

You must have heard the word *Automatic*. What does it mean? In simple words, an automatic device means that it can work with minimum or no human intervention. Similarly, *Automation* means the act of implementing the control of equipment with advanced technology; usually involving electronic hardware and robotic equipment. The main motto of automation is to reduce human work. It is an outcome of the varied application of robotics.

## Applications of Robotics and Automation

Whether it is outer space, home, farms, industries, hospitals, defense etc, robotics and automation plays a major role. Be it for research and exploration purpose, education, entertainment or disaster mitigation, automation is very essential. The following examples will clarify a bit more:

- intelligent home i.e. house automation systems are becoming popular day by day
- manipulative arms controlled by humans
- unmanned vehicles for defense and exploration
- automated harvesters and automated dairies
- car manufacturing process
- food processing industry and packaging industry
- robotic suit for nurses
- surgery-assisting robots
- interactive robots that exhibit behaviours and learning ability

- education is integrating technologies in a creative format and robotics involves all key learning areas such as maths, arts (i.e. materials and design), English, sciences (i.e. chemistry, physics, mechanics, electronics) and social skills

So, I guess you have got a good idea of *what* robotics and automation is! We will start with robotics and then move towards automation.

If you have read this post, do drop in a comment below. Whether good or bad, I will be happy to see them.

Source:

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