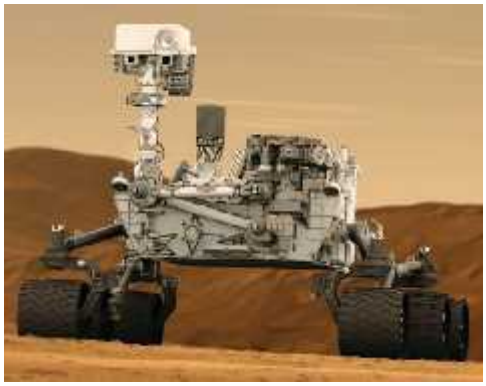
Robotics

Introduction

What comes to your mind when you hear the word robotics? You may think of some humanoid robots that you have seen in Star Wars or the Terminator or any other Sci-Fi film. However, robotics is not limited to machines that resemble the human body. Actually, robots are any machines that can sense, think and take action whatever their shapes and functions. The robotic vacuum cleaner in your house is an example of a robotic system. It senses its environ ment, think and plan its path and take action to move. The drones which now are used for photography and many other applications are examples of robots. They also sense their orientation through IMU sensor, think how to balance themselves again using the PID control and then take action to move by adjusting the voltage received to the brushless motors.



It is very interesting. Isn't it?!

Do you know that there are now robots that can autonomously dive underwater and discover the dangerous, unreachable sea bottom and there are robots that are above your head on Mars discovering its Environment? If not, you missed a lot. You missed the story of the Curiosity Rover on Mars and his revival and many other things.

Don't you feel the urge sometimes to discover the field of robotics and begin to create robots yourself? Join us today to build, program and test robot kits. You can make any design you want using small building blocks that are designed to make anything; then, you choose the sensors you want and connect them to your main controller in which you will upload your algorithms and problem solving techniques. Join us today to discover the interesting field of robotics.

Program Skills structure

The program is mainly concerning about developing skills rather than memorizing and that is the main base for the project-based learning. The journey here involves acquiring knowledge, understanding how nature works as this would be the main target of the program. Then follows teamwork skills. We cannot do significant something alone. Teamwork is a guarantee for maximum efficiency. You will involve with your team members discussing the design and implementation. As disputes are inevitable at the beginning, by time, you will acquire the skills to discuss efficiently. Then comes the practical application for which the team is constructed for. You and your team begin to describe resources, find a solution for the problem and make and design.
However, in your design, you have to consider cost and efficiency which is part of designing and practical work skills. It's a wonderful experience.

Scientific and knowledge skills

Science and knowledge are guiding our revolution in the twenty-first century. Their existence is of great importance for efficient design. Without knowledge, we are not expected to apply it, which is what engineers do. Here, students will study the scientific topics from their basics and at the same time will enjoy the beauty of it by making fun experiments

Engineering and Hands-on skills

Different form experiments, here, you are using knowledge to make a ma chine with a specific function that helps humans in somehow. You will work according to the engineering design process where you are considering the problem, find the solution and test your prototype. Nothing is more existing than creating your model from scratch, and watching it works. You will love the moment your voltammeter reads your first voltage.

Personal and Teamwork Skills

For large projects, humans are required to work in groups as a way to increase efficiency and productivity. Acquiring such skills is essential and thus, the program is concerned about improving your teamwork skills. You will be experience opposition from members and hard times, but above all you will learn how to discuss your points and shows your weaknesses and strengths. By time, your communication skills will be developed until you're able to persuade. From this point, it's the way to business and management skills. You're expected to make a business plan for your project in which you market your project.

Program progress phases

Phase 1 – Preparation

In this phase you will gain knowledge required for the next two stages. you will be introduced to LEGO kits, sensors and controllers. you will begin programming and coding on the ev3 controller provided by LEGO MINDSTORMS.

1.S: Scientific and knowledge content

The student will learn how to build structures using LEGO Bricks. Also, he will learn how to make mechanisms that have specific functionality using motors and servo motors and bricks. He will learn how to use the ev3 controller and sensors like IR sensor, ultrasonic sensor and color sensor. At the end, he will be able to make programs in the ev3 that can acquire information from the sensors and take action using motors.

1.E: Engineering Practices

They will research for robot arm designs and insects and animal simulator robots. They will be given case studies of motor torques and which motors to be used in specific applications. They also will be trained on the EV3 software and will be given algorithms to apply on.

1.H: Hands on Activities and checkpoint assignment

The students will involve in activities of making robots out of the components they have. They may make a robot arm or Hex pot robot.

Phase 2 – Design

In this phase you will go through something exciting, learning whatever it takes to start designing his project. Design structure, mechanisms, electronics, sensors, motors, etc. In this phase, you will be exposed to an advanced level of making robots where the interesting part comes. FabLab, Laser cutting, 3D printing and Arduino. However, you are free to use those facilities or stick to the LEGO components. It depends on the functionality you need in you robot.

2.S: Scientific and knowledge content

The students will learn the basics about manufacturing techniques and Computer Aided Design which are related to FabLab. They will know how to design and make simple mechanisms for gripping, lifting and other simple tasks. Also, they will be introduced to Arduino for tasks that may need advanced controllers.

2.E: Engineering Practices

CAD (Solid Work), Laser cutter (RDWorks), 3D printing (Ultimaker).

2.H: Hands on Activities and checkpoint assignment

The student will be divided into groups in which they will begin to decide upon their decisions regarding robot design, motion abilities and sensors positioning. Within groups, the students will have

to find solutions using the available components to some challenges assigned to them which is related to their walking robot. They will also be exposed to the abilities of Arduino Uno chip.

Phase 3 – Implementation

In this phase, all your dreams shall come true. It will completely be dedicated to building your project from scratch. Enough about formulas or equations, it's time to put all the designs and simulations into a real thing. Here, you will assembly your robot, test your algorithm, redesign and test again. Don't worry this is what should be done.

3.E: Engineering Practices

Fab Lab, real time components testing, re-Design, re-Implement and re-Test.

3.H: Hands on Activities and checkpoint assignment

Project construction, and testing. This is the part of pride and appreciation. In this part, you will watch your project doing what it is supposed to do. You will witness the effort that you have put into this project turning to success. You will see you robot move, sense and interact.