
Rosary College of Commerce & Arts

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Department of Computer Applications

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Principal's Message

In this day of continuous technological advancements, Robotics is a rapidly growing field. Robots have been built to perform jobs that require precision, speed and are hazardous to human beings such as defusing bombs, finding survivors in unstable ruins, exploring mines and shipwrecks etc. thus doing great service to mankind.

I am happy that our BCA Department is bringing up this new issue of Bits N Bytes focused on Robotics. Through this electronic platform our students and teachers of Computer Applications can express their views and ideas in this emerging field that could benefit society at large.

I congratulate Asst. Prof Mildred Lemos, our student Vailankan Pereira and all who have contributed to Bits N Bytes.

I hope and wish Bits N Bytes will inspire and ignite many minds.

Rev. Dr. Simão R. Diniz
Principal

Introduction to Robotics

Asst. Prof. Mildred Lemos

The word robotics was derived from the word robot, which was introduced to the public by Czech writer Karel Čapek in his play R.U.R. (Rossum's Universal Robots), which was published in 1920. The word robot comes from the Slavic word robota, which means labour.

Robotics is the branch of technology that deals with the design, construction, operation and application of robots and computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans, in hazardous or manufacturing processes, or simply just resemble humans. Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics.

Robotics is not a single discipline, but it a combination of many.

Mechanics includes the physical structure like the robot's body as well as the motors.

The electronics are cameras, speakers, sensors, and other devices that allow the robot to interpret and navigate the environment, to adapt, make decisions, and to communicate with humans.

Robots typically have a computer element. These robots are controlled by a miniature computer device which is a micro controller. This computer is programmed via an external computer using software.

Finally sophisticated mathematics are performed when the robot moves. Those calculations are called Kinematics.



A robot has four essential characteristics:

- Sensing :-First of all a robot would have to be able to sense its surroundings. It would do this in ways that are not unsimilar to the way that humans sense their surroundings. Giving robot sensors: light sensors (eyes), touch and pressure sensors (hands), chemical sensors (nose), hearing and sonar sensors (ears), and taste sensors (tongue) will give the robot an awareness of its environment.
- Movement :-A robot needs to be able to move around its environment. Whether rolling on wheels, walking on legs or propelling by thrusters a robot needs to be able to move. To count as a robot either the whole robot moves, like the Sojourner or just parts of the robot moves, like the Canada Arm.

- Energy :- A robot needs to be able to power itself. A robot might be solar powered, electrically powered, battery powered
- Intelligence :- A robot needs some kind of "smarts." This is where programming enters the pictures. A programmer is the person who gives the robot its intelligence. The robot will have to have some way to receive the program so that it knows what it is to do.

Today Robots are widely used in Manufacturing, construction, military, health care, space etc. Robots increase productivity, safety, efficiency, quality, and consistency of the products they create. They can work in hazardous environments needing no environmental comforts and without experiencing fatigue.

However they may lack the capability to respond in emergencies. Robots, although superior in certain senses, have limited capabilities in Degree of freedom, Dexterity, Sensors, Vision system and real time response.

Applications of Robots

Asst. Prof. Ramakrishna Reddy

Today, almost all the military organizations take the help of military robots to carry out many risky jobs that cannot be handled manually by soldier. We have also seen a great development in military robots when compare to military robots in earlier time.

Industrial robots - Industrial robots are robots used in an industrial manufacturing environment. Usually these are articulated arms specifically developed for such applications as welding, material handling, painting and others. If we judge purely by application this type could also include some automated guided vehicles and other robots.

*Domestic or household robots - Robots used at home. This type of robots includes many different devices such as robotic vacuum cleaners, robotic pool cleaners, sweepers, gutter cleaners and other robots that can do different chores.

*Medical robots - Robots used in medicine and medical institutions. First and foremost - surgery robots. Also, some automated guided vehicles and maybe lifting aides.

*Military robots - Robots used in military. This type of robots includes bomb disposal robots, different transportation robots, reconnaissance drones. Often robots initially created for military purposes can be used in law enforcement.

*Entertainment robots - These are robots used for entertainment. This is a very broad category. It starts with toy robots such as RoboBionics or the running alarm clock and ends with real heavyweights such as articulated robot arms used as motion.



Robotic Terms

- Vailankan Pereira (TYBCA B)

Biorobotics - A term that covers the fields of cybernetics, bionics and even genetic engineering as a collective study.

Humanoid - A robotic entity designed to resemble a human being in form, function, or both.

Insect robot - A small robot designed to imitate insect behaviors rather than complex human behaviors.

Prosthetic robots - Are programmable manipulators or devices for missing human limbs.

Surgical robot – A remote manipulator used for keyhole surgery.

Degrees of Freedom - The amount of values in a system possible of variation. A robotic joint is equal to one degree of freedom.

Arduino - The current platform of choice for small-scale robotic experimentation and physical computing.

Cloud robotics - robots empowered with more capacity and intelligence from cloud.

Dexterity - The measure of the robot's skill of completing specific difficult paths.

Parallel Robot - The linear or rotation joints of the robot's arms match each other in position and direction.

Nanotechnology - (Molecular Manufacturing) The science of studying and inventing products on the small scale of the molecular level.

Nanorobotics is an emerging technology field creating machines or robots which components are at or near the scale of a nanometre (10⁻⁹ meters).

