



ROBOTICS LEARNING PLATFORM EVOLUTION III (EVO III AND THE EXPLORERBOT)

INTRODUCTION



Evolution III is a robotics learning platform composed by two robots: EVO III and a three wheels protractor robot, the EXPLORERBOT, which enables the customer with all the necessary tools, to experiment and to learn about basic principles and advanced aspects, regarding the robotics field, by interacting with a very powerful and versatile system.

EVO III is composed by 19 servomotors with their respective micromechanical parts and actuators, driven by a micro-controlled board, USB port communicated with a PC, which runs a customer interface (GUI) developed in Visual Basic, providing the operator with the necessary commands to control all the robot functions and to program different movement sequences, which can be recorded and playback.

This system provides the customer with the possibility to experiment and interact, by configuring different robotics shapes by assembling the mechanical parts in different ways, and developing different software routines to control his creation, in many complexity levels depending on user background and learning program.

The EXPLORERBOT is a three wheels protractor robot communicated with a PC, which runs a customer interface (GUI) developed in Visual Basic commanded by a "Play Station" joystick control to navigate and explore surround. This system can be provided with different sensors to track objects, line tracking,, navigation avoiding obstacles, GPS controlled navigation, etc., and combined with the different structures created with EVO III amazing robot shapes can be created, like tactical robots.

With this tools, the customer will learn about robotics principles and advanced applications in automation field, biped humanoid locomotion, Tele-presence systems and a lot more topics in relation to this amazing field "THE ROBOTICS".

Welcome to EVOLUTION III.



MULTIPLE CONFIGURATION ROBOTICS SYSTEMS EVOLUTION III (EVO II AND THE EXPLORERBOT)



BASIC DESCRIPTION

Evolution III is a robotics learning platform composed by two robots : EVO III and the Explorerbot.

Evo III is basic conform by 19 servomotors driven by a electronic micro-controlled board. This control board is via USB port communicated with a PC in a wired way or as an option wireless in Bluetooth protocol.

The customer interface is developed in Visual Basic, providing the operator with the necessary commands to control all the robot functions and to program different movement sequences, which can be recorded and playback.

This 19 servomotors, with their respective micro-mechanical parts and actuators, can be assembled in multiple configurations, conforming different robotics applications.

Five basic configurations are going to be described on this article:

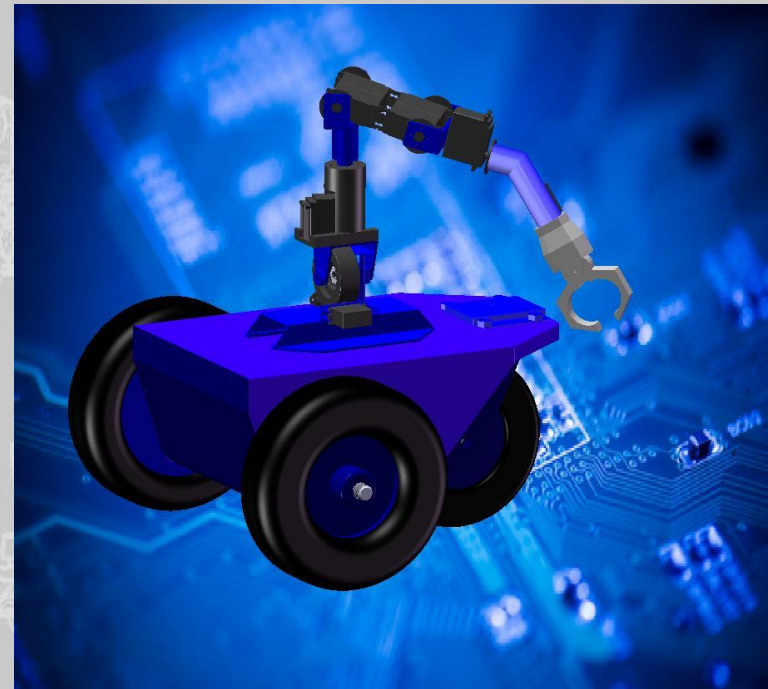
- ✓ One revolute coordinate arm.
- ✓ Two revolute coordinate arms mounted together on a basis.
- ✓ Two revolute coordinate arms mounted together on a basis actuated by a servo-mechanism which is able to turn the arms system counterclockwise and clockwise.
- ✓ One Android Configuration System composed by two fully articulated arms, mounted in a body structure.
- ✓ One biped humanoid robot one meter tall, which can walk, turn right and left, and to execute different tasks programmed by the customer through the Visual Basic interface. In addition as an option, can be supplied with wireless video and bidirectional audio channels, to conform a Tele-presence robot, with Machine Vision options.

The Explorerbot is a three wheels protractor robot communicated with a PC, which runs a customer interface (GUI) developed in Visual Basic commanded by a "Play Station" joystick control to navigate and explore surround. This system can be provided with different sensors to track objects, line tracking,, navigation avoiding obstacles, GPS controlled navigation, etc.

All above described robotic structures, can be combined with the Explorerbot to conform different and amazing robot structures, tactical and exploration robots, rescue robots etc...



REVOLUTE COORDINATE ARM EVOLUTION I *(EVO I)*



Evolution I is the first robotics configuration which is composed by 8 servomotors driven by an electronic micro-controlled board. This control board is via USB port communicated with a PC in a wired way or as an option wireless in Bluetooth protocol.

The customer interface is developed in Visual Basic, providing the operator with the necessary commands to control all the robot functions and to program different movement sequences, which can be recorded and playback.

This 8 servomotors, with their respective micro-mechanical parts and actuators, conform a Revolute coordinate arm with standard 3 degrees of freedom (shoulder rotation - flexion, and elbow flexion), plus a fourth freedom degree provided by a high power micromechanical system which can tilt the whole revolute coordinate arm in two directions. In addition the hand mechanism has a wrist which can turn the grip counterclockwise and clockwise.

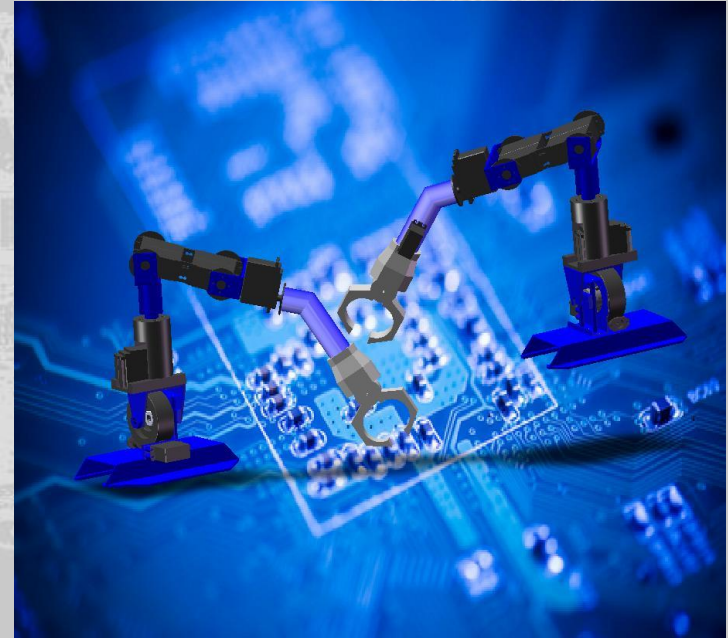
EVO I enables the user to, experiment and interact with a robotics revolute coordinate arm, learning and creating different routines of movement through the Visual Basic user interface, applicable in automation field, or by adding a locomotion system, the implementation of a mobile robot for increased flexibility. In addition, depending on user's background, provides the possibility to interact with the microcontroller software, to study and learn about servomotors driving and control techniques.

This robotic configuration, can be combined with the Explorer bot to create a tactical exploration and interaction robot.



TWO REVOLUTE COORDINATE ARMS SYSTEM

EVOLUTION IIA (EVO IIA)



Evolution IIA is the second robotics configuration which is composed by 16 servomotors driven by a electronic micro-controlled board. This control board is via USB port communicated with a PC in a wired way or as an option wireless in Bluetooth protocol.

The customer interface is developed in Visual Basic, providing the operator with the necessary commands to control all the robot functions and to program different movement sequences, which can be recorded and playback. This 16 servomotors, with their respective micro-mechanical parts and actuators, conform a Two Revolute coordinate arms system composed by two EVOs I.

EVO IIA enables the user to, experiment and interact with a more complex robotics arms system, learning and creating different routines of movement through the Visual Basic user interface, applicable in automation of industrial process, optimizing times and movements. In addition, depending on user's background, provides the possibility to interact with the microcontrollers software, to study and learn about servomotors driving and control techniques.



TWO REVOLUTE COORDINATE ARMS ASSEMBLY EVOLUTION IIB (EVO IIB)



Evolution IIB is the Third robotics configuration which is composed by 17 servomotors driven by a electronic micro-controlled board. This control board is via USB port communicated with a PC in a wired way or as an option wireless in Bluetooth protocol.

The customer interface is developed in Visual Basic, providing the operator with the necessary commands to control all the robot functions and to program different movement sequences, which can be recorded and playback. This 17 servomotors, with their respective micro-mechanical parts and actuators, conform a Two Revolute coordinate arms system composed by two EVOs I, mounted together on a basis actuated by a servo-mechanism which is able to turn the two arms system counterclockwise and clockwise.

EVO IIB enables the user to, experiment and interact with a more complex robotics arms system, learning and creating different routines of movement through the Visual Basic user interface, applicable in automation field, and or by combining it with the Explorerbot in the implementation of a more complex robotic system providing all the functions of this two arms robot with the navigation function, to create exploration, tactical and rescue robots. In addition, depending on user's background, provides the possibility to interact with the microcontrollers software, to study and learn about servomotors driving and control techniques.



ANDROID CONFIGURATION EVOLUTION IIC (EVO IIC)



Evolution IIC is the fourth robotics configuration which is composed by 19 servomotors driven by a electronic micro-controlled board. This control board is via USB port communicated with a PC in a wired way or as an option wireless in Bluetooth protocol.

The customer interface is developed in Visual Basic, providing the operator with the necessary commands to control all the robot functions and to program different movement sequences, which can be recorded and playback. This 19 servomotors, with their respective micro-mechanical parts and actuators, conform a Android configuration system with two fully articulated arms mounted on a body structure with a head driven by two servomotors which provide tilt and pan functions.

The body is mounted on a basis actuated by a servo-mechanism which is able to turn the whole system counterclockwise and clockwise.

EVO IIC enables the user to, experiment and interact with a more complex android system, learning and creating different routines of movement similar to the human body through the Visual Basic user interface, applicable in automation field, and or by combining it with the Explorerbot in the implementation of a much more complex robotic system providing all the functions of this android configuration with the navigation function, to create exploration, tactical and rescue robots, etc...In addition, depending on user's background, provides the possibility to interact with the microcontrollers software, to study and learn about servomotors driving and control techniques.

As an option, can be supplied with wireless video and bidirectional audio channels, to conform a Tele-presence robot with machine vision function.



BIPED WALKING HUMANOID ROBOT

Evolution III is the fifth robotics configuration which is composed by 19 servomotors driven by a electronic micro-controlled board. This control board is via USB port communicated with a PC in a wired way or as an option wireless in Bluetooth protocol.

The customer interface is developed in Visual Basic, providing the operator with the necessary commands to control all the robot functions and to program different movement sequences, which can be recorded and playback.

This 19 servomotors, with their respective micro-mechanical parts and actuators, conform one biped humanoid robot one meter tall, which can walk, turn right and left, and to execute different tasks programmed by the customer through the Visual Basic interface. In addition as an option, can be supplied with wireless video and bidirectional audio channels, to conform a Tele-presence robot with machine vision function.

On the other hand, depending on user's background, provides the possibility to interact with the microcontrollers software, to study and learn so much about servomotors driving and control techniques, as the developing of new locomotion sequences and movement routines. The system is supplied with a battery pack which provides about 2 hours autonomy.

EVO III can be unassembled and reconfigured to conform anyone of the above described robotics systems EVO I, EVO IIA, EVO IIB, EVO IIC, or any other configuration created by the user.

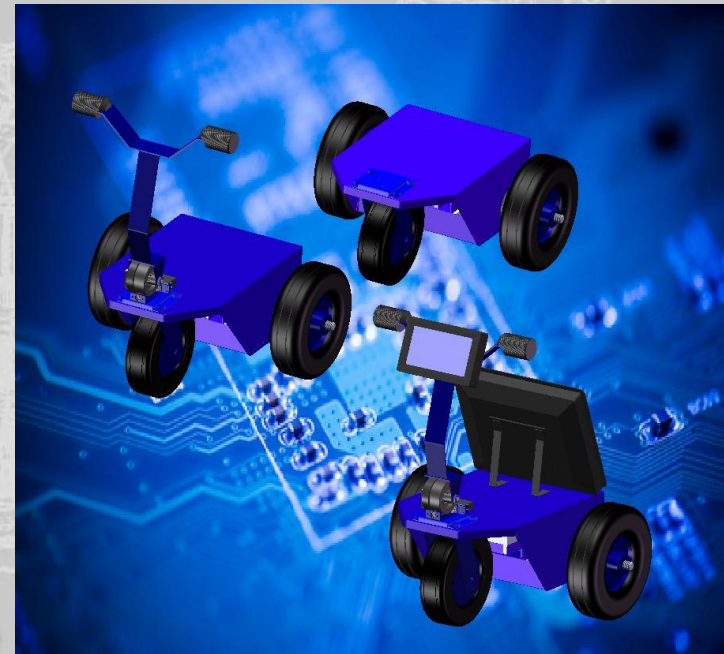
By combining this humanoid robot with the Explorer bot, a very amazing robotic configuration is created giving the humanoid much more mobility with the possibility of a lot of applications like publicity and products promotion, security, Tele-presence systems, etc....



EVOLUTION III (EVO III)



EXPLORERBOT (THREE WHEELS PROTRACTOR ROBOT)



The Explorerbot is a three wheels (26 cm diameter) protractor robot. The traction is provided by two high power micro-motors (9 Nm torque) which speed is controlled by a micro-controlled board communicated via USB port with a PC, which runs a customer interface (GUI) developed in Visual Basic commanded by a "Play Station" joystick control to navigate and explore surround. This system can be provided with different sensors to track objects, line tracking, navigate avoiding obstacles, GPS controlled navigation, etc.

By adding a servo-actuator coupled to a handlebars is able to be assembled with Evo III in the above described biped walking humanoid robot, configuring in this way a amazing robot structure.

By adding to this configuration two LED monitors, this robot structure can be used to present and promote products becoming a very dynamic and powerful publicity system.

The displacement speed can be controlled into a range of 20 cm/sec. to 70 cm /sec.



HUMANOID ROBOT WITH TELE-PRESENCE IMMERSION SYSTEM “VIDEO GOGGLES”

This configuration incorporates a Tele-presence immersion system, conformed by a advanced vision device, the “Video Goggles”.

This device receives wireless video and audio signals from the video camera included into the humanoid's head, projecting the video at a virtual reality goggles, creating in that way a Tele-presence immersion system which generates to the user the sensation to be into the robot.

In addition the “Video Goggles” incorporate a magnetic, gyro, accelerometer which delivers to the interface information about user's head roll – yaw movements (“Tilt-Pant” or “x-z axis”).

After the interpretation of this information, the interface sends wireless (“Bluetooth” protocol) commands to the humanoid, controlling in that way the servo-motors which drive its neck, replicating in that way the user's head movements, increasing in a huge way the sensation of immersion into the robot.

On the other hand the interface lets the user to control with two Joysticks the speed and displacement direction of the humanoid's protractor robot the “Explorerbot”, providing through the “Video Goggles” the sensation of traveling into the robot. In addition the interface is provided with a bidirectional audio channel with the one the user has the possibility to interact with the people surrounding the robot..

The system includes a battery pack which provides about two ours autonomy of operation.



EVO III can be unassembled and reconfigured as any of the above described robotics systems: EVO I, EVO IIA, EVO IIB, EVO IIC, or any other configuration created by the user. Adding to this configurations the above described Tele-presence system, the user is able to develop robots to perform remote tasks.