



News Release

CyboSoft Releases a Video to Demonstrate MFA Motion Control and Its Ability to Control Humanoid Robots

May 7, 2024 – CyboSoft (Rancho Cordova, California), the developer of Model-Free Adaptive (MFA) control technology and products, announced today that it has released a short video to demonstrate high-speed MFA motion control systems and the ability to control Humanoid Robots.



[Link to video](#)

CyboSoft CEO Dr. George Cheng said, “Riding the AI wave, humanoid robots are the next big thing that can provide huge benefits to our daily lives and revolutionize our world. Enabled by large language models and generative AI, humanoid robots could potentially mimic human behavior, respond to natural language commands, express emotions, and perform human-like tasks. However, AI is only the first half of the puzzle. The second half is connecting the robot to the physical world. A humanoid robot still needs to know how to walk, run, climb stairs, hold objects, move things around, and talk like a human. Smart sensors and controls are critical elements for humanoid robots to navigate and interact with the physical environment.”

Humanoid robots face unique motion control challenges due to their complex biometric design and the need to maintain dynamic stability during locomotion and manipulation tasks. Regardless of its complexity, at the lowest level, it is a high-speed servo control problem with variations in motion, dynamic behavior, inertia, and friction. Sudden and large load changes can cause instability and failed motions. Traditional PID control is not sufficient and model-based control methods are too complicated and costly to implement.

CyboSoft is the leader in high-speed adaptive motion control with its patented Model-Free Adaptive control technology. MFA controllers have been deployed on a large scale in building control, process control, and equipment control. In the video, an MFA motion controller is shown running at a 10-microsecond update rate controlling a linear piezo-motor under load changes. A load is suddenly added to test the robustness of the system. The trends show consistent control performance with and



without the load. The video also shows an MFA motion control system for a 2-axis stage under varying motion and load changes. It demonstrates the adaptive and robust nature of MFA controllers. Examples of sudden and large load changes to humanoid robots are listed in the following table.

No.	Robot Motion	Sudden and Large Load Changes to a Humanoid Robot
1	Lifting Heavy Objects	Lift a heavy object, the sudden increase in load can place significant stress on its joints and actuators.
2	Pushing or Pulling Objects	Pushing or pulling a heavy object, such as a cart or a door, sudden changes in resistance or friction can result in abrupt load changes.
3	Interacting with Dynamic Environments	In dynamic environments, humanoid robots may encounter unexpected obstacles or changes in terrain, leading to sudden changes in the load on their limbs and actuators.
4	Assisting Humans	When assisting humans, robots must adapt to changes in the human's movements and intentions, which can result in sudden load changes.
5	Performing Agile Movements	When jumping or leaping, robots may need rapid acceleration and deceleration, leading to sudden changes in load on their joints and actuators.

MFA is the only commercially successful smart controller that does not require mathematical models. Due to its smart and general-purpose nature, it is well suited to control special and general-purpose humanoid robots. CyboSoft is seeking strategic partners in the humanoid robot field. We look forward to working with you to build a bright new world served by billions of humanoid robots.

<p>CyboSoft High-Speed Servo Control Problem</p> <ul style="list-style-type: none"> • A high-speed servo control problem with variations in motion, dynamic behavior, inertia, and friction, etc. • Sudden and large load changes can cause instability and failed motions.  <p><small>Copyright by CyboSoft</small></p>	<p>CyboSoft CyboSoft Vision and Mission</p> <ul style="list-style-type: none"> • Founded in 1994 with headquarters in California, CyboSoft is the leader in control technology serving the worldwide process control, building control, and equipment control markets. • CyboSoft's Model-Free Adaptive (MFA) control technology can play a major role in controlling humanoid robots.  <p>MFA IN CONTROL</p> <p>Building a Bright New World Served by Smart Humanoid Robots.</p> <p><small>Copyright by CyboSoft</small></p>
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About CyboSoft

CyboSoft is the leader in control technology serving the worldwide process control, building control, and equipment control markets. CyboSoft's patented Model-Free Adaptive (MFA) control technology for automatically controlling physical processes is a major breakthrough. No other comparable technology possesses all the attributes of MFA. MFA is the only commercially successful smart controller that does not require mathematical models. For more information, please contact: CyboSoft, e-mail: Josh Bear, JBear@cybosoft.com. Website: www.cybosoft.com.