Cyton^{E} Robotic Arms

A New Generation of Robots

- Easy-to-task: trainable by anyone
- Inherently safe: cage free
- Lightweight and portable: < 5lbs
- Powerful: multiple applications
- Dexterous: performs human-like tasks
- Cost effective: accessible for all budgets

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Dynamic Solutions, Inspired Classrooms

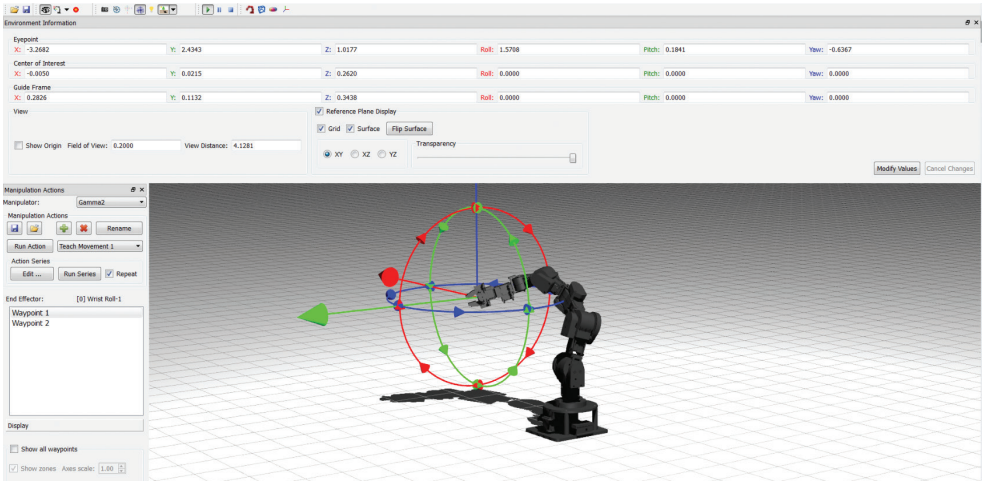
Actin Software - Empowering Cyton^{E}

Programming Methods

- Assistive (manual)
- Waypoints
- Frames
- C++

Interactive Control

- Interactive game controller (local / remote)
- Interactive dragger TCP (local / remote)
- Third-party controller
- C++ API



The Cyton is enabled by Actin software—the same software used for high-end hardware in the space, energy, medical, and nuclear fields. With the purchase of the Cyton, you gain access to the power of years of development by world-class robotics engineers and testing on robotic systems fielded across the globe.

The 3D visualization and control interface enables real-time remote control across a local network or over the Internet. You can train the robot tasks and automatically find joint angles that avoid collisions and joint limits. Easily download and deploy new functionality through the plugin interface.Even create your own plugins to customize the Cyton to suit your needs.

The included API and supporting software toolkit enables you to write your own C++ or Python programs. All this is supported by simulation-based validation, a physics-based simulation lets you try new payloads and new tasks in a virtual environment.

Graphical Interface

The 3D immersive environment displays the virtual robot matching the physical hardware. When used in real-time mode, the rendering matches the hardware motion and allows virtual eye points to be used for improved visibility and control. Set joint angles, create virtual camera views to match your sensor settings, plot joint values, rates, and accelerations in real time. Script complex motions for replay, direct control and remote control. Save motion data in a variety of formats for replay and analysis.

Fly the End Effector

Controlling a complex robot is difficult if you must set joint values directly. Actin software for the Cyton makes it easy by allowing you to "fly the end effector". In this control mode, you specify the position and orientation of the gripper the same way you would specify the position and orientation of your own hand.

Describe where to place the end effector through the intuitive graphical interface. End effector motion parameters, such as maximum velocity and acceleration are configurable at runtime. The Cyton has extra degrees of freedom that are used to avoid collisions with the environment and avoid joint limits while achieving the gripper motion you request.

Example programs show how to add buttons, toolbar components, context menus, as well as how to tie these UI components into the back-end Actin controller.

Simulation-based Validation

In addition to control, the Cyton software provides simulation-based validation of tasks, payloads, and environments. The graphical interface can be operated at any time without the robot operating or even attached. With graphical controls, the simulation can be swapped between kinematic (positions and velocities) and dynamic (forces and accelerations), enabling exploration of workspaces, actuator performance, and sensor placements. You can test robot-attached sensors or environmental objects digitally before implementing and calculate the effectiveness and robustness in new scenarios.

Remote Control

The Cyton software supports real-time remote control. Whether in the next room connected to a LAN or in the next country over the Internet, the Cyton software tools support fast operation. The interface can be hidden or graphically visible on computers on both ends of the network connection, and either joints or end-effector positions can be transmitted to implement the remote control. Software is available that adds the ability to receive compressed video data and display it in the same graphical environment as is used for control. Side-by-side simulations and camera imagery provides a powerful interface for remote operation.

Robai Cyton^{E} Humanoid Manipulator

Robai lightweight robotic systems transcend traditional robotics through advanced software. Robai's premier Cyton line of kinematically redundant robotic manipulators have more dexterity and a larger workspace that is enabled through powerful inverse kinematics algorithms. With Cyton robots, it is easy for any user to script complex motions, apply autonomous sensing procedures, or teleoperate from remote locations - all while automatically dodging collisions with the environment and optimizing joint placement for accuracy and strength.

Humanoid robot arms, with many degrees of freedom, can reach around obstacles and through gaps, reconfigure for strength, and manipulate objects with dexterous fluid motion. These robots have kinematic redundancy, like that of the human arm, that enables placement of a hand or tool at a position and orientation in an unlimited number of ways. Combined with Energid's Actin 3D visualization, reasoning, and control software, the Robai Cyton Gamma can perform advanced control by exploiting its kinematic redundancy.

Cyton Robotic Arm Specifications

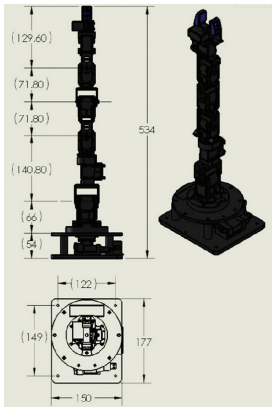
ELECTRICAL

- Input Voltage: 100-240VAC
- Battery supply (optional): 12V DC 2A

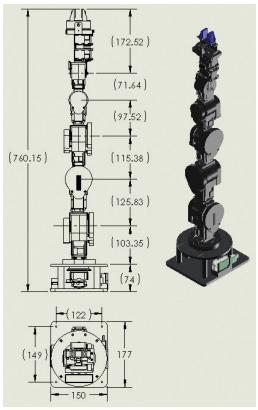
ENVIRONMENT

- Ambient temperature from 20°C to 35°C
- Can be used under normal atmospheric pressure conditions

Cyton^{E} Gamma 300



Cyton^{E} Gamma 1500



	300	1500
AXIS RANGE		
Total independent axes	7	7
Shoulder Roll (Spin)	300	300°
Shoulder Pitch (Articulate)	210	210°
Elbow Roll (Spin)	300	
Shoulder Yaw (Articulate)		210°
Elbow Pitch (Articulate)	210	210°
Wrist Yaw (Articulate)	210	210°
Wrist Pitch (Articulate)	210	210°
Wrist Roll (Spin)	300	300°
MECHANICAL		
Total weight:	1.2Kg	2Kg
Payload at full reach:	300g	500g
Payload at mid reach:	350g	2000g
Arm length (base to tip):	53.4cm	76cm
Reach:	48cm	68cm
Max.linear arm speed:	20 cm/sec	10 cm/sec
Max.speed (free move):	100 cm/sec	70 cm/sec
Repeatability	+/-0.5mm	+/-0.5mm
Gripper:		2 fingers
Opening range:	3.5cm	3.5cm

AVAILABLE ACCESSORIES

- Carrying/storage case
- Three-finger gripper for the 1500
- E-learning curriculum

Unlimited Applications for Education

With Cyton robotic arms the applications are endless, from initial exploration through sophisticated university research.

- Testing materials and finished goods
- Manufacturing: Machine tending, pick and place and quality inspection
- Gaming
- Working in a robotics ecosystem
- CytonE on a mobile robotic platform
- Working in tandem
- 2 Robots together create 15 axis workspace
- Robots working sequentially
- Human Interaction

Course Outline

Introduction to Robotics

- Lesson 1: What is a Robot?
- Lesson 2: Sensors, Actuators, & End Effectors
- Lesson 3: Joints, Degrees of Freedom (DOFs), & the Work Envelope
- Lesson 4: Payload & Torque
- Lesson 5: Using the Manipulation Director, Part 1
- Lesson 6: Garbage In Garbage Out (GIGO)
- Lesson 7: Motion Programming

Advanced Robotics

- Lesson 1: Automated Systems
- Lesson 2: Using the Manipulation Director, Part 2
- Lesson 3: The Perfect Tool
- Lesson 4: Over and Over Again
- Lesson 5: Feedback & Control
- Lesson 6: Sorting

Ordering Information

Curriculum available perpetually via LearnMate™, or leased annually via OnlineLearning.intelitek.com

CYT-ACTN-0300	Cyton E300 Arm with 5, 10, or 25 seat Actin License and Intro Curriculum
CYT-ACTN-1500	Cyton E1500 Arm with 10 or 25 seat Actin License and Intro Curriculum
CYT-ACTN-3002	Two (2) Cyton E300 Arms with 10 or 25 seat Actin License and Intro Curriculum
CYT-ACTN-1502	Two (2) Cyton E1500 Arms with 25 seat Actin License and Intro Curriculum
77-8156-0000	Introduction to Robotics with Cyton (LearnMate™)
77-8156-0000-L	Introduction to Robotics with Cyton (OnlineLearning)
77-8158-0000	Advanced Robotics with Cyton (LearnMate™)
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