BRACCIO ++
PRODUCT TEXT

One-liner
A revolutionary robotic arm, designed specifically for advanced high school and university students.

Short product text
Braccio++ is a revolutionary new robotic arm designed solely for advanced high school and university students, including engineering schools and institutes of technology – or even advanced high school and college students studying the sciences, industrial science or technology.

This next-level robotic arm is paving the way for high school and college students to dive into real-world manufacturing techniques - and you'll find that there's not much Braccio++ isn't capable of.

In addition to the open-source hardware, there's an e-learning platform with step-by-step instructions, lessons, and other learning materials. The student-optimized content that accompanies Braccio++ covers kinematics, dynamics, and control at university. For high school, it also covers computer-integrated manufacturing.

Long product text
The next level up from the Tinkerkit Braccio robot, Braccio++ is a revolutionary new robotic arm designed solely for higher education, including engineering schools and university institutes of technology – or even advanced high school and college students studying the sciences, industrial science or technology.

There's not a lot this robotic arm with five degrees of freedom isn't capable of, and recreating a replica of an industrial robot used on an assembly line will teach students more about manufacturing processes, product design, robotics, and automation.

Braccio++ is fully optimized and can be assembled in several ways for multiple tasks, such as moving objects, mounting a camera and tracking your movements, or attaching a solar panel and tracking the movement of the sun. Its uses are almost limitless.

Students will learn real life applications of physical concepts through lifting, placing, and rotating an item. These concepts include motions, forces, torque, gear ratios, stability, and weight of payload.

Braccio++ offers a multitude of expansive possibilities from the very outset, including a new Braccio Carrier with LCD screen, new RS485 servo motors, and a totally enhanced experience.

You can simply program and communicate with the new, intelligent Arduino smart servo motors, which are at the very heart of this new revision. One of the best features of the smart RS485 servo

motors is that they share information with each other through asynchronous communication. In other words, it doesn't require a clock signal for synchronization.

In addition to the open-source hardware in the kit, there's an e-learning platform with step-by-step instructions, lessons, and other learning materials. The student-optimized content that accompanies Braccio++ covers kinematics, dynamics, and control at university. For high school, it also covers computer-integrated manufacturing.

How is Braccio++ different from the TinkerKit Braccio robot?
We have made significant and expansive updates and improvements to the original TinkerKit Braccio robot to create Braccio++. These include:

- A completely new and fully optimized carrier with RS485 serial communication, an LCD screen, and a joystick
- The kit now includes an Arduino board, the feature-packed Nano RP 2040 Connect
- Instead of classic servo motors, the kit includes Arduino smart motors
- USB C powers the carrier and motors, and can be even used for charging your computer
- We are using a more sustainable material, Ecoallene, instead of the ABS plastics
- You have a bigger base on which to mount the Braccio
- Improved packaging, allowing you to mount and transport your Braccio in the box
- New, dedicated online content

Benefits of using Braccio++
- Teach real life applications of physical concepts through lifting, placing, rotating, and sorting different items
- Adaptability: Braccio++ can easily add mobility and enhance other projects
- Create a small replica of a real industrial robot used on an assembly line or an automotive factory

Quick features of Braccio++
- Aimed at advanced high school and college students aged 16+
- Access simple tutorials covering how to use and test the different parts of the hardware, including the display, joystick, buttons, and intelligent motors
- Projects demonstrating how to testor play with Braccio++ once it's assembled
- Up to three students can use one kit
- Find even more project ideas on the Arduino community
- Dedicated support for any questions
- Available in English
- 5 degrees of rotation
- It can carry objects up to 400 grams
- Accuracy of placement
- Students can use the Braccio ++ for standard picks and place to inverse kinematics having in between hundred of different possibilities.

- Braccio ++ is made by solid Ecoallene plastic and counts with a big base on which to mount it.
- Specialized online content
- Intelligent motors

What's included?

The Braccio++ kit includes (but isn't limited to):

- Assembly parts, screws, nuts, springs, and a screwdriver
- Six Arduino RS485 Smart Servo Motors (four SR418D servo motors which control the arm joints, and two SR312 servo motors which control the claw)
- Arduino Braccio Carrier
- Arduino Nano RP2040 Connect
- A printed guide on how to assemble the kit, make it work with the motors, and upload your first sketches

Learning outcomes

University:
- Kinematic chains
- Mathematical tools for kinematics and the dynamics of robot arms
- Methods to reason about 3-dimensional space and relationships between coordinate frames
- Delivering a payload to a specified location
- The geometry and mathematical representation of rigid body motion
- Forward and inverse kinematics of articulated mechanical arms
- Trajectory generation
- Manipulator dynamics
- Actuation and design issues
- Manipulator control

High school:
- Motions and forces
- Interactions of energy and matter
- Manufacturing processes, product design, robotics, and automation
- Robotic or automated system arm construction
- The concepts of torque, gear ratio, stability, and weight of payload
- The concepts of linkages and gearing in end effectors and their use in a robotic or automated arm system

Curriculum alignment

The content that accompanies Braccio++ covers kinematics, dynamics, and control. For high school, it also covers computer-integrated manufacturing.