ArmBot

Advanced AI-Vision Robotic Arm



Armbot PI
By Robox

The Premier Educational Platform for ROS 2, Computer Vision, and Human-AI Interaction

Robox
Crafting powerful machines

Product Overview



ArmBot is a sophisticated, 6-DOF educational robotic arm designed to bridge the gap between theoretical robotics and real-world AI applications. Powered by the Raspberry Pi 5, it serves as a high-performance terminal for mastering mechatronics, automation, and intelligent systems.

Whether for university laboratories or advanced research, ArmBot provides a robust environment for mastering ROS 2, MoveIt 2, and OpenCV. It is engineered to perform complex tasks such as autonomous color sorting, QR code recognition, intelligent object stacking and AI interaction with robotic arms.

Key Highlights

ROS

MoveIt



MAchine vision



Python

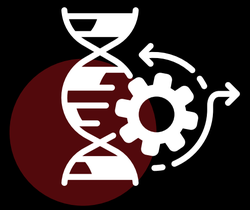


OpenCV



Inverse kinematics

Key Highlights



Next-Gen Processing:

Powered by the Raspberry Pi 5 (8GB) for seamless execution of ROS 2 Jazzy Jalisco and complex AI models.



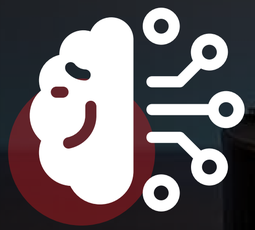
Precision Actuation:

Equipped with high-torque bus servos (up to 25 kg.cm) providing 0.29° position resolution for industrial-grade accuracy.



Open Framework:

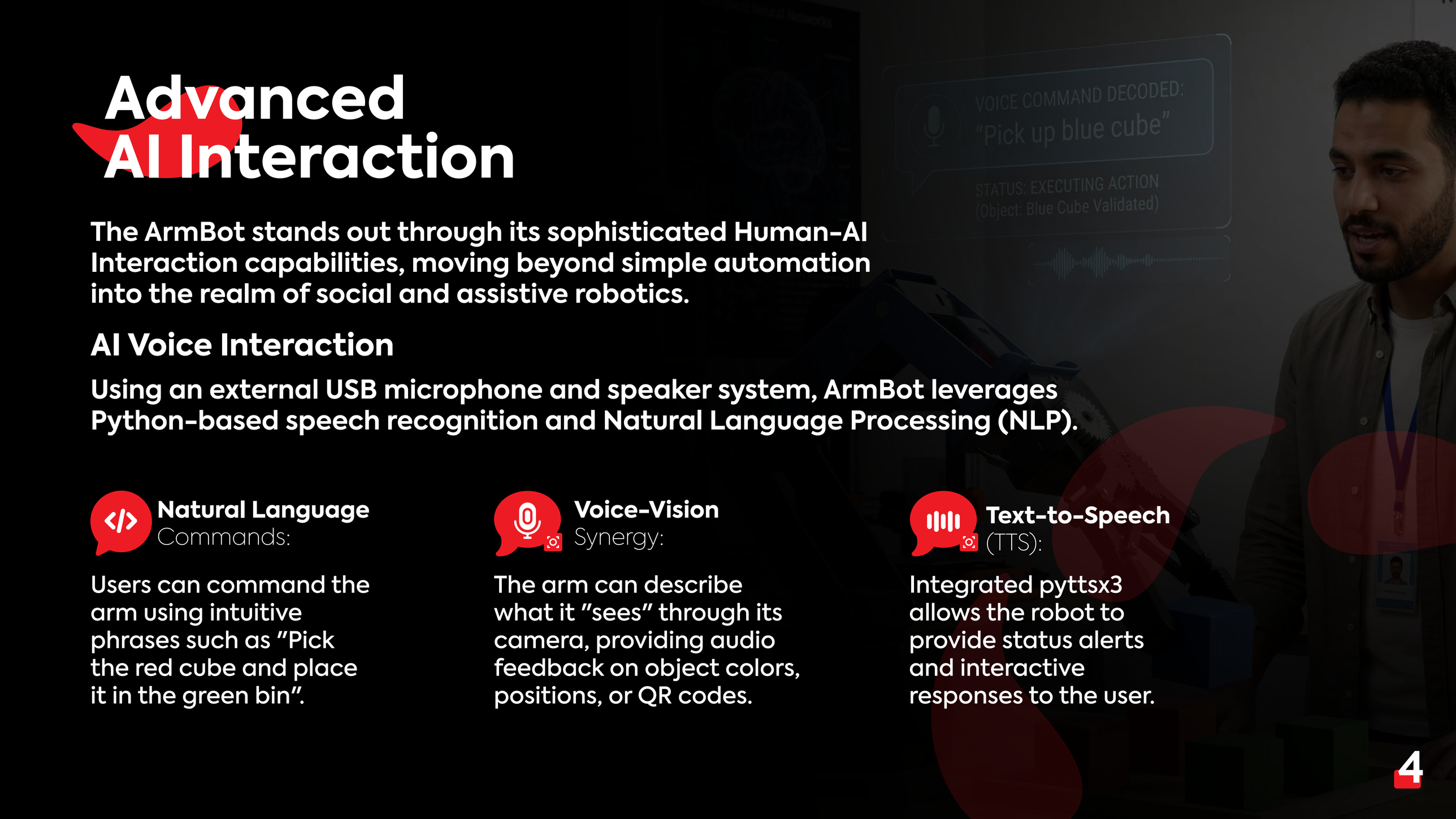
Fully open-source software stack including ROS 2, MoveIt 2, OpenCV, and Python 3.



Integrated AI Suite:

Features a built-in HD vision system and dedicated audio hardware for natural human-robot interaction.

Advanced AI Interaction



The ArmBot stands out through its sophisticated Human-AI Interaction capabilities, moving beyond simple automation into the realm of social and assistive robotics.

AI Voice Interaction

Using an external USB microphone and speaker system, ArmBot leverages Python-based speech recognition and Natural Language Processing (NLP).

Natural Language Commands:

Users can command the arm using intuitive phrases such as "Pick the red cube and place it in the green bin".

Voice-Vision Synergy:

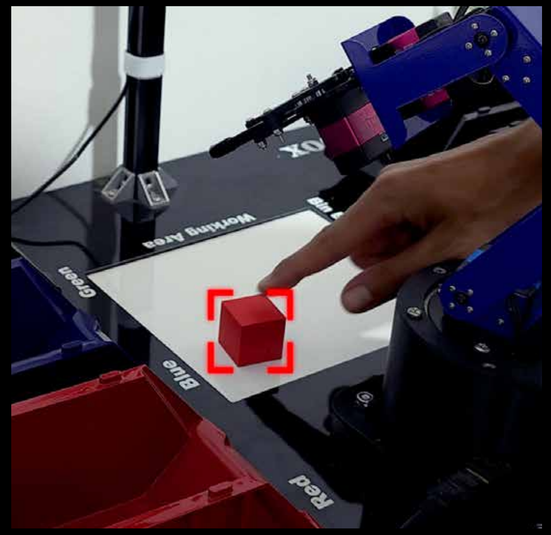
The arm can describe what it "sees" through its camera, providing audio feedback on object colors, positions, or QR codes.

Text-to-Speech (TTS):

Integrated pyttsx3 allows the robot to provide status alerts and interactive responses to the user.

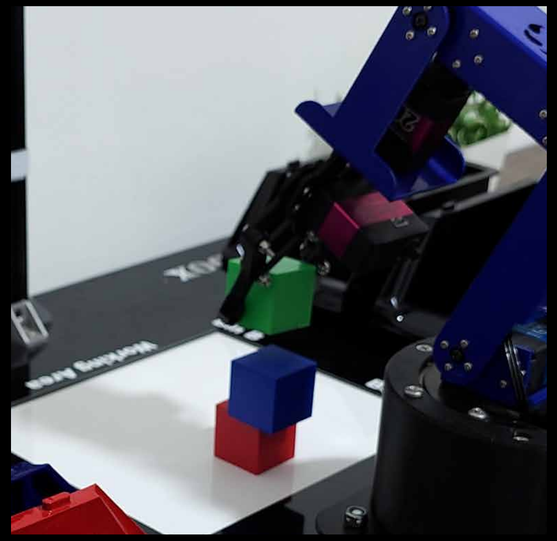
Vision-Driven Intelligence

The vision kit acts as the eyes of the robot enabling:



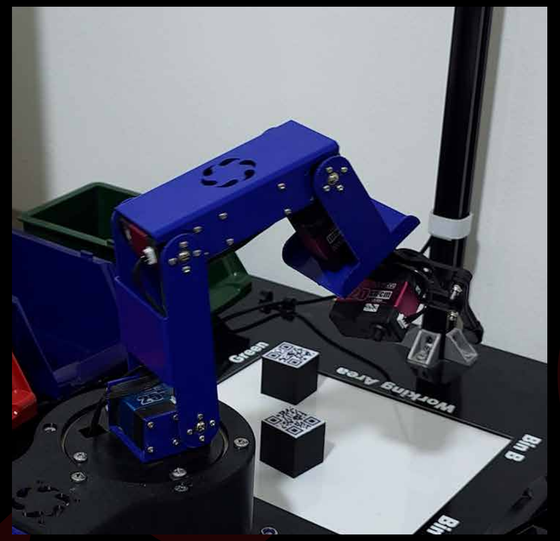
Autonomous Tracking:

Real-time visual servoing to follow moving objects.



Intelligent Decision Making:

Sorting and stacking objects based on complex visual criteria (Color, ID, or Spatial Orientation).



QR-Code Cognition:

Identifying and reacting to specific digital signatures for logistics and sorting simulations.

Technical **Specifications**

Degrees of Freedom
6-Axis Control (including gripper)

Main Controller
Raspberry Pi 5
8GB RAM
Quad-core 2.4 GHz

Max Reach / Height
400 mm

Vision
720p HD USB Webcam (60° FOV)

Payload Capacity
250g at full extension

Audio
USB Omnidirectional Microphone & Desktop Speaker

Dimensions
155x155 x500 mm.

Weigh
3 kg

Power
12V 5A adapter

Software Framework

ArmBot is an "open-box" software platform, pre-configured with the industry's leading robotics tools:

Operating System:
Ubuntu 24.04 LTS.

Python 3:
Primary language for AI integration, allowing students to develop custom automation workflows and machine learning models.

MoveIt 2:
Advanced motion planning framework for collision avoidance, path planning, and inverse kinematics.

ROS 2 (Jazzy Jalisco):
The foundational middleware for real-time communication, modularity, and scalability.

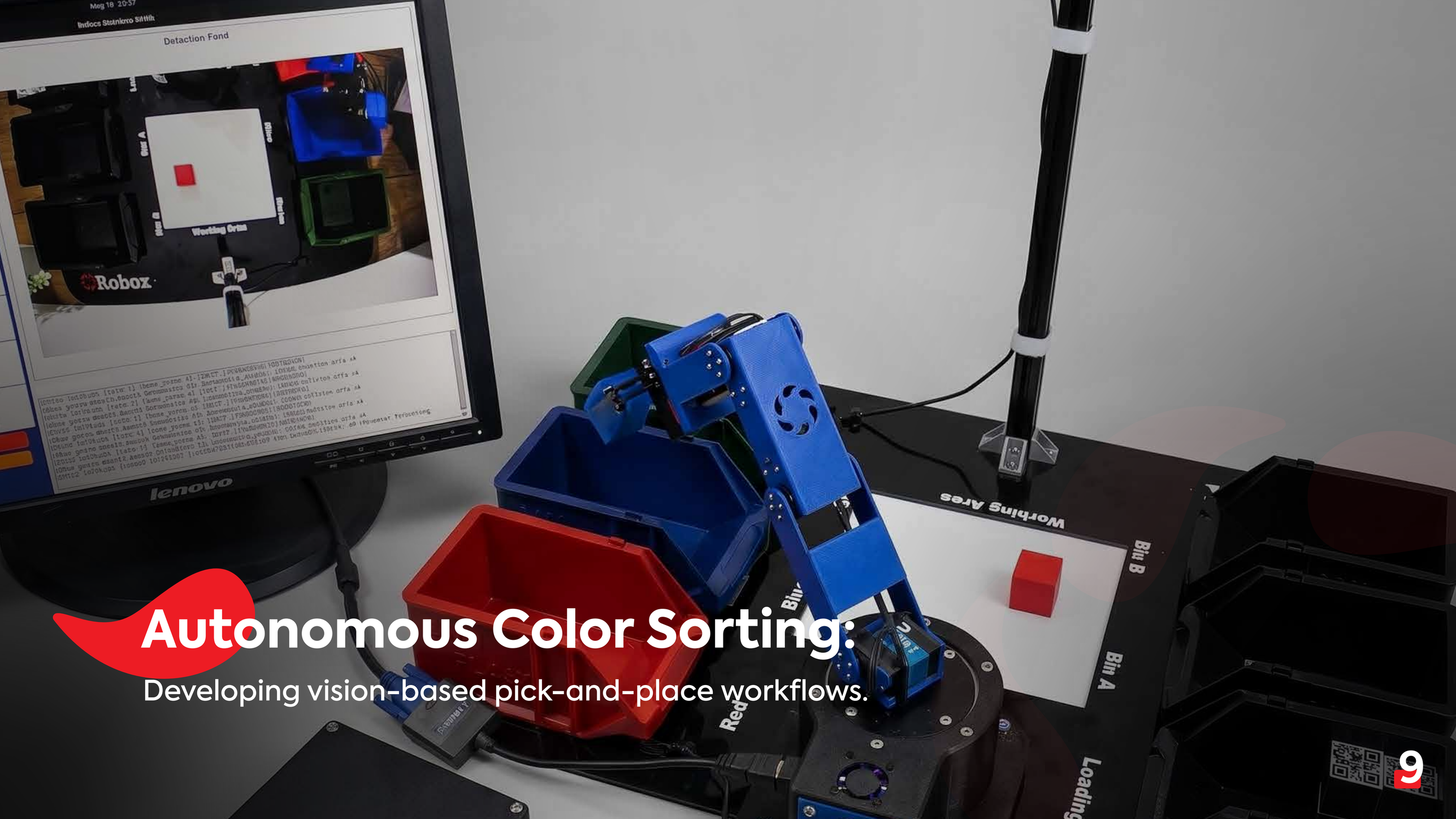
URDF/Xacro Support:
Full digital twin support for simulation in RViz and Gazebo.

OpenCV:
Industry-standard library for image processing and object detection.



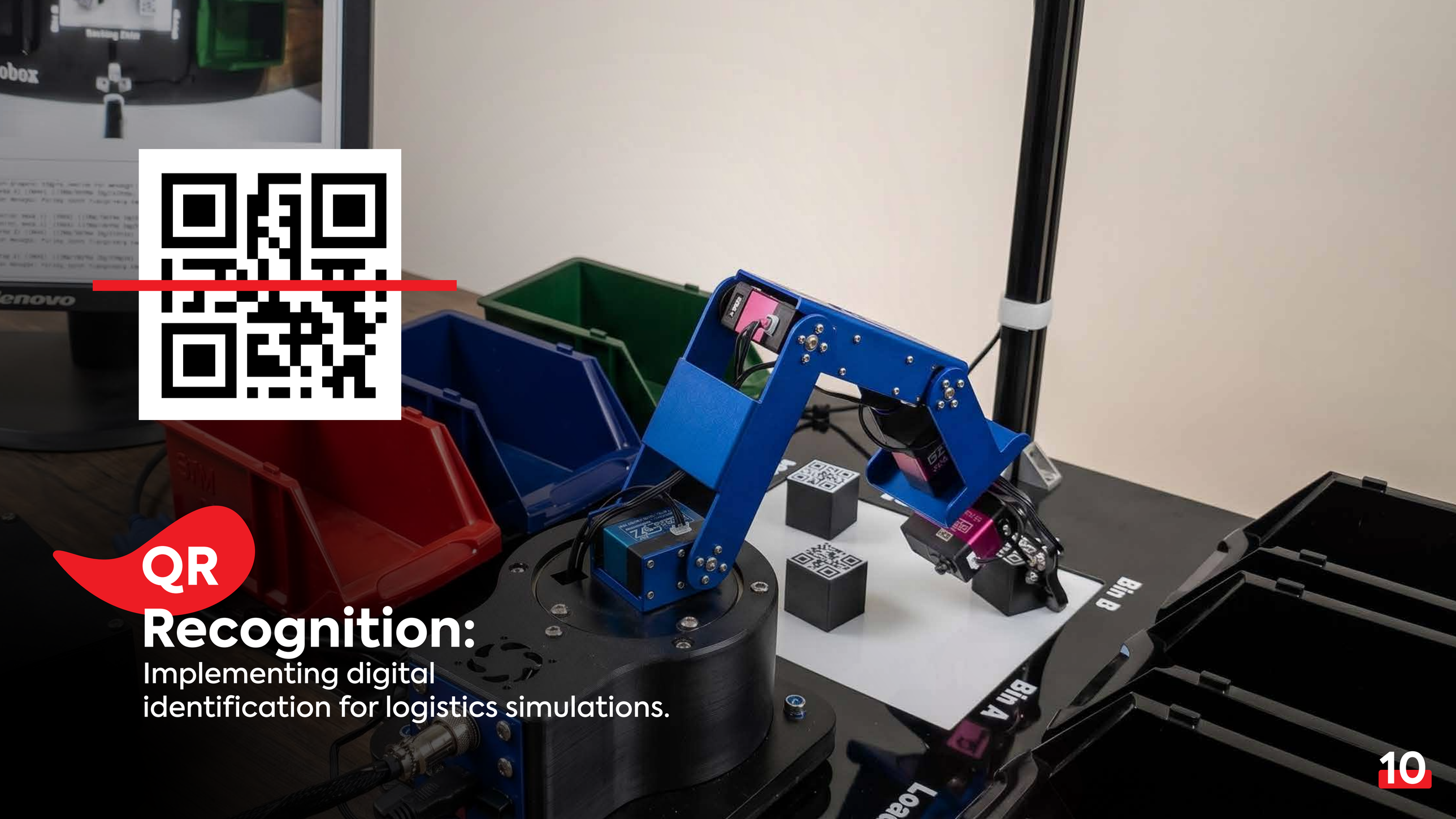
Kinematic Visualization:

Exploring URDF models and joint limits in RViz.



Autonomous Color Sorting:

Developing vision-based pick-and-place workflows.



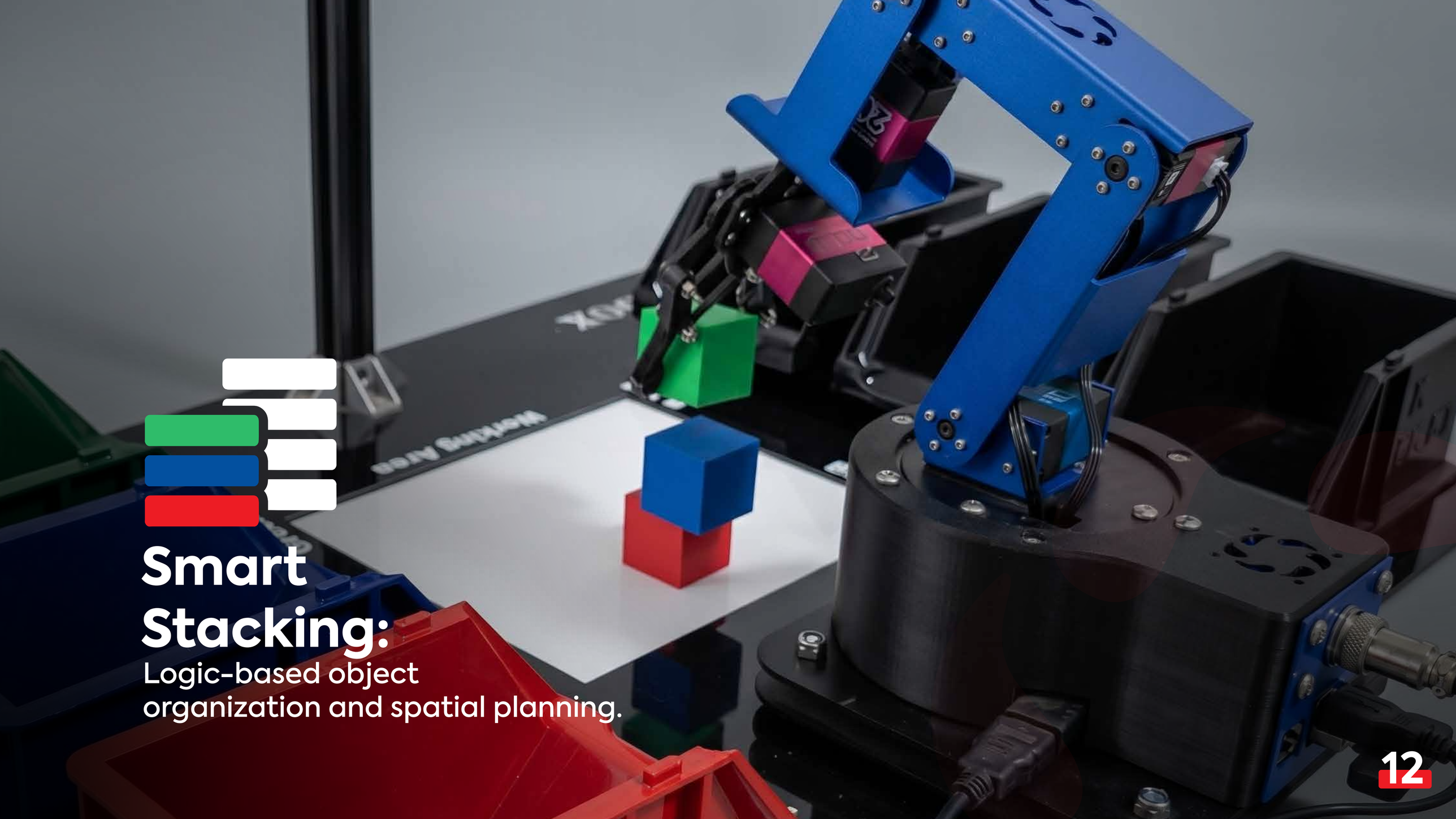
QR Recognition:

Implementing digital identification for logistics simulations.



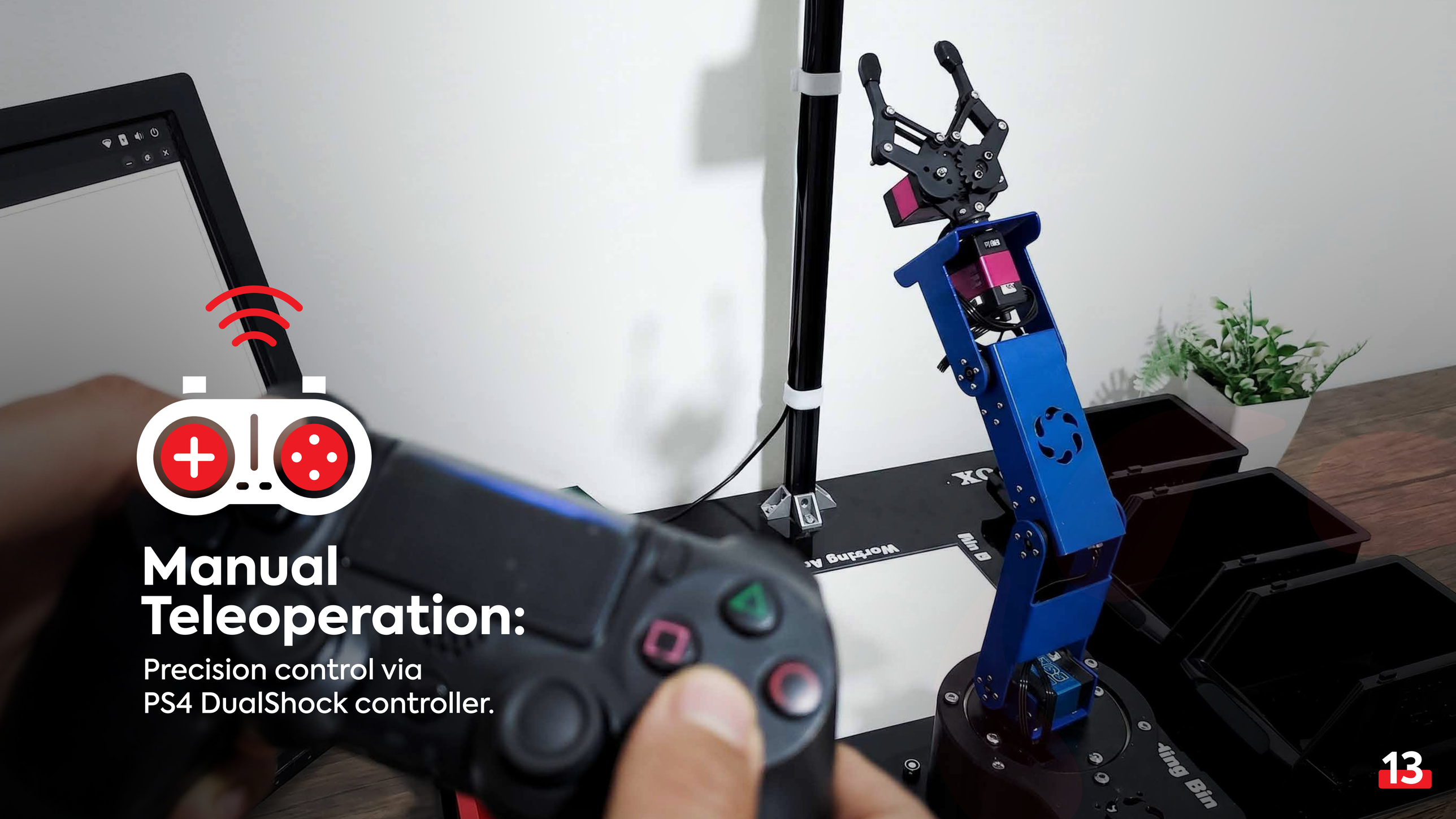
Dynamic Color Tracking:

Mastering real-time visual servoing.



Smart Stacking:

Logic-based object organization and spatial planning.



Manual Teleoperation:

Precision control via
PS4 DualShock controller.



Voice-Vision Interaction:

Combining speech and sight for human-centric tasks.

Complex AI Actions:

Executing multi-stage autonomous interactive sequences.

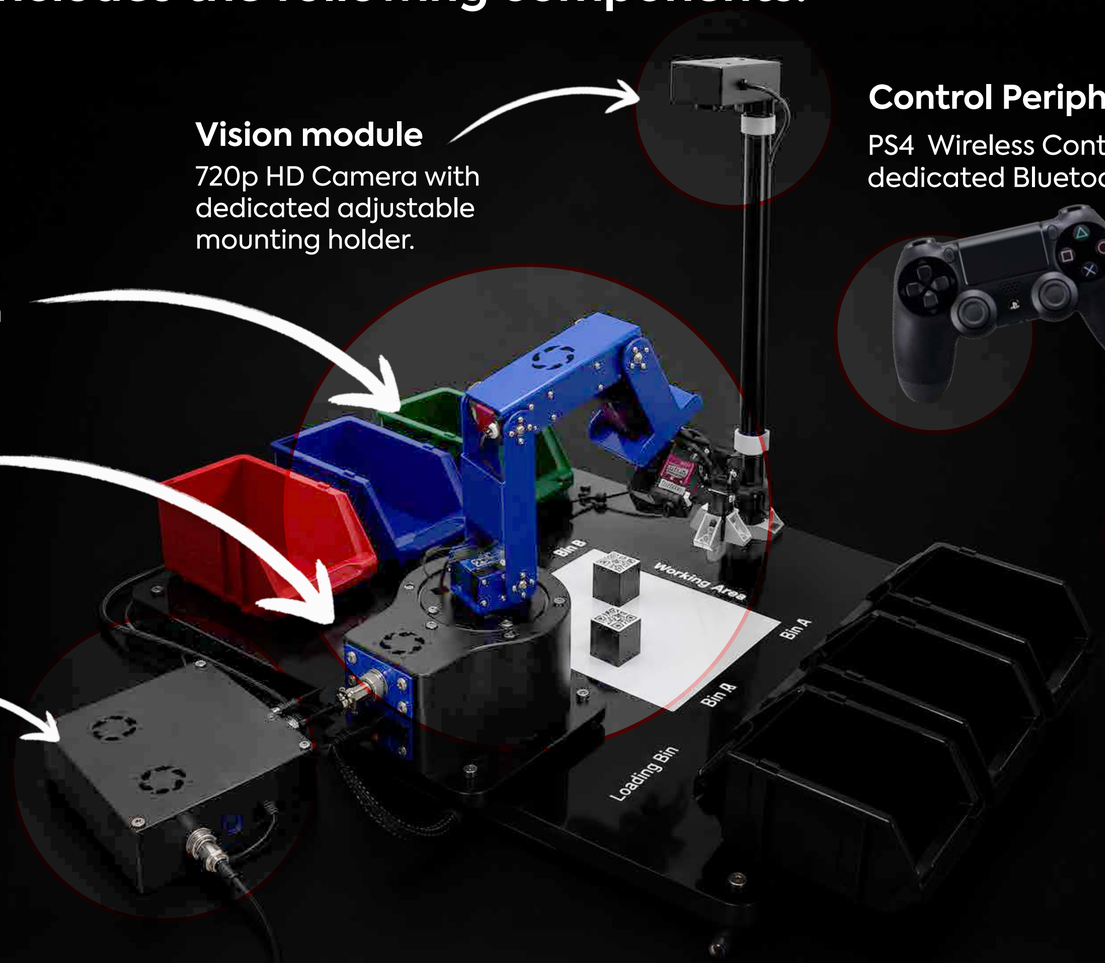
Scope of Delivery

The ArmBot kit is a comprehensive, "plug-and-play" educational solution. Each unit is shipped fully assembled and includes the following components:

ArmBot Robotic Arm
Fully assembled 6-DOF industrial-grade robotic arm with high-torque bus servos.

Computing Station
Raspberry Pi 5 (8GB RAM) including a 64GB MicroSD card pre-loaded with Ubuntu, ROS 2, and AI frameworks.

Power System
12V/5A High-current Power Supply with GX aviation connectors and power extender cables.



Vision module
720p HD Camera with dedicated adjustable mounting holder.

Control Peripheral
PS4 Wireless Controller with dedicated Bluetooth USB Dongle.

Interaction Set
Physical assets: 11x Color/QR blocks, 6x Color-coded containers, and 1x Specialized heavy-duty workspace map.





Audio Suite
External USB Omnidirectional Microphone and Desktop Speaker for AI voice interaction.

Peripherals
Essential accessories including a Powered USB Hub, Keyboard, Mouse, and HDMI Monitor.

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