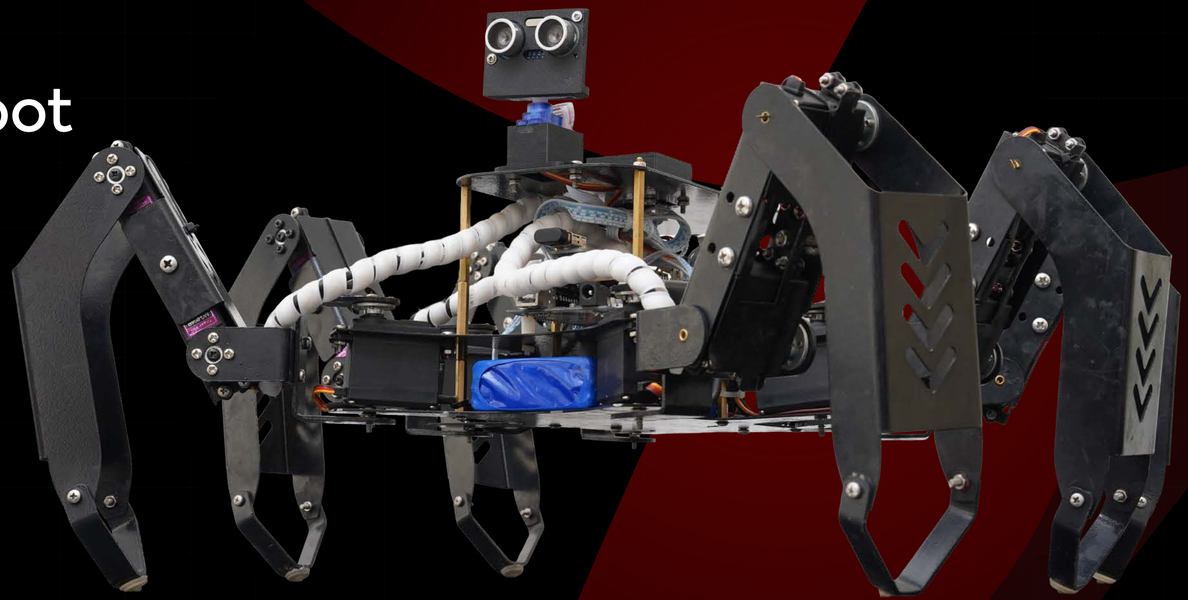
HexaBot

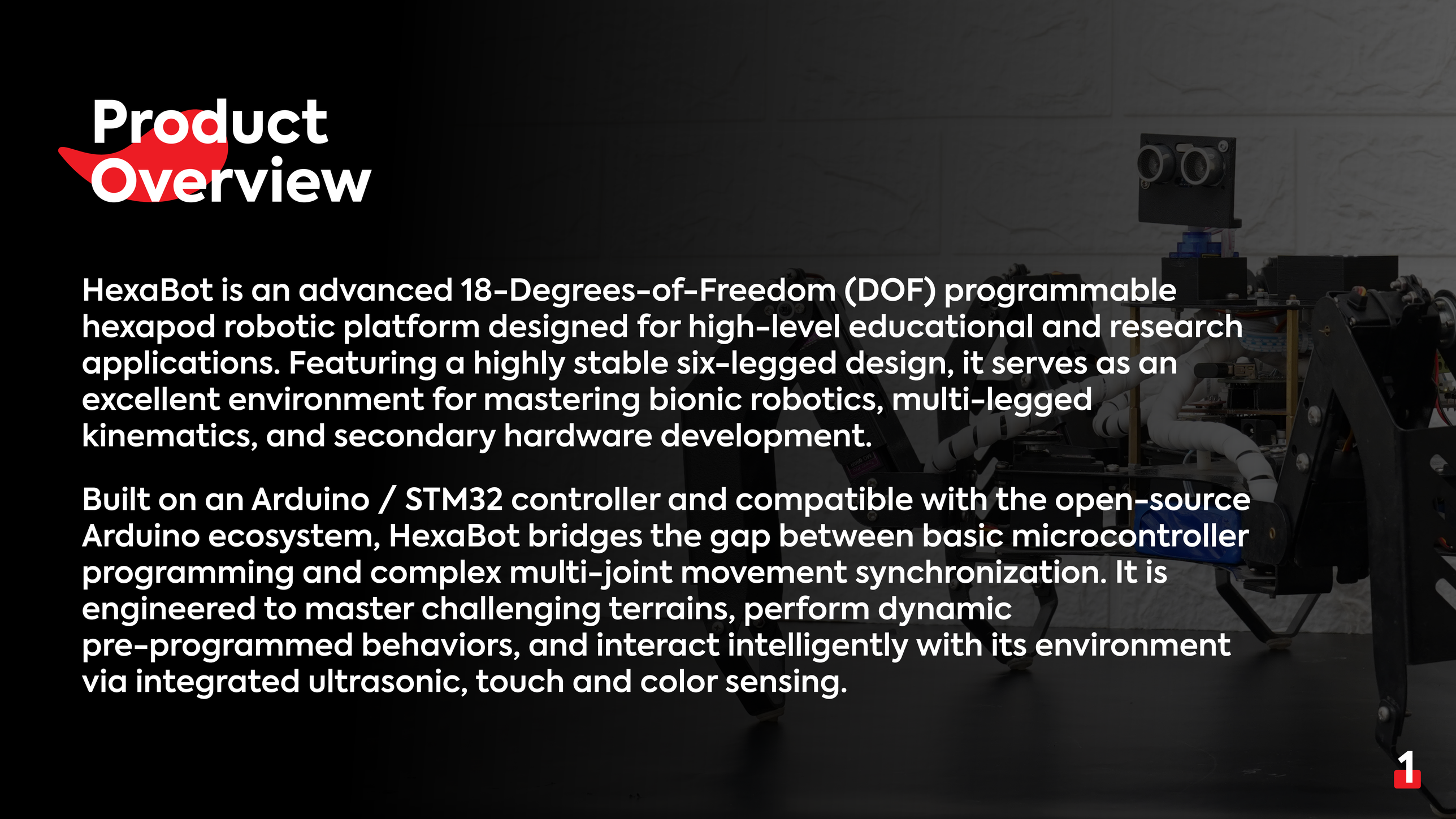
18-DOF Advanced Bionic Hexapod Robot

The Premier Open-Source Platform
for Multi-Legged Locomotion
and Bionics Research



Robox
Crafting powerful machines

Product Overview



HexaBot is an advanced 18-Degrees-of-Freedom (DOF) programmable hexapod robotic platform designed for high-level educational and research applications. Featuring a highly stable six-legged design, it serves as an excellent environment for mastering bionic robotics, multi-legged kinematics, and secondary hardware development.

Built on an Arduino / STM32 controller and compatible with the open-source Arduino ecosystem, HexaBot bridges the gap between basic microcontroller programming and complex multi-joint movement synchronization. It is engineered to master challenging terrains, perform dynamic pre-programmed behaviors, and interact intelligently with its environment via integrated ultrasonic, touch and color sensing.

Key Highlights

Biomimetic Architecture:
Features 18 Degrees of Freedom (3 DOF per leg) to closely replicate complex biological movements.

Open-Source Freedom:
Fully compatible with Arduino programming, accompanied by open-source code and extensive secondary development tutorials.

Industrial Precision Actuation:
Equipped with intelligent high-voltage bus servos with metal gears and high-precision potentiometers for exact linearity and longevity.

Superior Locomotion Stability:
Uses an engineered tripod gait design to navigate and adapt to diverse, real-world surfaces seamlessly.

Expandable Research Hub:
Features an alloy back bracket with pre-drilled holes for hassle-free mounting of external sensors and custom electronics.

Advanced Features & System Intelligence

Tripod Gait Locomotion

HexaBot utilizes a dedicated tripod gait movement pattern where three legs move simultaneously while the remaining three legs provide a rock-solid tripod base. This biomimetic strategy guarantees continuous equilibrium and efficient traversal over uneven environments, making it ideal for mobile robotics research.

Intelligent Bus Servos

Every single joint is driven by a specialized high-voltage bus servo. These servos provide up to 180° of precise rotational control and utilize internal high-precision potentiometers to deliver flawless positioning feedback. Constructed with robust metal gears, they resist high mechanical stresses during intensive laboratory testing.

Environmental Cognition & Expansion

Out of the box, HexaBot features an ultrasonic distance sensor (2–80 cm), An ultrasonic sensor that detects obstacles 2–80 cm away, plus touch and color sensors. Using this sensor data, researchers can write autonomous collision avoidance, spatial mapping, or maze-solving algorithms. The alloy chassis is pre-drilled for modular physical expansion to support further custom electronics.

Technical **Specifications**

Degrees of Freedom
18 DOF (3 DOF per leg x 6 legs)

Net Body Weight
Approximately 6 kg

Physical Dimensions
Individual Leg: 255mm | Max Stretching
Footprint: 695mm × 614mm

Main Hardware Controller
Robox Hexapod control board (Arduino / STM32-based)

Chassis Material
High-strength alloy with modular expansion mounting holes

Actuator Rotation Angle
180° per intelligent high-voltage bus servo



Technical **Specifications**



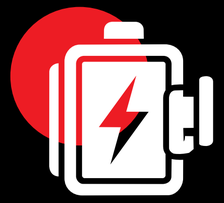
Sensor Payload

Ultrasonic distance sensor (2–80 cm), touch sensor and color sensor



Operational Endurance

Approximately 60 to 120 minutes of continuous runtime



Power System

High-capacity 12V 8000mAh 10C Lithium Battery

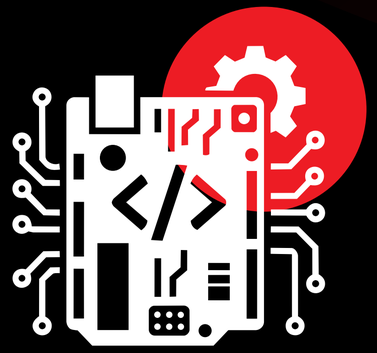


Control Interfaces

Real-time PC Software Graphical UI / Wireless Gamepad Controller

Software Framework & Capabilities

HexaBot operates on an entirely open-box ecosystem, facilitating smooth integration into engineering curricula:



Arduino IDE / STM32 Integration (C/C++)

For advanced students, engineering coursework, and researchers. Code can be compiled and customized directly in C/C++ to manipulate low-level servo coordinate arrays and sensor feedback loops.



Robox PC Graphical Software UI:

A visual manipulation interface that allows users to calibrate individual servos, configure custom timeline-based keyframes, and choreograph complex gaits graphically without writing code.

Software Framework & Capabilities





PC Visual Configuration:

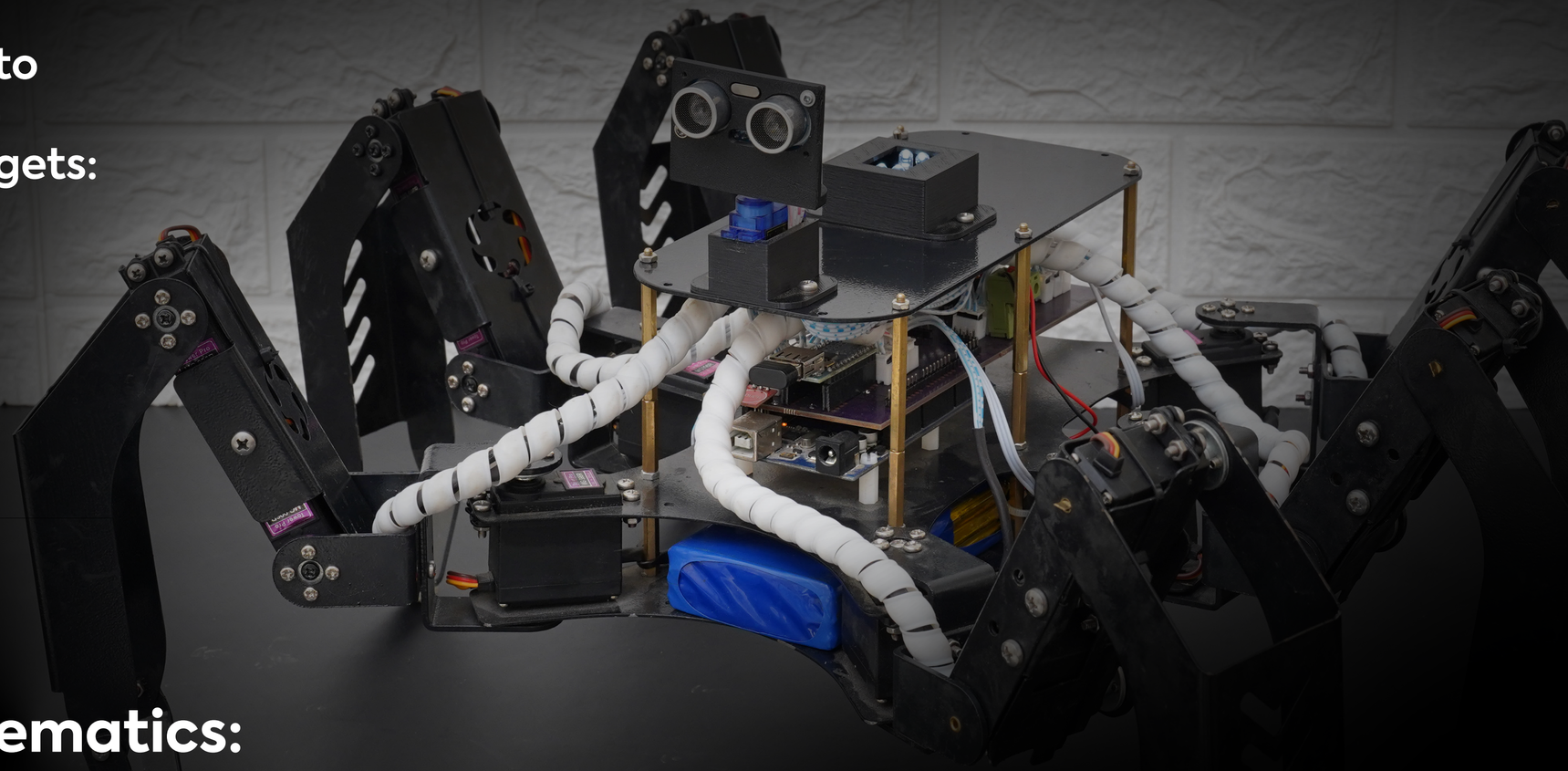
calibrate each servo, build timeline keyframes and choreograph gaits graphically, no code needed.

Wireless Firmware Stack:

pre-configured to receive low-latency movement commands from the wireless gamepad.

Educational Core Competencies

The HexaBot platform is built to fulfill multiple educational lab experiments and research targets:



Multi-Axis Inverse Kinematics:

Studying the mathematical coordinates required to coordinate 18 simultaneous joints.

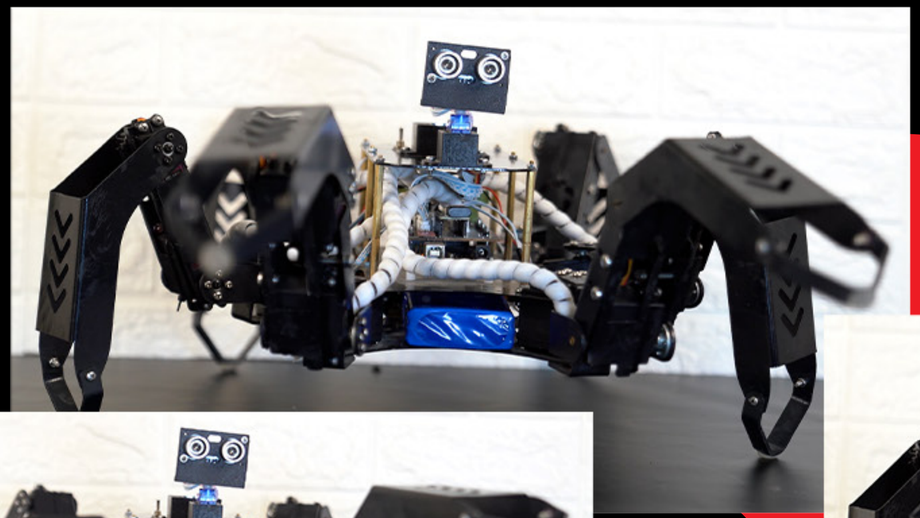
Educational Core Competencies

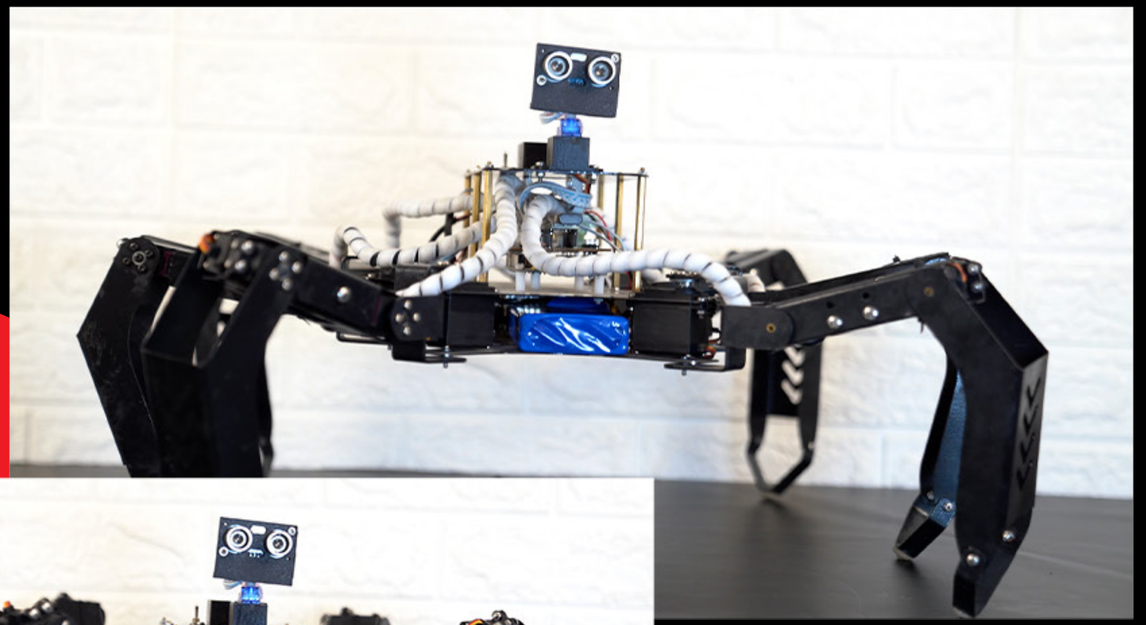


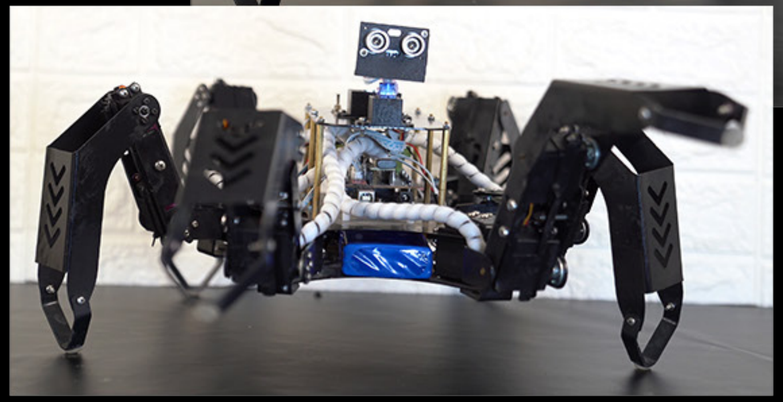
Autonomous Obstacle Avoidance:

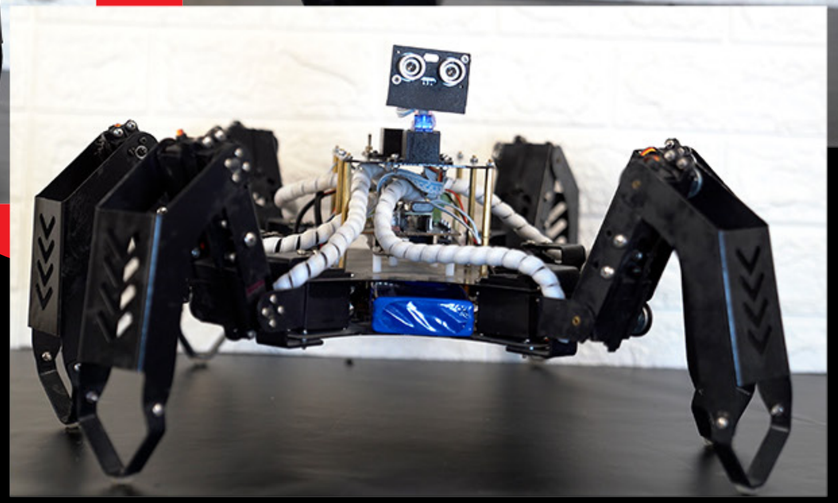
Utilizing real-time ultrasonic and touch-sensor feedback to calculate trajectories around environmental hurdles.

Educational Core Competencies





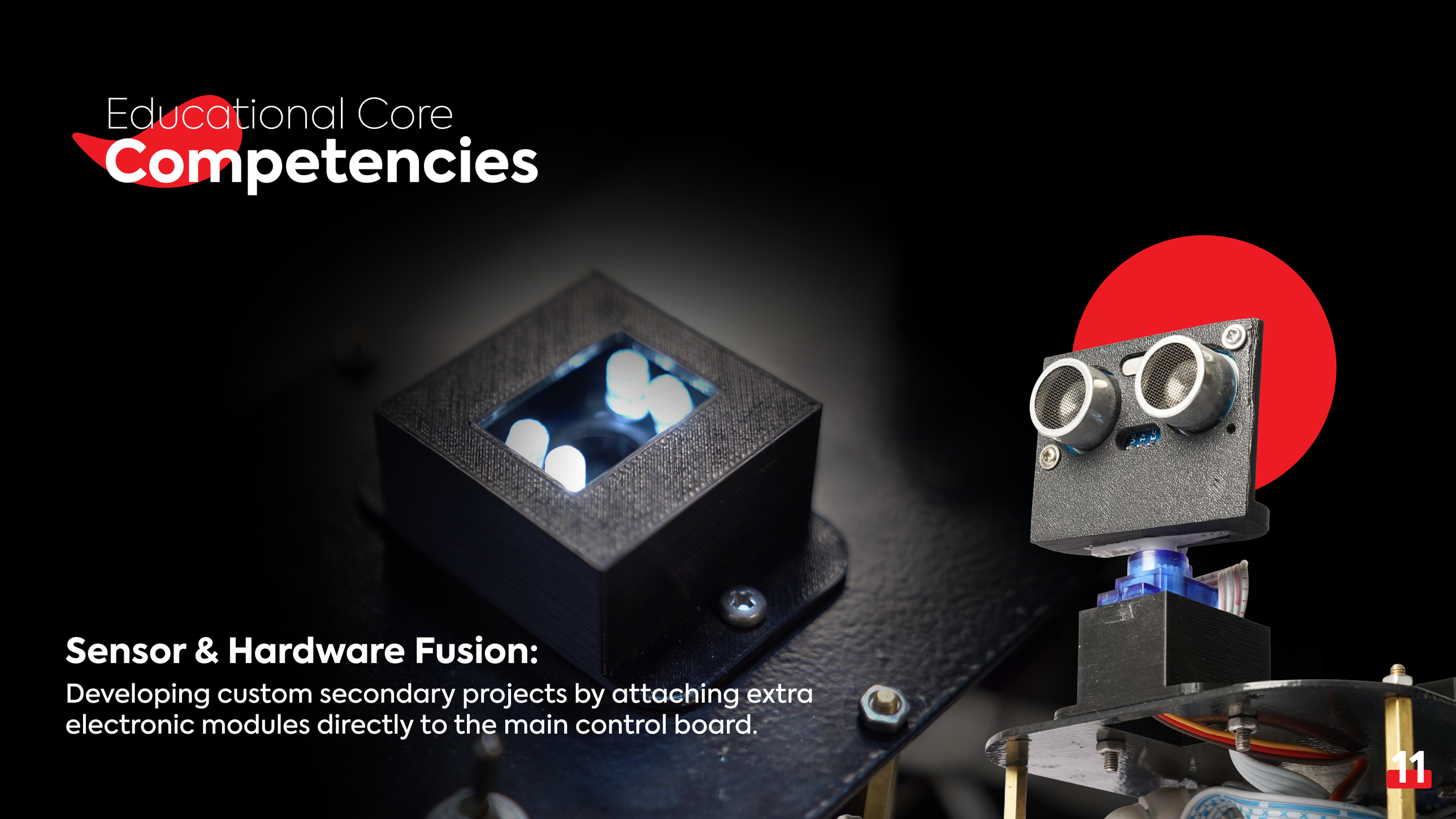




Bionic Movement Algorithms:

Programming lifelike responses including custom gaits, walking, climbing, waving, and synchronous dancing.

Educational Core Competencies



Sensor & Hardware Fusion:

Developing custom secondary projects by attaching extra electronic modules directly to the main control board.

Scope of Delivery

The Robox HexaBot Educational Kit ships as a complete, self-contained educational package. It includes all necessary structural, mechanical, and electronic subsystems required to run university laboratory sessions immediately:

HexaBot Robotic Chassis
Fully assembled 18-DOF hexapod robot structure integrated with a high-strength alloy back bracket.

Intelligent Actuator Set
18x High-voltage intelligent bus servos equipped with internal metal gears and precision potentiometers.

Main Control Unit
1x Pre-installed Robox Hexapod control board (Arduino / STM32).

Sensing Module
1x Ultrasonic distance sensor, 1x touch sensor and 1x color sensor, with modular attachment cables.

Wireless Teleoperation Kit
1x Dedicated ergonomic Gamepad Controller paired with a companion wireless receiver.



High-Output Battery Pack
1x Long-lasting 12V 8000mAh 10C Lithium Battery for extended lab sessions.

Software & Media Suite
Visual PC control software, open-source code libraries and an integrated manual (lab manual, step-by-step experiments, operation manual).

Robox

Crafting powerful machines

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