

LEANBOT BROCHURE

Introduction



www.leanbot.space

LEANBOT™





Digital Twin-enabled Robot with Global Competencies, Computational Thinking and STEM Education for online and offline learning

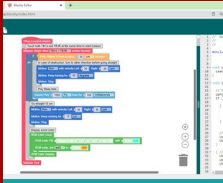
- Leanbot is **an innovative educational robot** designed for the metaverse era, with a focus on learners.
- It offers **cloud-based tools** like Blockly, a C++ Editor, an LMS, and links to the metaverse, enabling **K-12 students** for STEM learning.
- With an **Arduino main board** and diverse sensors, servos, and components, Leanbot provides a versatile **platform** for **hands-on learning, design thinking, and problem-driven exploration**.
- The Pythaverse LMS integrates **courses** with activities showcasing **IoT, AI, Digital Twin, and XR** technologies.





A Precise, Autonomous Robot

- Weighting in 400– 500 grams
- Equipped with comprehensive sensors, servos, motors and innovative and patented Gripper system.
- Carefully paired Cyber-Physical environment enables precise motor movement on the physical robot.
- Enables for precise Digital Twin (Cyber-Physical) environment from robot to real-time data logging and synchronisation online, virtual simulation, IoT projects.



Boosted with Cloud-based Tools and Content

- Blockly and C++ Programming Language
- Arduino Programming IDE
- Over 50 ready-to-use learning activities on its LMS
- Seamlessly integrates with Pythaverse Educational Multiverse
- Online and Cross-platform Device Use (recommended using Google Chrome on Windows, Mac, Chromebook)
- Leanbot Programming Library



Offering extended capabilities for AI and IoT learning

- AI Tutoring
- Extension ports for IoT
- Bluetooth-Mobile Gateway for mobility

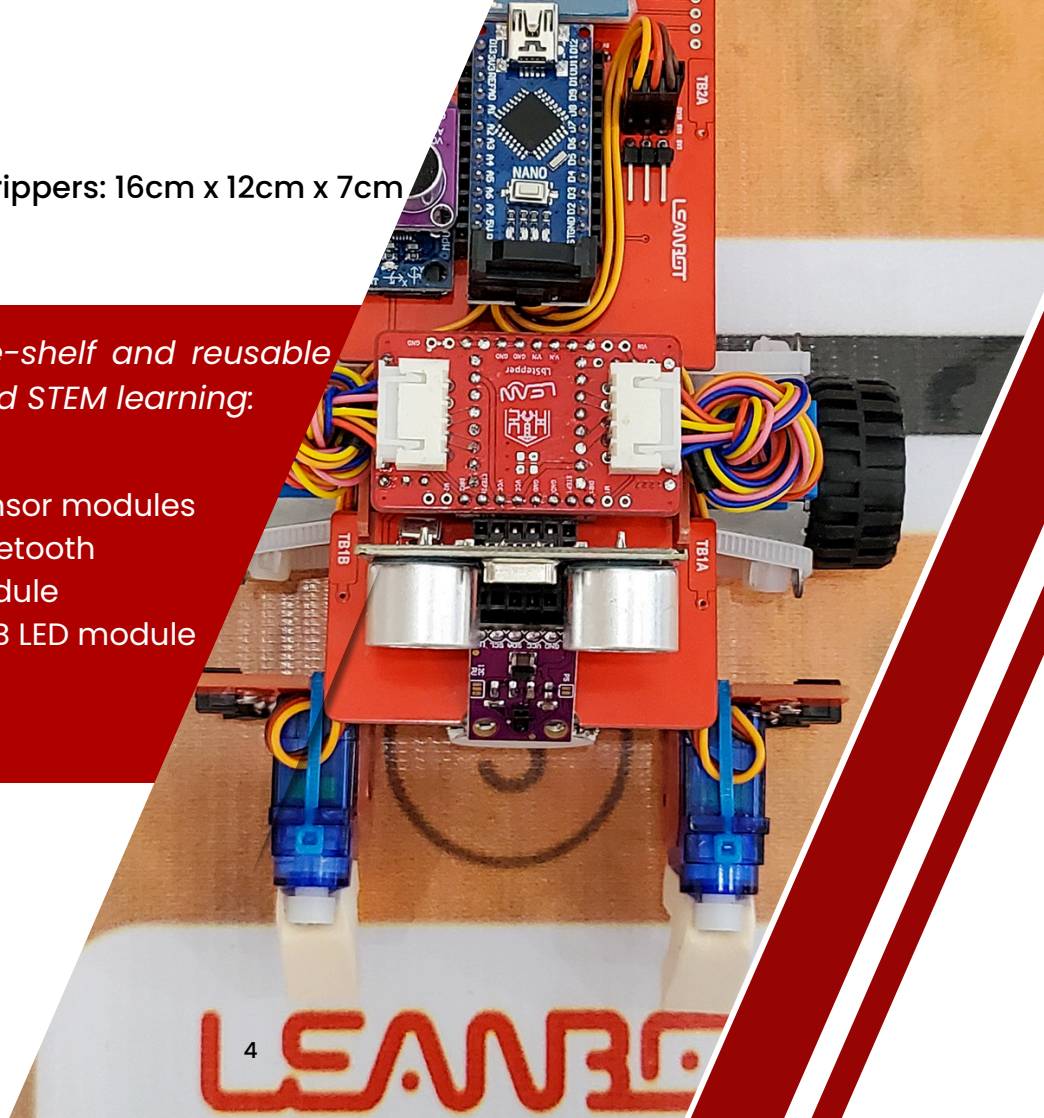
Robot Body

Pre-assembled

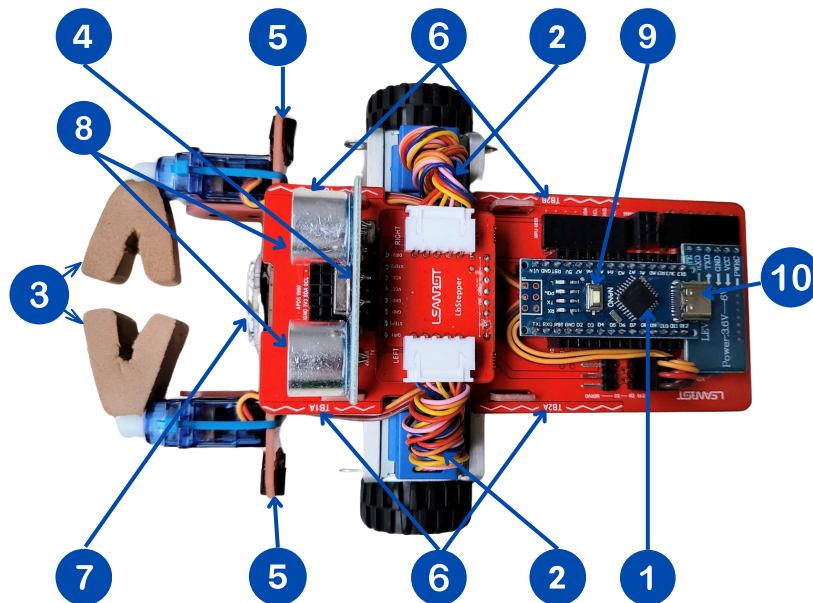
Compact in size, including grippers: 16cm x 12cm x 7cm

Most components are off-the-shelf and reusable with other Arduino projects and STEM learning:

- Arduino Nano
- PowerBank
- Stepper motors
- Servo motors
- Sensor modules
- Bluetooth module
- RGB LED module

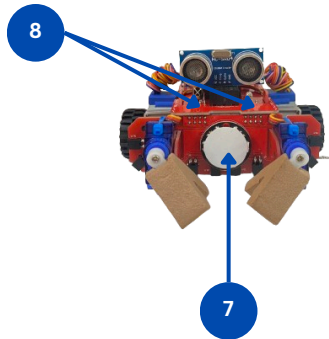
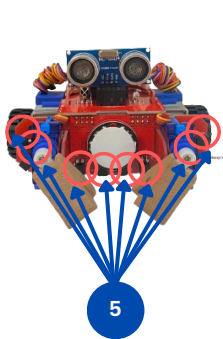


LEANBOT (Standard Version)



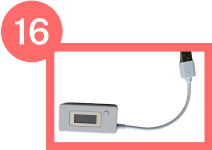
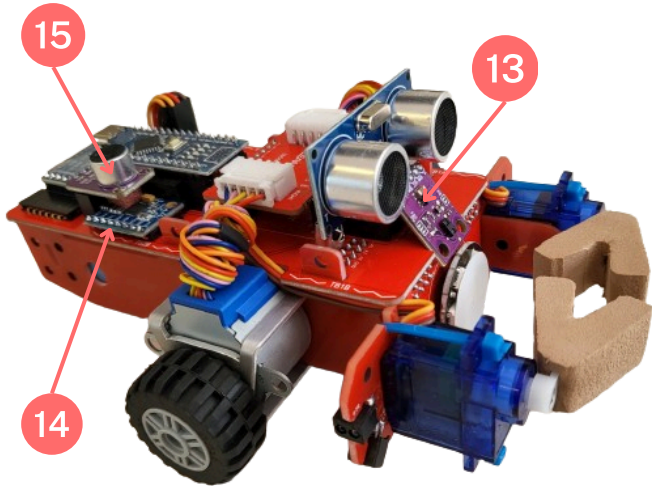
	Components	Remarks
1	Arduino Nano Brain	<ul style="list-style-type: none">• 1 pcs• USB Type C port
2	Stepper Motor	<ul style="list-style-type: none">• 2 pcs• Differential (left/right) drive kinematic model• Precise step counters (no extra wheel encoders) 2038 steps per revolution• Max speed: ~10 cm/s
3	Servo Motor	<ul style="list-style-type: none">• 2 pcs• Grabbing and lifting 2-4 cm objects
4	Ultrasonic Sensor	<ul style="list-style-type: none">• 1 pcs
5	IR Sensor	<ul style="list-style-type: none">• 6 line following sensors• 2 wall following sensors
6	Touch Sensor	<ul style="list-style-type: none">• 4 pcs• Embedded into robot frame
7	RGB LED	<ul style="list-style-type: none">• 7 pcs• Arranged in a 7-pixel circular display• Can show simple colored shapes
8	IR Remote (embedded in LbBase)	<ul style="list-style-type: none">• 1 pcs
9	Mini Buzzer (Below the Arduino Nano)	<ul style="list-style-type: none">• 1 pcs
10	Bluetooth Module	<ul style="list-style-type: none">• 1 pcs

LEANBOT (Standard Version)



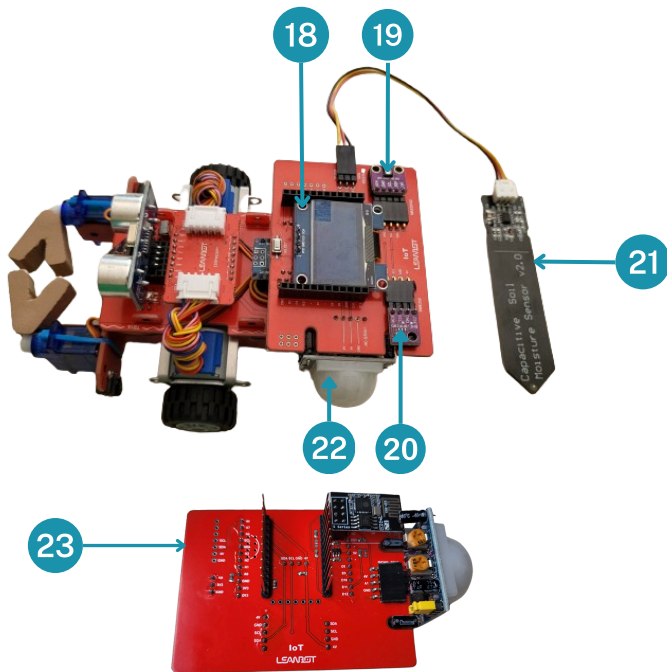
	Components	Remarks
11a	Power Bank	<ul style="list-style-type: none">• 1 pcs• 5V operating voltage• Micro-USB charging port
11b	Rechargeable Battery	<ul style="list-style-type: none">• 2 pcs• 18650 Li-ion cells• 3-hour continuous run time per charge
12	USB	<ul style="list-style-type: none">• USB cable + adapter

LEANBOT (Advanced Version)



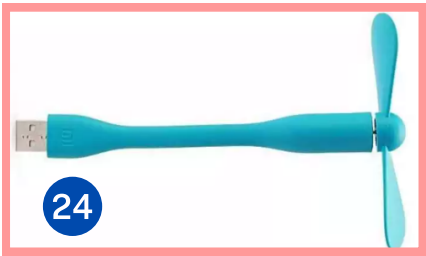
	Components	Remarks
ADDITIONAL ACCESSORIES		
13	Light, Gesture and Color Sensor	• 1pcs
14	Gyro Sensor	• 1pcs
15	Microphone	• 1pcs
16	KCX 017 USB Power Meter	• 1pcs
17	Frame Tool	• 1pcs

LEANBOT with IoT Extension Kit



	Components	Remarks
ADDITIONAL ACCESSORIES		
18	OLED	<ul style="list-style-type: none">• 1 pcs
19	Integrated Pulse Oximeter and Heart Rate Sensor	<ul style="list-style-type: none">• 1 pcs• MAX 30102
20	Humidity & Temperature Sensor	<ul style="list-style-type: none">• 1 pcs• BME280
21	Capacitive Soil Moisture Sensor	<ul style="list-style-type: none">• 1 pcs
22	Passive Infrared PIR Motion Detector	<ul style="list-style-type: none">• 1 pcs• HC-SR501
23	Wifi Module	<ul style="list-style-type: none">• 1 pcs

LEANBOT External Component



	Arduino Components	Remarks
ADDITIONAL ACCESSORIES		
24	USB Mini Fan	
25	USB Water Pump with Hose	



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Leanbot Specifications

Control Board

Firmware update required	Arduino Nano or compatible
Processor	ATmega328P (8-bit, 16MHz)
Clock Speed	16MHz
Flash	32KB
SRAM	2KB
EEPROM	1KB

Control Board

Switch Mode	Arduino Nano or compatible
Quantity of Programs can be stored	1
Coding Support	Blockly and C++
Wireless Communication	Bluetooth IR broadcast
Input	Touch button x 4 Reset button
Output	Buzzer

Control Board Expand Capabilities

Stepper Motor Interface	2
Servo Motor Interface	2
LED Strip-Compatible Interface	1
Arduino-Compatible Interface	1
Expandable Electronic Port	<ul style="list-style-type: none"> • 16 GPIOs • Support many Arduino- compatible modules
Plug-in Sockets for Add-on Modules	<ul style="list-style-type: none"> • APDS9960 - Light, RGB, Proximity, and Gesture sensor • MPU6050 - 3-axis Accelerometer & 3-Axis Gyroscope sensor • MAX4466 - Microphone sensor • VL53LOX - Time-of-Flight laser distance sensor

Battery

Type	<ul style="list-style-type: none"> • Standard 18650 cell x 2 • Li-ion rechargeable • USB-C charging port
Placement	<ul style="list-style-type: none"> • Internal
Capacity	<ul style="list-style-type: none"> • 1800mAh • Upgradeable to 3000mAh or more
Runtime	<ul style="list-style-type: none"> • 3-hour continuous run time per charge

Drive Motors

Drive Motors	<ul style="list-style-type: none"> • Stepper motor (28BYJ-48)
Rotating speed	<ul style="list-style-type: none"> • 1-60 RPM
Precision of rotation	<ul style="list-style-type: none"> • $\leq 2^\circ$
Output shaft material	<ul style="list-style-type: none"> • Metal
Turn corners	<ul style="list-style-type: none"> • Accurate turning
Move straight forward	<ul style="list-style-type: none"> • $\leq 1\%$ deviation • The command "move forward xx mm" is available

Gripper		Electronic Components	
Motor	Servo Motor (SG90) x 2	Line-following sensor	6
Capabilities	Grip, hold, lift, shake external objects	Wall-following sensor	2
		Ultrasonic sensor	1
		RGB LED display	Round 7-pixel RGB LED



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Thank You



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