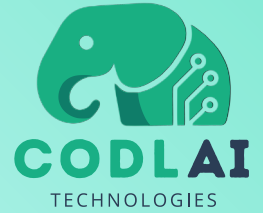


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IOTBOT USER MANUAL

"ROBOTIC CODING FOR EVERYONE"

IOTBOT User Manual

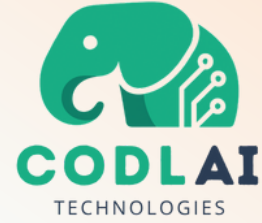
2025 (v2.0)

CODLAI

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Who Are We?

CODLAI TECHNOLOGIES INC.

CODLAI Technology Inc. was founded during the pandemic, when the challenges and shortcomings of distance learning became apparent. During this period, it was observed that the existing infrastructure, particularly in robotics coding and similar practical courses, was inadequate, leading to significant decreases in productivity. To address these issues, in 2021, one of our founders and a graduate student, Samed Kaya, completed his thesis titled "Internet-Oriented Sensor Board Design and Production for Intermediate and Advanced Robotics Coding Education." This work laid the foundation for the CODROB brand and our first products, the IoTBot and sensor modules.

The resulting products have attracted attention with their innovative features as well as eliminating the deficiencies in the market. In 2022, with the partnership of Kule Mold Machinery and Industry INC. located in Gebze/Kocaeli, CODROB has gained wider opportunities and developed new generation programmable robots, advanced program called "CODROB Editor" and web platform.

The CODROB Project, awarded the "Seal of Excellence" in the first call of the 2025 TÜBİTAK 1812 (BIGG) Program, began its R&D and commercial activities under the name "**CODLAI TECHNOLOGY INC.**" The company operates in the Teknopark Istanbul area.

CODLAI currently offers a wide range of products, including three different programmable IoT-based motherboards, more than 20 sensor modules, programmable cars, robotic arms, and drones. Furthermore, it aims to meet all needs in the field with its next-generation AI-powered products, coding editor, and training curriculum. Curricula and sample projects appropriate to the learning level have been created for all devices produced.

Our Future Vision

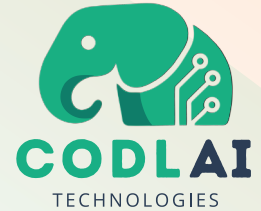
As CODLAI, we aim to focus on innovative topics such as new programmable motherboards, developable robots for robotics competitions, and robotic coding via virtual reality in the future. Our aim is to provide pioneering and innovative solutions in educational technologies and to ensure that students and educators have the best experience.

Our Mission

As CODLAI Technologies Inc., our mission is to provide innovative, accessible and effective solutions to students and educators by using technology in education in the most effective way. We aim to raise the technology leaders of the future by increasing the quality in robotic coding and applied courses. In this direction, with our constantly developing product range and educational materials, we aim to provide practical and advanced technology-based educational tools that are suitable for the needs of learners at all levels. Increasing efficiency in education, integrating technological innovations into the world of education and developing products that can compete on a global scale are among our basic principles.

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What Do We Offer?

STEM TRAINING KITS

You can learn robotics and electronics from scratch to advanced level with training sets consisting of CODLAI Products!

PROGRAMMABLE ROBOTIC KITS

You can reinforce the foundations established with training kits with robotic kits, and learn what, when, where and how you can use it in daily life!

CODLAI EDITOR

You can perform either block-based or text-based programming and simulation with the dual-language supported 'CODLAI Editor' program that you can use on all platforms. Moreover, a web editor that does not require installation is waiting for you! For more: www.editor.codlai.com

CURRENT CURRICULUM

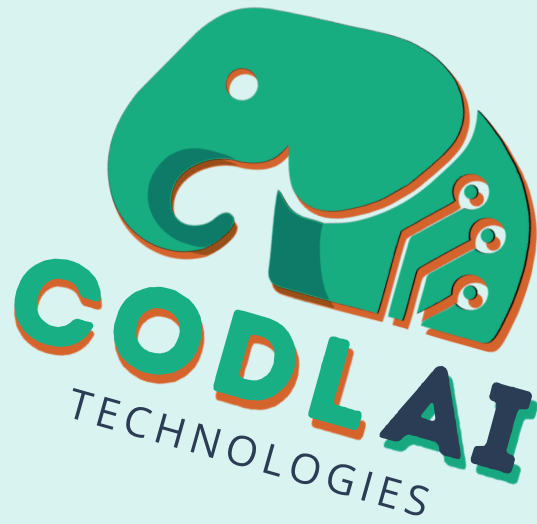
CODLAI products are supported by course programs and sample applications prepared by leading instructors in the sector. Get a 1-0 head start on your training with its current and even future-visioned curriculum.

RELIABLE CONTENT

Our sample applications and programs on our CODLAI site have been prepared by expert trainers and checked by our engineer team. We take a firm stance against misinformation and misinformation!

ALWAYS FULL SUPPORT

CODLAI products are always with you, not just until the first sale. We are waiting for you at www.codlai.com, where you can find all kinds of support and updated content about the products! You can also always get a response as quickly as possible with our Whatsapp live support line.



IOTBOT User Manual

Entrance
Basic Information
Hardware Information
Closing

WARNING

The information in this manual, including products and software, may not be reproduced, transmitted, copied, stored or translated into any language. SUPPLIERS (MANUFACTURERS AND RESELLERS) CANNOT BE HELD LIABLE FOR ANY ERRORS OR OMISSIONS IN THIS MANUAL AND DAMAGES THAT MAY ARISE FROM USER USE. The pictures and drawings in this manual are for illustrative purposes only. Actual product appearances may vary depending on various terms and conditions. The content of this manual is subject to change without notice or confirmation.

1. Entrance

1.1 Introduction to the Regulation

- **CE Compliance**



This appliance is suitable for home and office use. The CE Mark confirms compliance with European Union regulations:

- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Low Voltage Directive 014/35/EU (equal to A2:2013)
- Radio & Telecommunications Terminal Equipment (R&TTE) Directive 1999/5/EC



This device can be operated at a maximum ambient temperature of 35 °C. Do not expose to temperatures below 5 °C or above 40 °C. THERE IS A RISK OF EXPLOSION IN CASE OF INCORRECT APPLICATION OF BATTERIES AND POWER ADAPTER. PLEASE USE THE BATTERIES AND ADAPTER SPECIFIED FOR THE PRODUCT IN ACCORDANCE WITH THE INSTRUCTIONS.

1.2 Safety Instructions



Do not use this device near magnetic fields as this may adversely affect the performance of the device.



If you think there is a problem with the device or any of its components, consult the technical service team. In case of malfunction, the device must be repaired by the technical service. Please do not repair it yourself.



Do not apply excessive pressure to the device by hitting, dropping or pushing it. This may damage or destroy the device and/or its components.



Do not expose the device to direct sunlight. Keep it away from high temperature ambient conditions and avoid contact with high temperature surfaces.



Do not expose your device directly to liquid. Do not leave it in rain or humid environments and prevent exposure to these. Do not leave the product's power adapter plugged in during conditions such as thunderstorms.



Use and keep the device, its accessories, components and packaging out of reach of babies and children to prevent the risk of suffocation and injury.

1.3 Guide Information



ATTENTION: This sign and warning message indicates special rules that must be observed for user safety.



Before using your device for the first time, read and follow this original user manual and the safety warnings provided with it. Keep this manual for later use or for future users.

2. Basic Information

2.1 Product Features and Areas of Use

lotBot is a board developed specifically for use in robotics coding courses with an IoT focus. This board has built-in basic sensors needed to make IoT applications, thus saving users from making complex cable and sensor connections.

Features and Ease of Use

With its basic sensors, internal battery and wireless connection features, lotBot can be used as a wireless smart remote control for controlling robots. Its outer shell protects sensitive electronic components and is distinguished from its counterparts by its user-friendly design similar to a game console. Notification LEDs connected in parallel to the sensors allow the signals from the sensors to be seen. For example, it can show that the light gradually increases and decreases as you turn the potentiometer, or that the light turns on and off when the digital button is pressed. This makes it easier to understand the terms digital and analog.

Motor Driver and Extra Features

The lotBot has an internal L293D motor driver. This means that it can be used in applications that require a motor without the need for an additional device. In addition, the chips, which are delicate parts that require a lot of wiring and can easily break, are embedded in the board, which makes them last longer. A light sensor is added to the board for applications that require ambient light. A relay is included in the board for applications that require switching. An LCD screen is added to track data from the sensors, which can even be a simple mobile phone menu when programmed.

Processor and Connections

The ESP32 microprocessor was chosen as the lotBot processor. This processor was chosen due to its multi-language support, dual-core high-speed processing power, built-in wireless features and its prevalence among IoT applications in the market. The buzzer used to give audible feedback in robotic applications is integrated into the card. TYPE-C socket is used for charging and coding.

Additional Modules and Security

Additional modules have been produced for sensors that are not added to the card and are used more away from the processor. RJ45 cables are used to power these modules and communicate with the processor. This eliminates the risk of damaging the card and sensors by making incorrect cable connections and saves time with ease of use. The CP2102 chip is integrated into the card to communicate with the processor and the computer. Regulators and other electronic elements are designed to prevent the card from being affected by electromagnetic fields, electronic interference from the user, and similar problems.

Compatibility and Extensibility

Thanks to parallel power and communication ports, IoTbot can be used with other boards (e.g. Arduino, Raspberry Pi). With the power port, it can receive power to operate Arduino with jumper cables and with the communication ports, it can communicate with each other using different protocols. These communication ports provide the user with freedom to develop universal applications. The RFID port is designed to connect with sensors used to make projects in this field.

2.2 Technical Specifications

Processor	: ESP32 - 240 MHz Tensilica Xtensa Dual Core 32-bit LX6 microprocessor
Battery	: 2000 Mah Li-po
HMI	: 20X04 Programmable Characterized Blue LCD Display
Input/Output	: 1 x Type-C Socket (Programming + Power) 5 x RJ45 Type Module Port (Analog & Digital) 1 x RJ45 Type Motor Driver Port 1 x Programmable Relay Output 1 x Jumper Cable Type SPI, UART, I2C, 5v, 3v, GND Output 1 x RC522 RFID Communication Port
Programming Languages	: C++, Micropython (Text and Block Based)
Wireless connectivity	: 2.4 GHz WiFi + Bluetooth® + Bluetooth LE

Internal Sensors : 20X04 LCD Screen
L293D Motor Driver
2 Axis Button
Joystick
Potentiometer
Encoder
Analog Button
Digital Button
LDR
Relay
Buzzer

Additional Features : Visual feedback LEDs parallel to sensors Reset and on-off button
Impact-resistant outer shell
CODLAI Editor Support
CODLAI Platform Support
Information sections on the device Programming with open source editors Documentation required to create IoT applications

Security : Hardware accelerators for AES and SSL/TLS
Certificates : CE, ROSH, EMC
Working Voltage : 5VDC

3. HARDWARE COMPONENTS

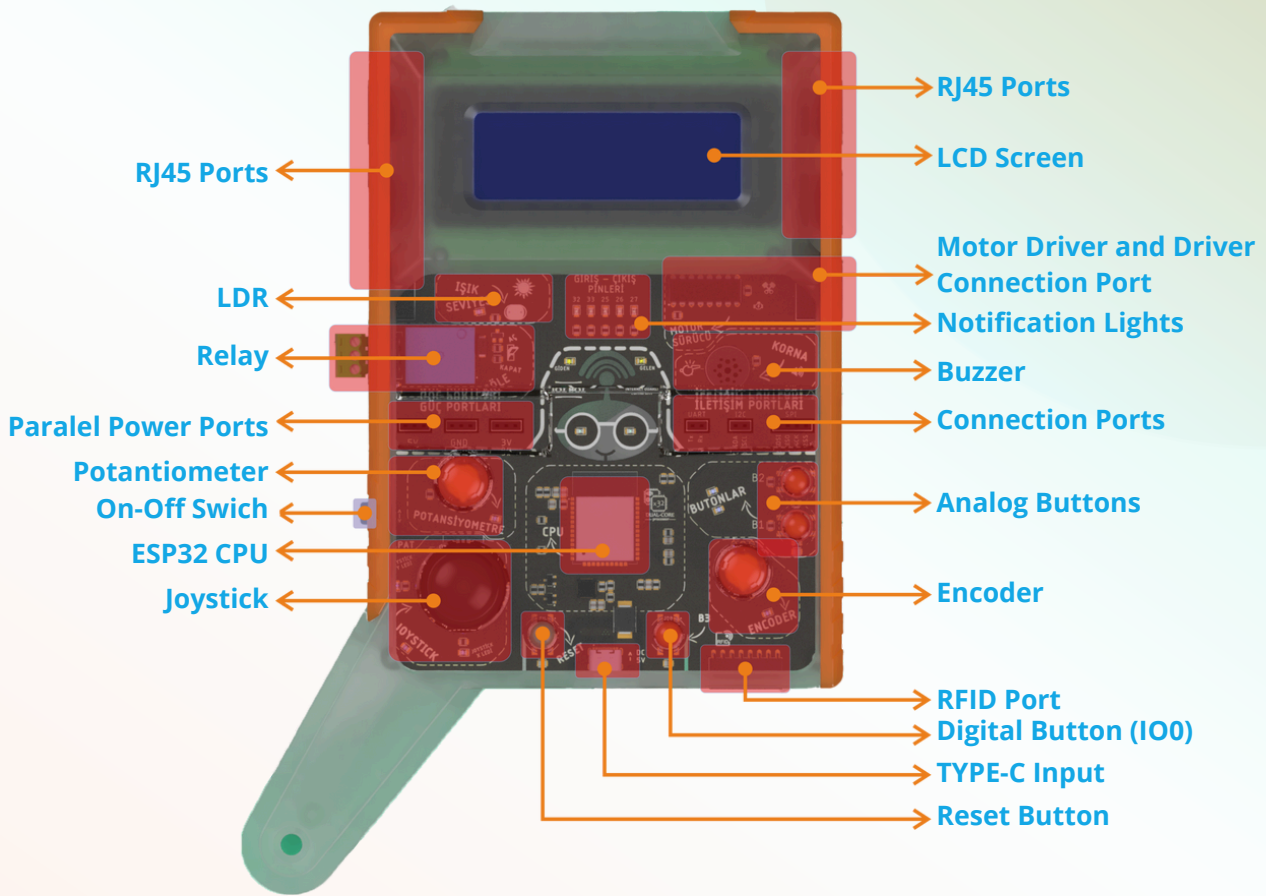


Figure 1 - IoTBot Components

3.1 LCD Screen



Figure 2 - LCD Screen View

You can use it to see sensor data or to make menus in your LCD screen projects. You can use it to see your data instantly in your applications and to see the accuracy of your measurements. It has a 20x4 character capacity. It is a low power consumption screen technology.

3.2 LDR

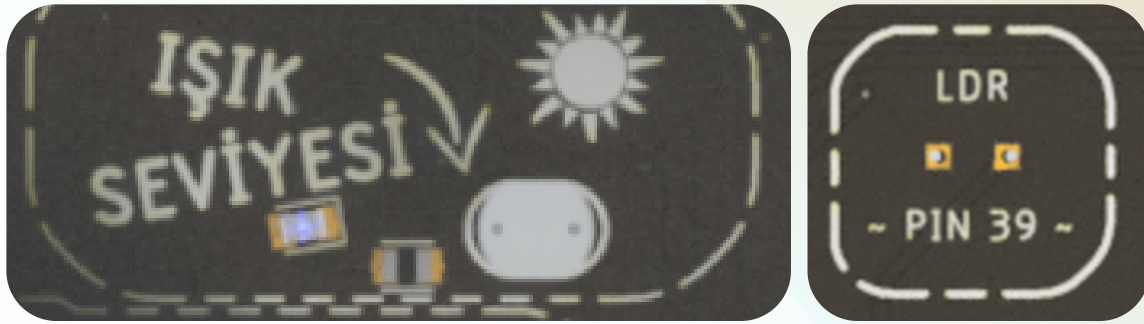


Figure 3 - LDR Front and Rear View

It is short for "Light Dependent Resistor". A light dependent resistor is an electronic component whose electrical resistance changes according to the ambient light level. The resistance of the LDR decreases as the ambient light level increases, and its resistance increases as the light level decreases. We can understand the resistance level of the 5mm LDR found in the IoTBot from the light intensity of the LED next to the sensor. The LDR is connected to pin 39 of the processor. You can use the LDR in your lighting, alarm and night light projects.

3.3 Relay

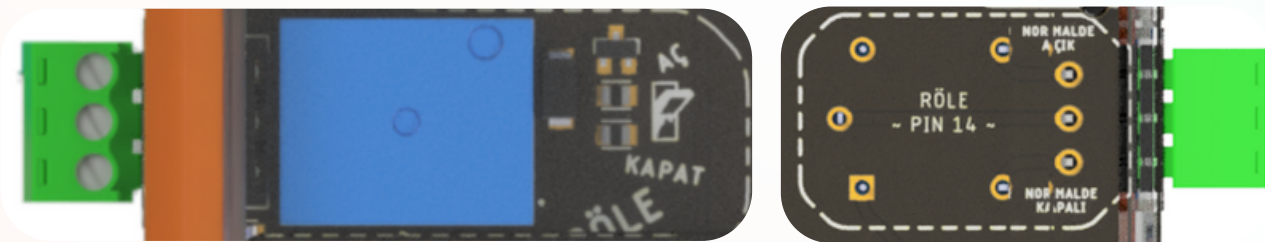


Figure 4 - Relay Front and Rear View

A relay is an electromechanical switching device that performs the opening or closing of a circuit by electrical signals. There is an LED on the IoT that indicates that the relay has been triggered. The relay on the IoT works with 5V. The relay is connected to pin 14 of the processor. Relays are versatile electromechanical switching devices that can be used in many different projects. You can use them in your projects such as motor control, lighting systems, and home automation.

3.4 Notification LEDs



Figure 5 - Notification Lights Front and Rear View

A relay is an electromechanical switching device that performs the opening or closing of a circuit by electrical signals. There is an LED on the lotBot that indicates when the relay is triggered. The relay on the lotBot works with 5V. The relay is connected to pin 14 of the processor. Relays are versatile electromechanical switching devices that can be used in many different projects. You can use them in your projects such as motor control, lighting systems, and home automation.

3.5 Potansiyometre

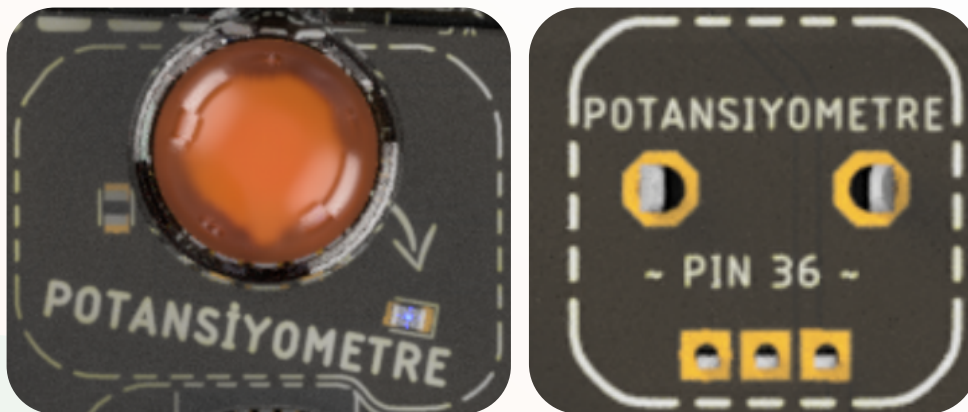


Figure 6 - Potentiometer Front and Rear View

A potentiometer is an electromechanical component that allows manual adjustment of electrical resistance. It is often abbreviated as "POT". Potentiometers have variable resistances and are used in different devices and electrical circuits to perform various functions. The lotBot has a 10kΩ POT and an LED that changes light intensity according to the resistance level. The POT is connected to pin 36 of the processor. With the potentiometer, you can adjust the brightness of the lights on the lotBot by making analog readings, change the motor angles and switch between menus on the screen.

3.6 Joystick

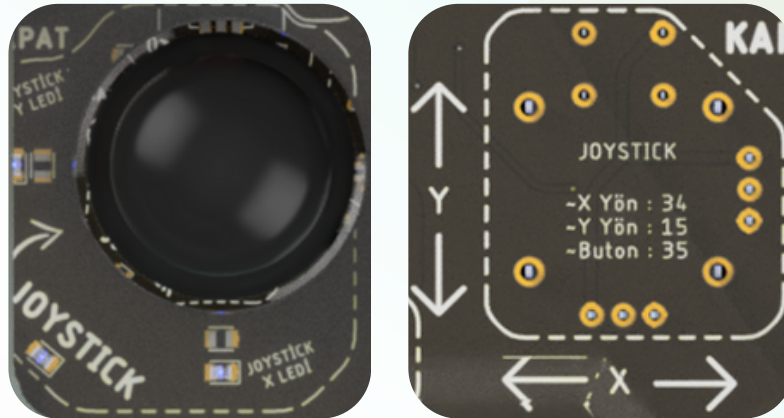


Figure 7 - Joystick Front and Rear View

Joystick is an input device used for steering operations. The joystick in lotBot has 2 axes and a button. The x-axis is connected to the 34th pin of the processor, the y-axis to the 15th pin, and the digital button to the 35th pin. We have a total of 3 LEDs that show the axis movements of the joystick and the button status. You can implement your mobile robot, simulation systems, and motion-controlled camera projects using the joystick.

3.7 ESP32 Microcontroller

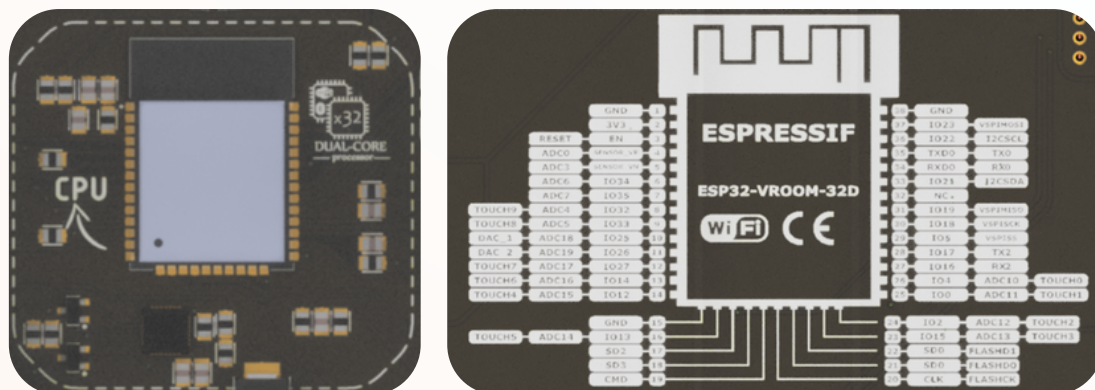


Figure 8 - ESP32 Processor Front and Back View

ESP32 is a dual-core microcontroller with built-in Wi-Fi and Bluetooth connectivity. It has features such as numerous digital and analog input/output pins, low power consumption, and high processing power. General features of ESP32 are:

- It has a 240 MHz operating speed and consists of dual cores. It has 4 Mb internal memory.
- It has internal Wi-Fi 802.11 b/g/n and Bluetooth 4.2 BLE (Bluetooth Low Energy) modules.
- It has 34 GPIO (General Purpose Input/Output) pins.
- It provides energy efficiency thanks to its power management features that provide low power consumption. It has an operating voltage of 3.3 Volts.
- It has security measures such as hardware-based encryption, secure boot and Wi-Fi network encryption.

3.8 Restart Button

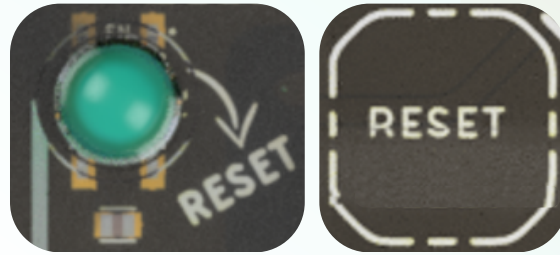


Figure 9 - Restart Button Front and Back View

If pressed, the system will be restarted. (Does not delete the software) This restart is done by momentarily connecting the 'ENABLE' (Activation) pin on the ESP32 to ground.

3.9 IO'0' Button

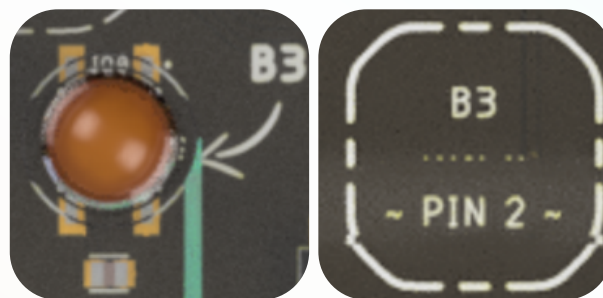


Figure 10 - Front and Back View of IO'0' Button

This button stands for "Input/Output 0" and is a button used for programming and software loading. The basic use of the IO0 button is to put the module or development board into programming mode or to enter a special state called "Bootloader Mode" or "Programming Mode" for loading software. If you hold down this button and press the RESET button, the processor will start in boot mode.

3.10 Encoder

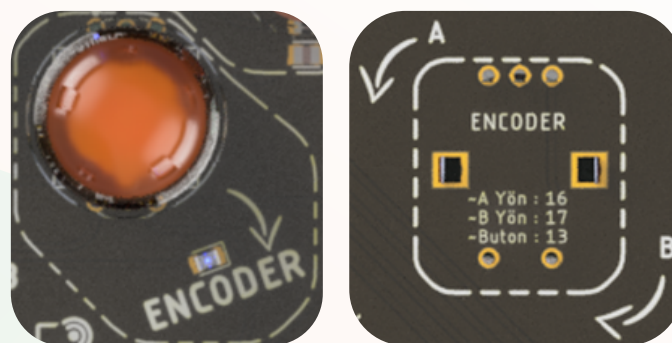


Figure 11 - Encoder Front and Rear View

Encoder converts the movement into digital data by detecting and measuring the rotation of a rotated shaft. The encoder in IoT is 2-way and has a button. The A direction is connected to pin 16 on the processor, the B direction is connected to pin 17, and the button is connected to pin 13. With the encoder, you can do clock and timing, automation projects and radio frequency projects that require fine tuning.

3.11 Analog Buttons



Figure 12 - Analog Button Front View

A button is a switching component that can be pressed or released to perform a specific action in electrical circuits or electronic devices. The analog buttons on lotBot are connected to Pin 4. When the buttons are pressed, the LEDs in the display will light up. You can use the buttons in your clock and timing, sound effects, and alarm system projects.

3.12 Buzzer (Horn)



Figure 13 - Buzzer Front and Rear View

A buzzer is an electromechanical device that converts electrical signals into sound waves and thus produces sound. Different sounds can be obtained by sending different signals. The buzzer in lotBot is connected to pin 14 on the processor. With the buzzer, you can make projects such as alarms, music and melodies, and ring systems.

3.13 L293 Motor Driver

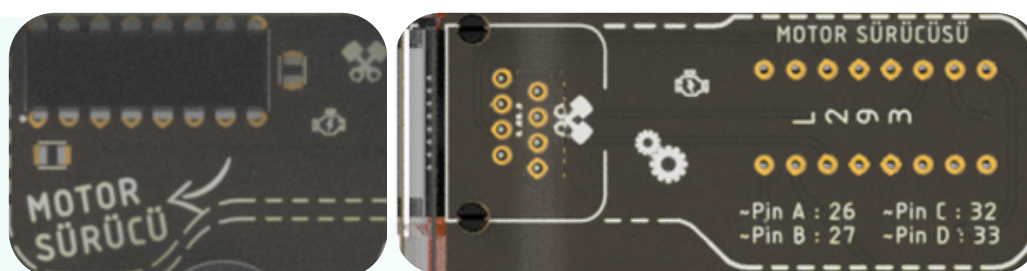


Figure 14 - Motor Driver Front and Rear View

Motor driver ICs are special types of integrated circuits used to control and drive electric motors. Motor drivers perform the power and signal processing functions required to control the speed, direction and torque of electric motors. In order to use the L293 model motor driver found in lotBot, the driver has an RJ45 output. The motor driver uses processor pins 26 for DC motors and 27 for stepper motors, and 26-27-32-33. You can realize robotic projects, electric vehicles and toy projects with the motor driver.

3.14 Input Ports

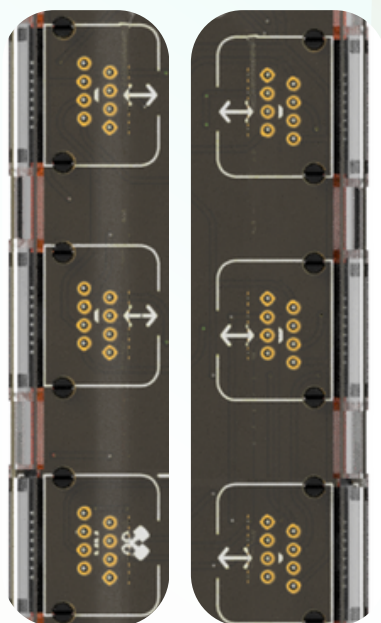


Figure 15 - RJ45 Input Ports Rear View

RJ45 internet sockets used in input ports are a widely used connection standard. It allows you to easily connect between lotBot and modules. You can connect all the products in the set to each other and communicate without any problems. This line has 5 different signal pins, 1 ground connection pin, 1 5 Volt and 1 3 Volt pins.

3.15 Parallel Power Ports

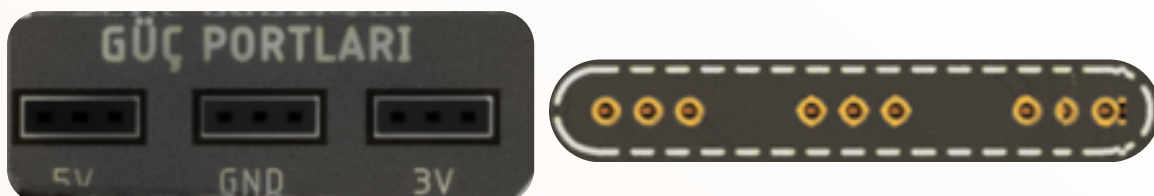


Figure 16 - Parallel Power Ports Front and Rear View

Parallel power ports provide 3V and 5V power output from lotBot. Thus, you can operate external sensors or components that operate with 3-5V.

3.16 Parallel Communication Ports

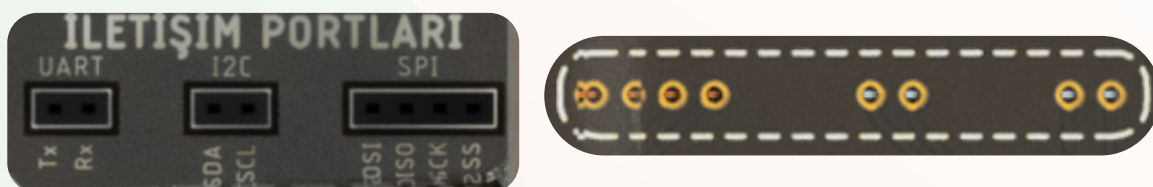


Figure 17 - Communication Ports Front and Rear View

Parallel Communication ports allow external communication with lotBot's processor. lotBot can also connect to your own products outside of the set content. In this way, you can develop a much wider variety of applications and also evaluate the materials you have.

3.17 On Off Switch

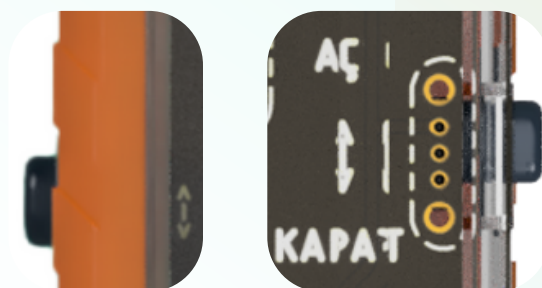


Figure 18 - On Off Switch Front and Rear View

Parallel power ports provide 3V and 5V power output from IoTBot. Thus, you can operate external sensors or components that operate with 3-5V.

3.18 USB Type-C Power and Data Input

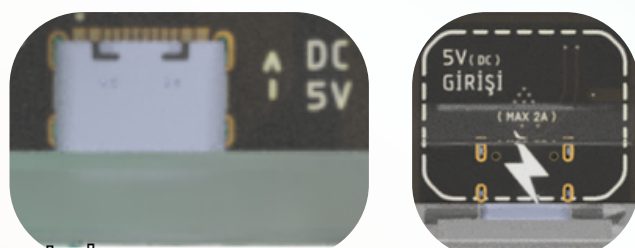


Figure 19 - Communication Ports Front and Rear View

USB Type-C is a type of USB (Universal Serial Bus) connection standard and is widely used among newer generation devices. It provides power to the IoTBot and allows us to transfer data to the processor. It also provides the energy needed to charge the internal battery.

3.19 RFID Port Input

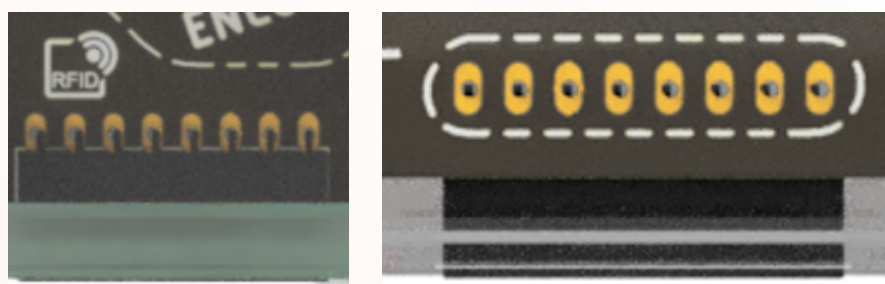


Figure 20 - RFID Ports Front and Rear View

RFID (Radio-Frequency Identification) is a technology used to wirelessly identify and track objects using radio frequency. RFID works by using tags that carry unique identification information about objects and the detection and processing of these tags by reader devices. IoT has a suitable entry for this system. You can develop various applications using the RFID sensors you have. You can create access control systems and tracking systems.

3.20 Battery



Figure 21 - Battery Front View

lotBot uses a 3.7v 2000mAh Li-ion battery. They are frequently preferred in new technology devices, their most important feature is that they are small, light and high-powered. Li-Ion batteries can be kept waiting after being charged like Ni-Cd batteries and do not lose capacity in a short time. Thanks to the battery in lotBot, you can develop applications and run lotbot independently of the cable.

IOTBOT USER MANUAL

"ROBOTIC CODING FOR EVERYONE"

CODLAI TECHNOLOGIES INC.

In this period when technology is advancing Decently, robotics and coding skills are among the most valuable competencies of the future. CODLAI Technologies A.Sh. as such, we invite you to step into this exciting world.

Encode the Future with CODLAI

Our mission is to provide innovative, accessible and effective solutions to students and educators by using technology in education in the most effective way.

Be the Technology Leaders of the Future

We aim to educate the technology leaders of the future by increasing the quality in robotic coding and applied courses. With our constantly developing product range and educational materials, we offer practical and advanced technology-based educational tools that are suitable for the needs of students at all levels.

CODLAI Technologies INC.

"Innovative Solutions in Education, Strong Steps to the Future"

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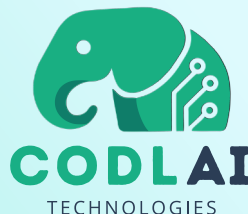
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