



## **TRACDUINO PLATFORM CAPABILITIES**

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**Abstract:** *Using the Tracduino platform, which is considered one of the platforms used to control existing robots in the field of robotics, getting to know its features and capabilities.*

**Key words:** *Tracduino platform, MicroPython, Trackduino module.*

Robotics is an applied science dealing with the development of automated technical systems.

Robotics focuses on such subjects as electronics, mechanics, computer science, radio engineering and electrical engineering.

In 2020, the group of companies "Development" and "RoboTrack" presented a new multifunctional controller "Tracduino Pro".

Trackduino Pro multi-function controller is an electronic device with multiple reprogrammability in two programming environments (Python and C++).

The Tracduino Pro platform is based on the STM32 microcontroller, a 32-bit controller widely used in industry. The choice of a particular STM microcontroller model was made taking into account the availability of a high-performance 32-bit microcontroller based on the Cortex-M4F core with a floating-point DSP computing system. Tracduino Pro is a modern multifunctional microcontroller platform based on the STM32F407VGT6 microcontroller. Due to the high speed of operation and memory-optimized data exchange, it was possible to use the MicroPython language as the main programming language of the platform.



This language facilitates the development of prototypes of mobile robots and robotic devices, and also has a low entry barrier, which positively affects the possibility of teaching robotics using high-level languages.

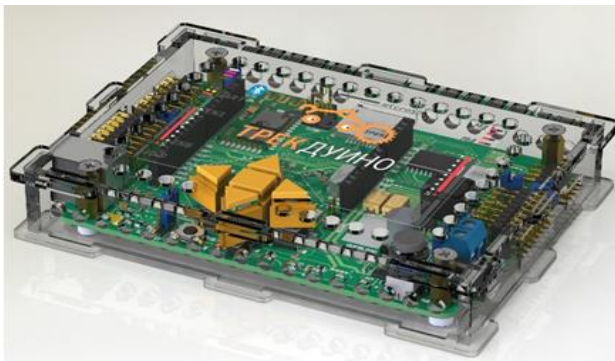


Figure 1. Tracduino board

The ability to program in MicroPython for the Trackduino Pro platform allows users to create more complex and efficient programs and robotic devices than in a visual development environment.

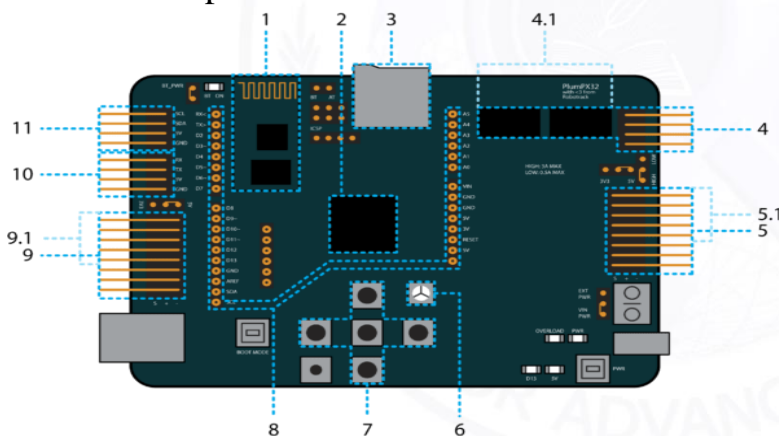


Figure 2. Features of Tracduino

1. Built-in Bluetooth module;
2. Microcontroller STM32F407VGT6;
3. slot for microSD memory cards;
4. 4x DC motor ports;
- 4.1. 2x drives for 2 DC motors;
5. 8x output ports;
- 5.1. 5x output ports with PWM support;
6. Built-in three-color LED;





7. 5x built-in control buttons;
8. Arduino Uno interface;
9. 8x input ports;
- 5x input ports with 9.1 PWM support;
10. 2x output USART ports;
11. 2x output I2C ports.
11. 2x output I2C ports.

The platform can be effectively used as a platform-independent device (for running resource-intensive machine learning models), for machine learning tasks, and as a microcomputer controller with video data processing services using machine learning in general.

The control board is enclosed in a case with no access to some ports that may be needed only by "advanced" users (screw terminal block for external power supply, Arduino interface, supply voltage of IN and OUT ports 3V switches to switch to). and 5V, Bluetooth setup jumper, etc.). To access these elements, the case cover must be removed.

**Power Requirements:**

- USB - exactly 5 volts
- External power - 6-17 volts.

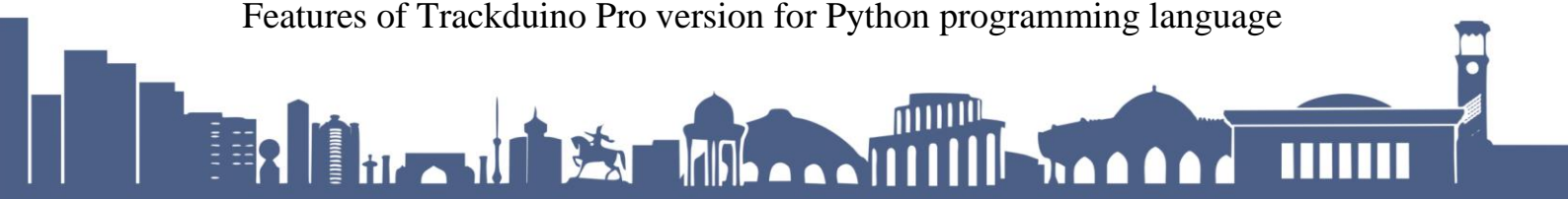
External power can be:

- Six AA batteries or a 9-volt battery pack using a battery (3 sections);
- Lithium-ion batteries with a total voltage not exceeding 17 volts;
- 6 to 17 volts DC power supply and at least 500mA current (1-3A when using multiple motors and servomotors).

When using power sources that are not capable of delivering high currents (for example, alkaline batteries or nickel-metal hydride batteries or weak power supplies), it should be taken into account that large loads can cause a drop in the supply voltage, as a result, to restart the controller, e.g

- \* sudden stop and blocking of engines;
- \* sudden changes in the direction of engines before stopping;
- \* connecting a large number of servomotors;
- \* use of servomotors to lift excessive weight.

Features of Trackduino Pro version for Python programming language





The Trackduino Pro platform for Python programming includes a built-in MicroPython interpreter. MicroPython is an implementation of the Python 3 programming language that includes the core set of the Python standard library and is optimized to run on microcontrollers.

The MicroPython version for Trackduino Pro is based on the MicroPython for PyBoard firmware. You can read the documentation for this on the official website.

To program the platform in Python, you need to install the driver. After the driver is successfully installed and the platform is connected to the computer in the correct mode, the platform will appear on the computer as a removable device named PYBFLASH.

TRACKDUINO Pro API for MicroPython is platform-loaded software that allows you to easily program the platform to use Robotrek's hardware and software components. The add-on package includes the following components:

- A boot.py script that describes the behavior of the platform immediately after boot. By default, the primary function of this script is to run the main script;
- main.py script describing the logic of the robot controlled by the platform;
- A pybcde.ini configuration file that contains platform settings information for use on a Windows computer.

Trackduino module included

- Executor module is a set of driver modules for Robotrack executor devices;
- sensor module — a set of drive modules for robot-track sensors;
- common.py file is a collection of common functions and classes used in other modules and simplifying platform programming;
- The pins.py file is a set of definitions for the pins available on the platform, providing simple named access to the required pins.

A DC power supply of 6 to 17 volts and a current of at least 500 mA (1-3A when using multiple motors and servomotors).

A USB power card is recommended for projects that do not use high current consumers, such as servo motors and motors. For projects using motors or more than two servo motors, external power is mandatory.

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