

Petoi Bittle - Bionic Open Source Robot Dog



- **Unique bionic system** : The unique bionic system can perform dynamic movement and has excellent coordination. The bionic structure of the legs gives it more freedom in unstructured terrain. This dynamic mobility can only be seen in some of the best laboratories or some luxury robots of big companies, such as Boston Dynamics Spot or Sony Aibo.
- **Compatible with multiple programming methods:** Bittle can be programmed at different levels in various programming environments including Arduino IDE for C language and Codecraft for graphical programming. Developers and STEM educators can also review and modify Bittle C code, which is completely open source.
- **Customized Arduino board:** Bittle is driven by NyBoard V1, a customized Arduino board with rich peripherals (Atmega328P chip). It fully utilizes the chip of a regular Arduino Uno to coordinate sophisticated motions. The board can drive at least 12 PWM servos, and an IMU (Inertial Measurement Unit) is used for balancing.

- **Rich extensions:** Raspberry Pi or other artificial intelligence chips can be installed to make Bittle have stronger artificial intelligence capabilities; 4 grove interfaces can be connected with external sensors, such as ultrasonic sensors and infrared sensors (it can be held in the mouth, very cute)
- **Easy to operate:** Bittle has been pre-programmed to be usable out of the box, with a 3D interlocking structure for the body and legs, reducing the use of screws.
- **Rich curriculum resources:** Bittle has a wealth of course resources, 16 exclusive graphical programming courses, with expansion packs.
- **Strong protection:** High-strength injection molded plastic provides the best protection against collisions and dust (not waterproof!). In the stress test, the assembled robot can withstand the footsteps of adults without damaging any components.

This kit is Suitable for:

- Students ages 12+
- Maker teachers & STEM camps
- DIY Robot hobbyists
- Homeschooling educators
- Bionics enthusiasts

Description

Bionic Open Source Robot Dog

Bittle is a small but agile and powerful robot dog. It is an ideal tool for learning, teaching and researching quadruped robots. With customized Arduino board coordinating all instinctive and sophisticated movements, you can clip on various sensors to bring in perception. You could also inject artificial intelligence capabilities by mounting a Raspberry Pi or other AI chips.



Watch Video At: <https://youtu.be/l1mONv27ntw>

Innovative 3D interlocking parts

Bittle skeleton consist of 3D interlocking parts, which reduces the use of screws and makes it simple and beautiful.

Each component has gone through dozens of iterations of 3D printing. And we use high-strength injection molded parts to provide the best protection to prevent collisions and dust from entering (Bittle is not waterproof however). In the pressure test, the assembled robot can withstand adult stepping on it. You can learn more through the following gif.



What is Grove?

No jumpers or soldering required, Grove makes it easier to connect, experiment, and simplify the prototyping process significantly. We have developed more than 300 Grove modules, covering a wide range of applications that can fulfill a variety of needs. Each one comes with clear documentation and demo code to help you get started quickly. Not only are these open hardware, but we also have open-source software.

Compatible with variety of programming languages

Bittle supports graphical programming, C and Python. Whether you are a beginner or a senior engineer, you can give Bittle "life" in your own way. You can learn about the actions that Bittle can complete after programming it through the following gif.

*To use Python, external components are needed, not included in the basic kit.

Exclusive graphical programming course (16 lessons)

Our professional team of STEM educators has developed a graphical programming course for Bittle. It makes getting started programming for Bittle easy and accessible for everyone. The course assumes basic familiarity with graphical programming. If you are a complete beginner, you can start with Codecraft Introduction to Graphical programming course first!

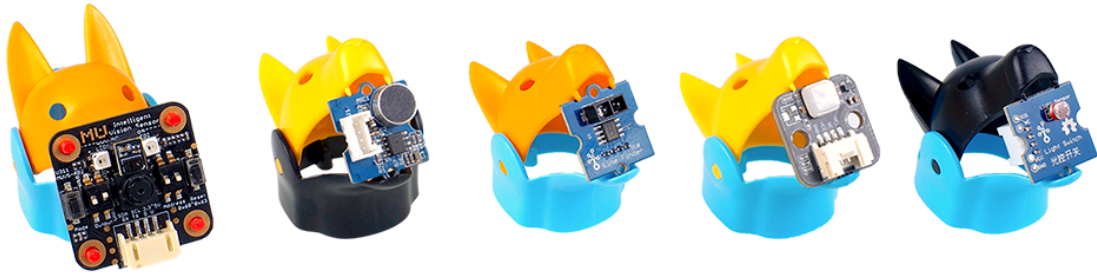


Active online community and professional technical support

As a joint project between Petoï and TinkerGen, Bittle has a support of active online community, including forums, professionally written documentation and experts from the team ready to help users with issues if they arise. You can find up to date information about Bittle on <https://www.tinker-gen.com/> and online tutorials, projects and lesson ideas at TinkerGen Education Platform, Make2Learn.

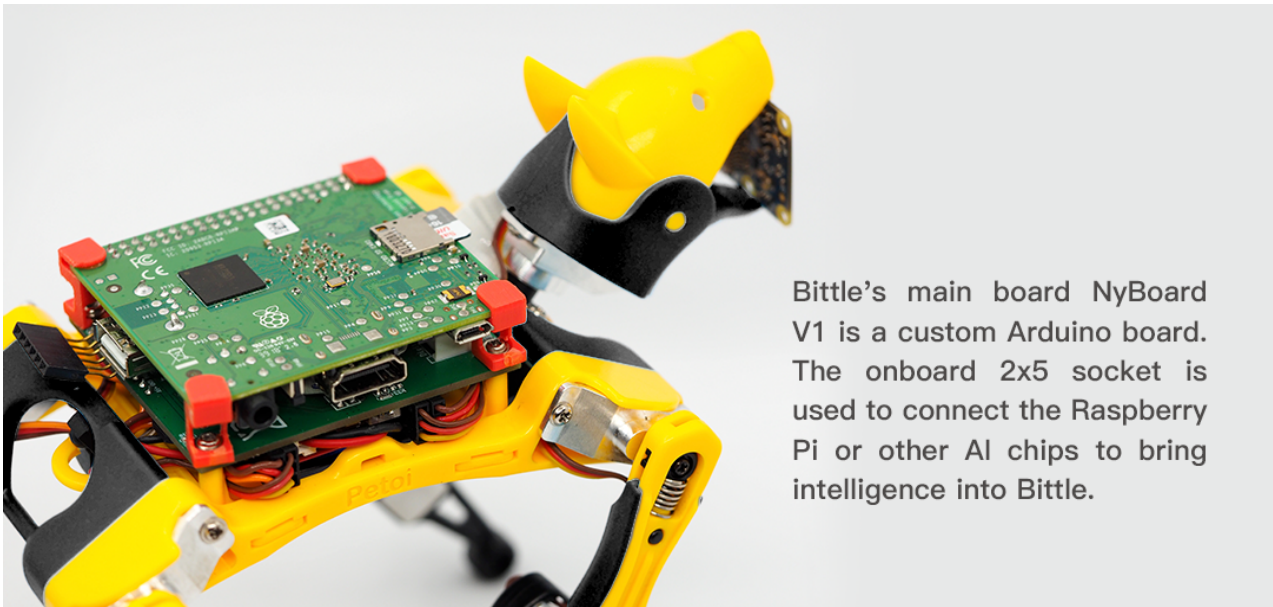
Rich extensions

Bittle's main board NyBoard V1 is a custom Arduino board with 4Pin connectors on the board. You can configure various Grove modules for Bittle to bring a totally new perception to Bittle.



Compatible with Raspberry Pi/ESP32

Bittle's main board NyBoard V1 is a custom Arduino board. The onboard 2x5 socket is used to connect the Raspberry Pi or other AI chips to bring intelligence into Bittle.



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Hardware overview

All robots, and our Bionic robot dog in particular, are complex electromechanical systems, comprised of multiple different components working all together. Just by looking at it, it's hard to say how it can perform advanced movement functions. In this lesson we're going to have an in-depth look at the modules that Bittle is made of and how they're all interconnected.

Main components

Here are the main components you can see when you look at Bittle:

- servos in every joint, that needs to be moved, namely shoulder and hip joints and head pan joint
- battery installed under the belly
- mainboard with control chip and some modules under black cover



Servos

Servos are motors, that can be precisely controlled to be turned to a certain angle. A servo is very similar to electric motor - in fact it IS an electric motor with a controller chip, a potentiometer and gears for reducing speed all packed inside of plastic casing.

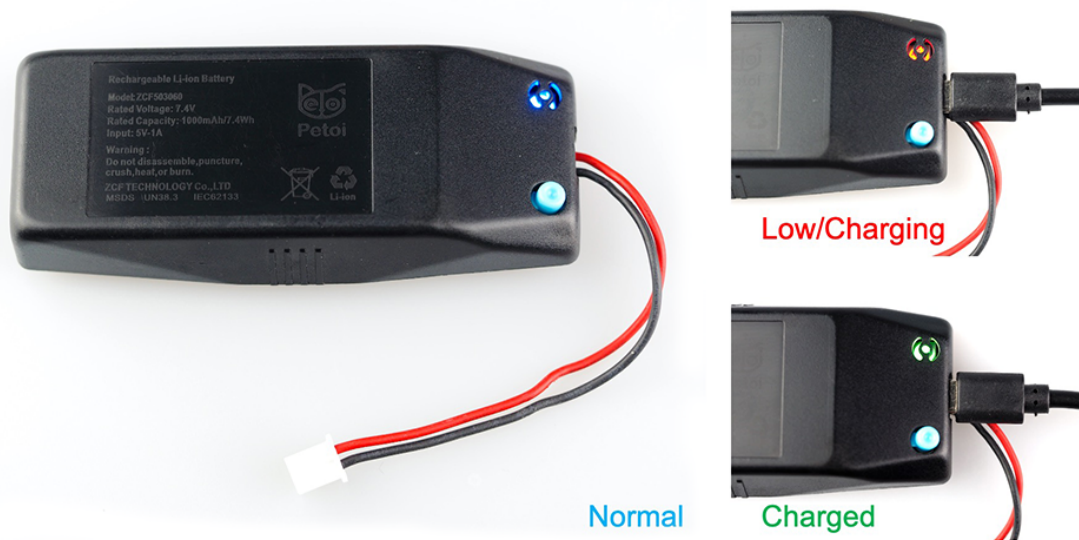


Potentiometer can be used to measure the angle of rotation of the shaft - and using control circuit we can move servo shaft to precise degree, unlike with simple DC motor, where we can only control the direction and speed. All that makes servos uniquely useful in robots applications.

Battery

The battery used in Bittle is a lithium-ion battery. A lithium-ion battery is a lightweight, high-power battery used in computers and mobile phones. That makes it useful for devices that should be lightweight. Lithium-ion batteries work by the movement of

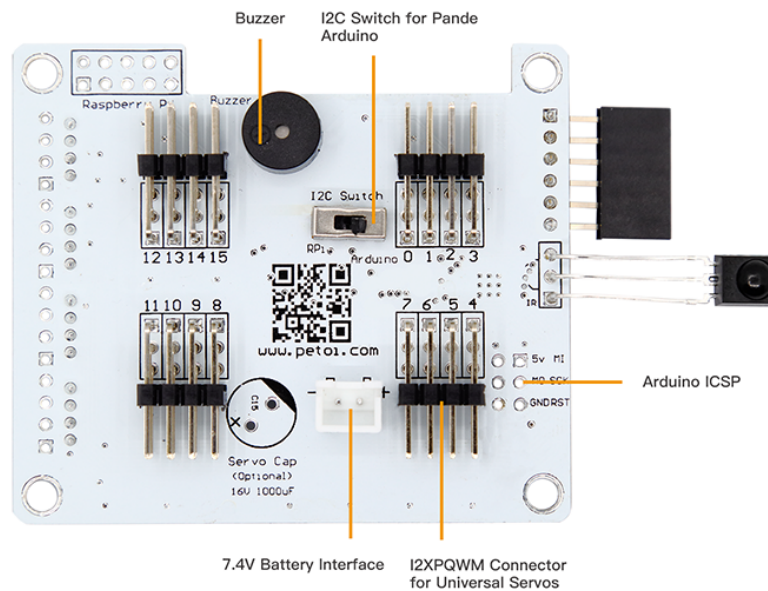
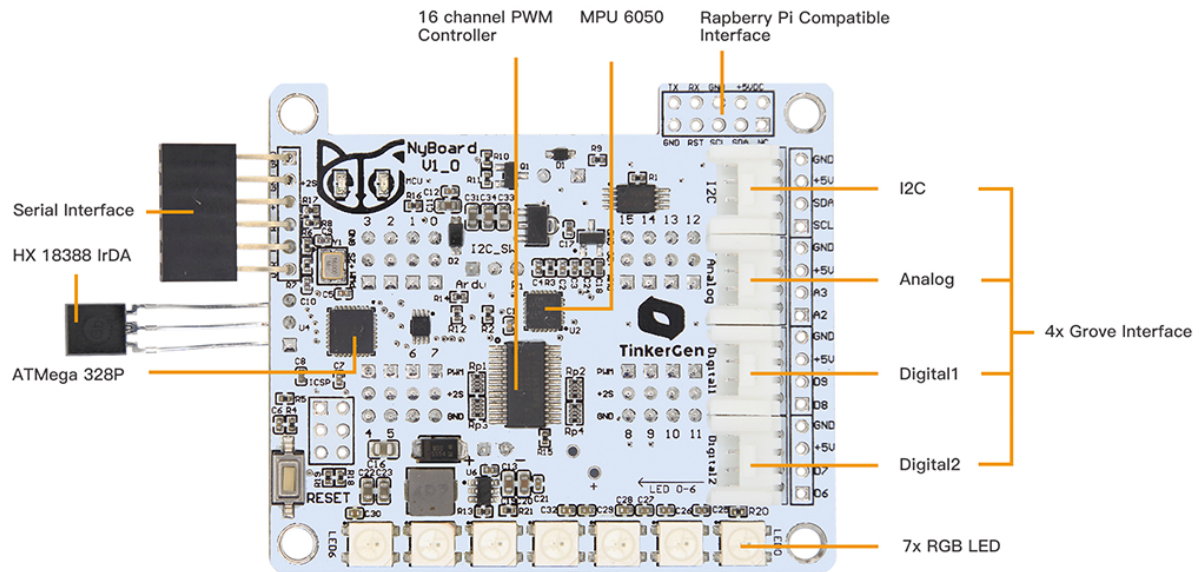
lithium ions through a membrane (thin sheet that allows some substances to pass through).



Mainboard

After you lift the back cover, you will be able to see the top of the mainboard. The main control chip, ATmega328p is located under the mainboard, so you won't be able to see it.

In the center of the board you can see another chip, PCA9685, which is used for controlling the servos. You can think of main control chip as the brain and servo driver chip as a spinal cord in mammals, responsible for motor coordination.



Grove connectors

Additionally, on top of the board you can see four Grove connectors: two digital, one analog, and one I2C bus connector.

Neopixel RGB LED

Finally, you also can see seven LEDs on top of the board. These are Neopixel RGB LEDs, each one of them can be addressed individually and its color can be changed. They are very useful for debugging and just look shiny!

Specifications

Overview

- Shock resistant ABS injection-molded plastic
- Spring-loaded upper legs
- 20cm x 11cm x 15cm
- Product weight: 290g
- Maximum load weight: ~300 g

Servo

Model P1S

Voltage	8.4
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Working angle	270
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Stall current	1500mA
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Stall torque	3.15 kg/cm
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Battery

2S Li-ion battery module

Micro USB-A charging

Voltage	7.4V
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Current	5A
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Capacity	1000mAh/7.4Wh
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Mainboard

NyBoardV1_1

- ATmega328P
- Chip frequency 16 MHz
- Memory 2KB SRAM, 32KB flash, 1KB Internal EEPROM + 8KB I2C EEPROM
- 4x Grove interface
- 1x UART, 1x I2C, 1x SPI

Supports plugging in the Raspberry Pi (not provided in the kit), powering the Raspberry Pi, and communicating with the Raspberry Pi through the serial port and I2C. Support plugging in the Bluetooth module (not provided in the kit), and using the mobile APP remote control.

What's in the Box

Bittle Kit Includes everything you need to make the robot dog up and running:



Joint Tuner x1



USB To Uart x1



Bittle x1



P1S Servo(Spares) x1



Micro-USB Cable



IR Remote Controller x1

In the Pre-assembled kit, we have helped you install Bittle in advance, and burned the default program for Bittle. You just need to open the package, and you can use the remote control to control Bittle immediately