# Lesson 1 TonyPi Pro Introduction
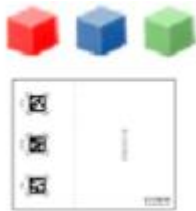
1. Production Introduction

TonyPi Pro is an AI vision humanoid robot development kit powered by Raspberry Pi 4B 4G. Upgraded from Hiwonder TonyPi advanced kit, TonyPi Pro not only retains the original functions, but extends more interesting AI creative games, including Clearing Hurdles, Going Up and Down Stair, Intelligent Picking, Mask Recognition, Group Controlling, etc.
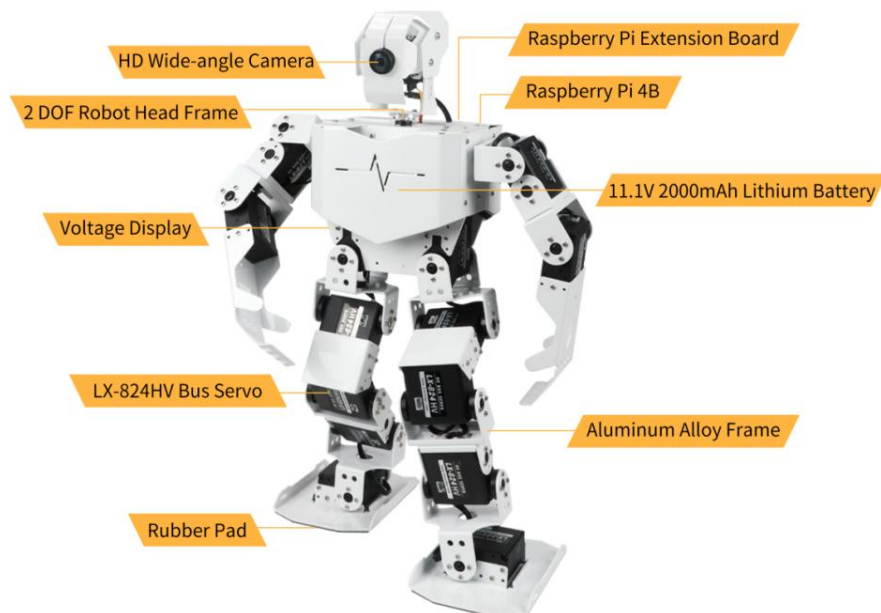
In addition to learn and verify robot vision and kinematics algorithms, it also provides fast and easy integration scheme for sensor application, vision picking and other secondary development.

2. TonyPi Pro Packing List

TonyPi ready to use	TonyPi hand	MP3 module	Fan module
Glowing Ultrasonic sensor	Dot Matrix display	Light sensor	Touch sensor
PS2 Wireless handle	Lipo Battery charger	4PIN wire	Map and tools
Line map	Stair	Hurdle	Balls
Blocks (3*3cm)	Tag cards (4.5*45cm)	16G U disk with tutorials	Card reader

Screw bag			

3. Tutorials Overview

Step1: TonyPi Pro Introduction

Please go to folder "1.Getting Ready" to learn about TonyPi Pro introduction and how to start the robot to help better you understand TonyPi Pro.

You will have a rudimentary knowledge of TonyPi Pro humanoid robot and learn how to turn on the robot, as well as the robot's status after powering up.

Step 2: Operate TonyPi Pro with mobile APP

Please go to folder "Quick User Experience" to learn how to start games quickly. Connect and operate TonyPi Pro with mobile App, and then start AI vision games.

Step 3: Getting Ready for AI Vision Games

Please go to folder "3.AI Vision Games/Lesson1 Set Development Environment" to learn the installation of VNC and device connection to preliminarily understand the structure of TonyPi Pro system catalog.

"Frequency Modification Method" is suitable for all the users who do not have 5G network card on their computer and provide a solution to modify the frequency when the device cannot be found to turn on the hotspot.

(Note: TonyPi Pro defaults to 5G frequency, which has a better experience than the 2.4G frequency. Users who use desktop computers are recommended to prepare a 5G frequency network card.)

Step 4: AI Vision Programming Games Learning

Learning the command line startup method of each AI Vision games to have a brief understanding of the implementation process. In addition, users can modify the program with their ideas.

Compared with the mobile APP control, it can further deepen the experience of OpenCV machine vision and operate with the commands.

Step5: Advanced Learning

Folders from "8.Sensor Basic Development Lessons" to "12.Vision Picking Lesson" are the exclusive content for TonyPi Pro.

1. Advanced Program Lesson (seven lessons included)

Please note that "1.Advanced Program Lesson" is not suitable for users who purchased the standard version. A simple instruction for game program files in Lesson 1. Learn how to install and wire sensors in Lesson 2. The following lessons in this chapter are the content of related games.

2. Advanced Lesson-PC software Control (two lessons included)
Learn how to control robot by PC software in this chapter. Learn about function buttons of PC software in Lesson 1 and how to connect and start PC software in Lesson 2.

3. Advanced Lesson-TonyPi Pro PC software and action Programming (four lessons included)

Learn how to use TonyPi Pro PC software.

4. Advanced Lesson-Raspberry Pi Basic Lesson (ten lessons included)

You can have a brief understanding of Raspberry Pi board and master the basic operation of Raspberry Pi board.

5. Advanced Lesson-Raspberry Pi Expansion Board Lesson (five lessons included)

Combined with Raspberry Pi expansion, this section is mainly to learn the example of hardware operation by controlling bus servo, digital servo, buzzer, RGB light, which provides ideas and help for user development.

6. Advanced Lesson-OpenCV Basic Lesson (five Lessons included)

Learn some brief instructions for the mainstream technology of robot OpenCV to help user quick learning, which provides an idea direction for users to learn OpenCV later.

This section mainly provides some brief descriptions of some mainstream recognition technologies of robot vision OpenCV to help users quickly understand and learn, which provides a direction for users to learn OpenCV.

7. Advanced Lesson-Robot Vision Basic Application (five Lessons included)

This section is related to "3.AI Vision Games". It mainly learns the basic lessons of robot AI vision games through some basic cases.

8. Advanced Lesson-Sensor Basic Development Lesson (six lessons Included)

This section is mainly to learn the basic principle of sensors, and prepare for the subsequent combination of robot vision algorithms through the verification of basic routine.

9. Advanced Lesson-Sensor Application Development Lesson (six lessons included)

This section focuses on the combination of sensors and vision algorithms to realize game development, which provides users with secondary development ideas.

10. Advanced Lesson-Group Control Lesson (two lessons included)

This section can learn how to use PS2 wireless handle to control TonyPi Pro and the configuration method and the principle of "one-click" group control.

11. Advanced Lesson-Vision Picking Lesson (four lessons included)

This section needs to be assemble the novel robotic hand so that TonyPi Pro is able to flexibly pick and sort small-sized object through AI vision, which provide ideas for developers to have more AI creative scenarios.

12. Advanced Lesson-Athletics Lesson (four lessons included)

This section will teach you how to assemble the exclusive athletics tools and combine image processing and gait movement control algorithm for robot to make TonyPi Pro to realize some athletics performance, such as cross hurdle and go up and down stair.