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人工智能开发套件

Artificial Intelligence Development Kit

产品介绍

Product Introduction

Hunan Blinx Technology Co.,Ltd.

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Artificial Intelligence Development Kit

Service courses

Python Programming

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The artificial intelligence development kit is a teaching product aimed at artificial intelligence related majors. It integrates edge computing terminals, and is also equipped with 2D vision, depth vision, robot arm, voice recognition, embedded sensors and other AI modules, covering the main application scenarios in the field of artificial intelligence, allowing users to participate in the full process training of artificial intelligence such as data acquisition, model reasoning, etc. completely and freely.

Structural characteristics

Integrated design, equipped with a 17 inch screen, keyboard, and mouse, ready to use out of the box.

hardware configuration

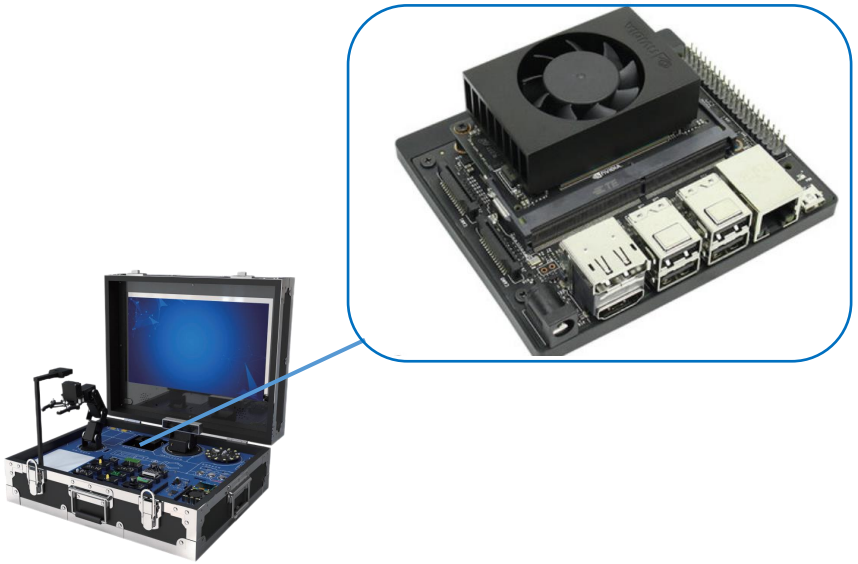
Integrated edge computing terminal, 2D vision, depth vision, robot arm, voice module and embedded sensor, supporting practical teaching of more than 8 courses.

software environment

Install Linux operating system and use Jupyter Notebook interactive programming environment


7.17 inch display screen
1.AI computing unit
2.2D Vision
3.Mechanical arm
4.PTZ+Deep Vision
5.speech recognition
6.Embedded Sensors

The edge computing terminal adopts the Jetson Xavier NX processor of NVIDIA Corporation. As the core module of the test box, the processor pre installs the Linux operating system, deploys all software frameworks and SDKs required by all intelligent product modules, and provides a common communication interface.



Edge computing terminal

Main technical parameters and functions

01 CPU: 6-core NVIDIA Carmel ARM v8.264 bit CPU; Memory: 8G; Hard disk: 128G; GPU: NVIDIA Volta Architecture, Equipped with 384 NVIDIA CUDAcores and 48 Tensor cores; Video Memory: 8GB128-bit LPDDR4x51.2GB/s; Connection: Gigabit Ethernet; Display: HDMI and DP.

02 Install Linux operating system with built-in Python 3.5 or above runtime environment, meeting the programming and AI teaching needs of Python, machine learning, and deep learning.

03 The deployed AI algorithm library includes object recognition, object detection, facial recognition, speech processing, etc., which meet the needs of basic applications and development.

04 Support the combination experiment of multiple modules such as machine vision, speech processing, robotic arms, and intelligent sensors.

The 2D vision system uses a 300000 pixel camera that is compatible with operating systems such as Ubuntu, Linux, and Raspberry Pi. When used alone, it can capture images of static targets in the field of view and perform basic image processing work; When used in conjunction with a six axis robot, visual calibration can guide the robot's movements and deploy a robot+visual execution system.

2D visual system

Main technical parameters and functions

01 Pixel count: 300000; Resolution: 640 × 480; 90 degree wide-angle camera; Frame rate: 30fps; Focusing method: manual focusing.

02 Adopting a bracket installation, it supports folding and storage.

The deep vision system adopts a 2-megapixel depth motion sensing camera, which is compatible with operating systems such as Ubuntu, Linux, and Raspberry Pi, and is compatible with USB 3.0 interface protocol. It can perform depth information perception, facial recognition, etc.

Deep vision system

Main technical parameters and functions

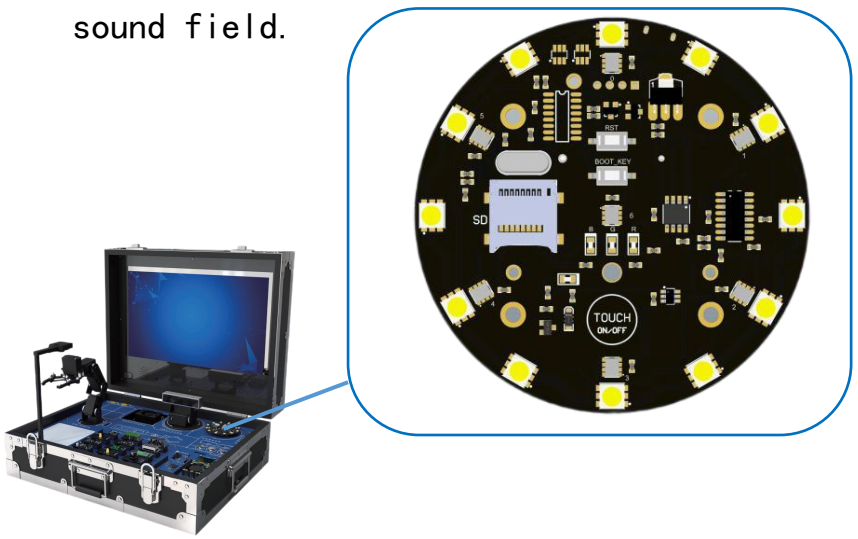
01 Minimum depth distance: 30cm; Depth stream output resolution: 1280 ×720; Deep stream output frame rate: 30fps; RGB sensor resolution: 1920 × 1080; RGB sensor frame rate: 30fps.

02 Support recognition and tracking of faces in the field of view, and output processing results.

03 Support recognition and tracking of dynamic targets in the field of view, and output processing results.

04 Support real-time facial feature extraction, enabling real-time analysis of faces appearing in the current field of view and obtaining facial feature data.

Adopting a programmable microphone array module, it supports functions such as voice recognition, interactive intelligent speech recognition, and sound source localization. A microphone array is a system composed of a certain number of acoustic sensors (microphones) that can be used to sample and process the spatial characteristics of the sound field.



Speech recognition unit

Main technical parameters and functions

01

Plug and play, compatible with Windows 10 and Linux systems; Sound pickup distance: about 2 meters in regular indoor environments, up to 5 meters in quiet environments; Equipped with 360 ° surround picking mode and sound source localization function; Power supply: 5V.

02

Support user-defined commands and control components such as robots, vision, sensors, etc. to perform specified actions.

The robotic arm adopts STM32 microcontroller for motion control, combined with machine vision system, to build a "hand eye integration" robot vision system, making the robotic arm more flexible and achieving adaptive recognition and grasping of objects.

Robotic arm

Main technical parameters and functions

01

Payload: ≥ 200g； Effective grasping range: radius ≥ 15cm; Degree of freedom: 5 degrees of freedom with clamping arm.

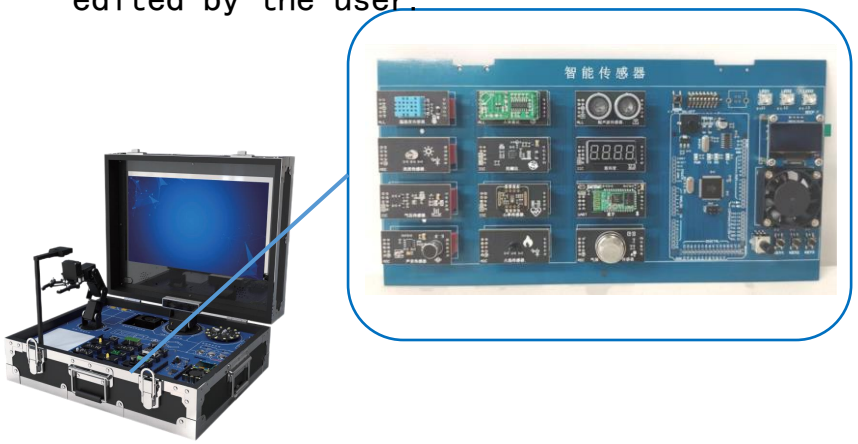
02

Support inverse kinematics control: By decomposing the servo motion control of the robot's 5 degrees of freedom, the theoretical motion angles of each servo are calculated by inputting the target coordinates. Combined with the servo control protocol, the motion of each servo can be controlled simultaneously.

03

Support voice control of robot movements, including up, down, left, right, grasping objects, etc.

Embedded sensors mainly consist of ultrasonic sensors, human detection sensors, temperature and humidity sensors, heart rate sensors, air pressure sensors, digital tubes, Bluetooth modules, gyroscopes, sound detection sensors, light detection sensors, etc. Each sensor can be connected to the edge computing terminal to perform corresponding actions according to the functions edited by the user.



Embedded Sensors

Main technical parameters and functions

01

The unified communication protocol is adopted, and each sensor is connected to the edge computing terminal.

02

Corresponding actions can be executed based on user edited functions, such as gyroscope controlled gimbal, light array control, human motion recognition, etc.

AI + Visual Sorting

- Collaboration between robotic arm and visual system;
- Visual recognition based on deep learning;
- Appearance and size identification;
- Defect detection, part identification, electronic product identification.

AI + Depth Vision

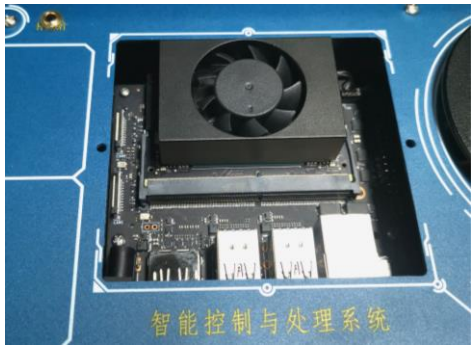
- Two degree of freedom gimbal+depth vision;
- Facial detection and recognition;
- Real time measurement of target distance;
- Motion target capture, recognition, and tracking.

AI+ Speech Processing

- Microphone array, sound source localization;
- Voice control sensor activation detection;
- Voice control of robotic arm movement;
- Other voice commands and actions can be customized.

AI + Embedded Sensors

- Up to 12 commonly used embedded sensors, including temperature and humidity, ultrasound, heart rate, air pressure, gyroscope, etc;
- Can be linked with other devices to build smart home or smart security scenarios.

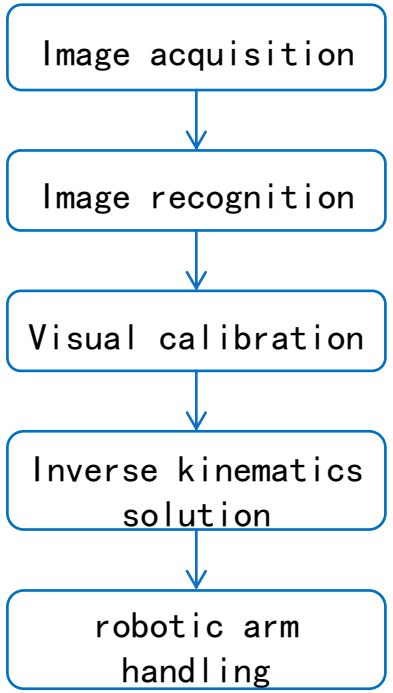


- Provide 9 course resources including Python programming, machine learning, deep learning, digital image processing, machine vision, deep vision, speech recognition, etc., with over 500 class hours.

	Python programming (part)		Machine Learning (Part)		Deep learning (Part)		Digital image processing (part)
1	Number types, conversions, and operations	1	AdaBoost movie dataset data classification	1	Linear regression modeling and application: house price prediction experiment	1	Algebraic operations between images
2	Basic usage of Python operators, built-in functions, sequences	2	Verification of double coin toss model based on EM inference	2	Model construction and application of neural network: clothing classification experiment	2	Coding and decoding of image operations
3	Program selection structure experiment	3	Classification of unknown data based on K-means algorithm	3	Neural network regularization: clothing classification optimization experiment	3	Geometric affine transformation of the image
4	Program loop structure experiment	4	Movie genre recognition based on K-nearest neighbor algorithm	4	Neural network parameter optimization: nonlinear function minima finding experiment	4	Image airspace filtering
5	List experiments	5	Dynamic pedestrian detection based on HOG and support vector machine	5	Model construction and testing experiments based on neural networks	5	Frequency-domain filtering of images
6	Ensemble experiments	6	Decision tree-based diagnosis of breast cancer	6	Optimization model design based on residual network	6	Morphology-based detection of rice grains
7	Function experiments	7	Naive Bayes-based spam filtering	7	Neural network optimizer - handwritten digit recognition	7	Image cutout based on Canny algorithm
8	String experiments	8	Face recognition based on random forest	8	Text classification - JD shopping classification	8	Image contour segmentation based on watersheds
9	The regular expression experiment	9	Housing price prediction based on linear regression	9	Design based on LeNet handwritten digit body recognition system	9	Based on Hu rectangular shape matching
10	Visualize the data,etc	10	Design of Lane Line Detection System Based on Deep Learning,etc	10	Automatic arrangement design of songs based on RNN	10	Smooth filtering and morphological processing
	Machine vision (part)		**Speech Processing and Sensor Control (part)**		**Embedded Systems and applications (part)**		**Vision-based Robotics Applications (part)**
1	Visual system cognition	1	Cognition of speech processing module	1	Intelligent sensing system cognition	1	Robotic arm cognition and basic operation
2	Calibration of the vision system.	2	Sound source localization	2	The construction of the Arduino programming environment	2	Robotic arm teaching and motion control
3	Object positioning and angle measurement	3	Voice control lighting	3	OLED display experiment	3	Calibration of robotic arm and vision system
4	Edge length measurement and area detection	4	Voice control to play music	4	Human radar detection experiment	4	Vision-based object classification of robotic arms
5	Object color and shape recognition	5	Speech recognition and response	5	Illuminance detection experiment	5	Vision-based robotic arm object palletizing
6	Barcode and QR code recognition	6	Voice-controlled robotic arm visual grabbing	6	Heart rate detector experiment	6	Visual based numerical sorting of robotic arms
7	OCR character segmentation and training	7	Voice-based intelligent sensor control	7	Ultrasonic rangefinder experiment		**Depth vision (part)**
8	OCR character recognition			8	Intelligent traffic light control experiment	1	Face detection and ranging
9	Detection of product surface defects based on morphological treatment			9	Fan speed control experiment	2	Facial detection and gimbal tracking
				10	Gyroscope-based attitude somatosensory gimbals control	3	Face detection and recognition
				11	Bluetooth-based intelligent security system design	4	Mask testing

Experimental principle:

Capture images through a 2D camera, recognize objects based on the Nanodet model, and locate the pixel center points of the objects. By visual calibration, the pixel center point of the object is converted into the world coordinates of the robotic arm. After grasping the object, the robotic arm classifies it based on the recognized fruits.



Below is a demonstration of "vision based robotic arm fruit classification" in vision based robot applications:

比邻星科技

Thank you!

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