Introduction

The ESP32-S3 AI Camera is a cutting-edge intelligent camera module built around the high-performance ESP32-S3 chip, designed for **efficient video processing, edge AI, and voice interaction.** Featuring a wide-angle infrared camera, onboard microphone, and speaker, it is ideally suited for applications such as electronic peepholes, baby monitors, and license plate recognition. With powerful AI processing capabilities, it integrates seamlessly into IoT ecosystems, supporting **edge image recognition** and online **AI model interaction** through Wi-Fi connectivity, making it an essential component for IoT applications, from security surveillance to AI assistants.

Intelligent AI Processing and Edge Computing

The ESP32-S3 AI CAM utilizes the powerful neural network capabilities of the ESP32-S3 chip for **edge-based image recognition** with platforms like Edge Impulse, YOLOv5, and OpenCV. It supports efficient on-device processing for tasks such as object detection and image classification, while integration with ChatGPT enables voice-controlled command execution. This combination of local AI processing and cloud-based model access makes the module ideal for a wide range of IoT applications.

To ensure easy integration, the ESP32-S3 AI CAM comes with extensive tutorials, documentation, and sample code:

Basic Tutorials: Camera setup, video transmission, and audio recording.

Advanced Tutorials: Image recognition, Object classification, and OpenCV contour detection.

Example Code: Integration with openAI for voice/image recognition and custom model training with EdgeImpulse.

Integrated Voice Interaction for Enhanced Usability

The onboard microphone and amplifier support **voice recognition (ASR**) and **interactive dialogue** powered by **ChatGPT**, enabling intuitive voice commands and real-time interaction. This integration allows for **smart automation** in IoT devices, simplifying control and enhancing user experience. With voice recognition capabilities, the ESP32-S3 AI CAM opens up possibilities for voice-activated smart assistants, AI-controlled surveillance, and hands-free device management.

Night Vision for All-Day Monitoring

Equipped with a 160° wide-angle infrared camera and **infrared illumination,** the ESP32-S3 AI CAM ensures exceptional image quality even in low-light or complete darkness. The module's light sensor further enhances adaptability, making it an ideal choice for **24/7 monitoring** in applications like baby monitoring, security surveillance, and smart home systems. Its ability to perform in all weather and lighting conditions makes it a reliable solution for around-the-clock surveillance.

Wireless Transmission Support: Wi-Fi & BLE 5

The ESP32-S3 AI Camera Module is equipped with Wi-Fi and BLE 5 connectivity, enabling seamless remote monitoring from your mobile devices or other connected equipment. Whether you're at home or on the go, you can easily access live video feeds and manage your monitoring system remotely. This wireless transmission capability expands the flexibility of the module, making it an ideal solution for applications requiring real-time surveillance and control, such as home security and smart automation.

Features

- Various AI capabilities
  - Edge image recognition (based on EdgeImpulse)
  - Online image recognition (openCV, YOLO)
  - Online large models for voice and image (ChatGPT)
- Equipped with a wide-angle night vision camera, infrared illumination, and all-day usability
- Onboard microphone and amplifier for voice interaction
- Offers a variety of AI models, with tutorial support for quick learning

Applications

- Electronic peepholes
- License plate recognition

AI Robot Toy

Smart Glasses

Specification

Basic Parameters

Operating Voltage: 3.3V

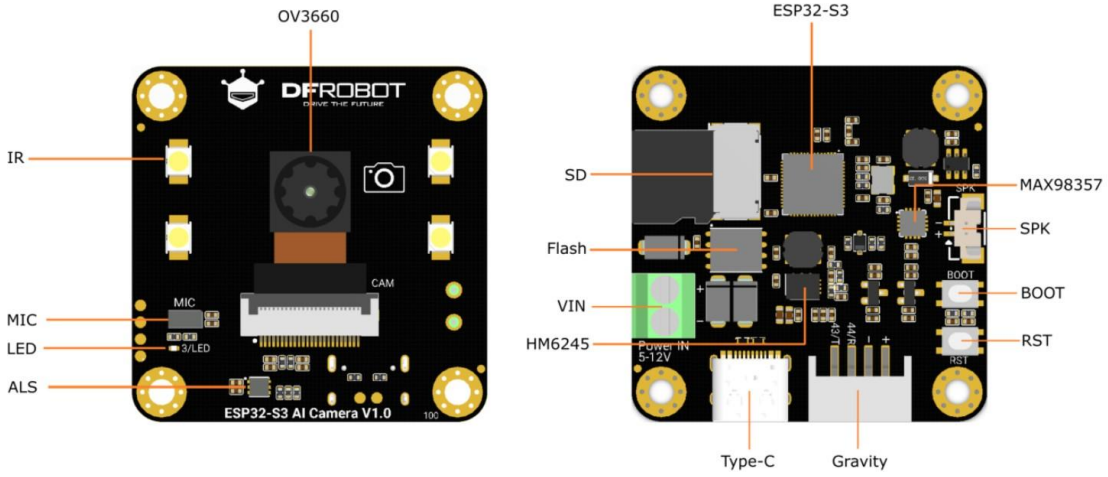
Type-C Input Voltage: 5V DC

VIN Input Voltage: 5-12V DC

Operating Temperature: -10~60°C

Module Size: 42*42mm

Functional Indicators



OV3660: 160° wide-angle infrared camera

IR: Infrared illumination (IO47)

MIC: I2S PDM microphone

LED: Onboard LED (IO3)

ALS: LTR-308 ambient light sensor

ESP32-S3: ESP32-S3R8 chip

SD: SD card slot

Flash: 16MB Flash

VIN: 5-12V DC input

HM6245: Power chip

Type-C: USB Type-C interface for power and code uploading

Gravity

+: 3.3-5V

-: GND

44: IO44/TX

43: IO43/RX

RST: Reset button

BOOT: BOOT button (IO0)

SPK: MX1.25-2P speaker interface

MAX98357: I2S amplifier chip

Camera Specifications

Sensor Model: OV3660

Pixels: 3 Megapixels

Sensitivity: Visible light, 940nm infrared

Field of View: 160°

Focal Length (EFL): 0.95

Aperture (F/No.): 2.0±5%

Distortion: < 8%

Documents

Product Wiki

OpenAI Image Q&A Demo Code

OpenAI Real-Time Communication (RTC) Demo for ESP-IDF (GitHub Repository)

Shipping List

ESP32-S3 AI CAM development board (with camera) x1

Speaker x1

Gravity-4P I2C/UART sensor connection cable x1