

Introduction

The Gravity: Offline Edge AI Gesture & Face Detection Sensor is designed for intuitive gesture control and multi-person presence detection. Equipped with an integrated camera and onboard AI processor, the sensor can **recognize 5 predefined hand gestures and detect up to 10 faces or upper-body presences simultaneously within a 3-meter range**. By combining computer vision and real-time edge AI computing, it delivers responsive and private interaction without cloud dependency.

Featuring dual communication interfaces (I2C and UART) and wide voltage support (3.3V–5V), this module is fully compatible with [Arduino](#), [Raspberry Pi](#), [ESP32](#) and graphical platforms like MakeCode and [Mind+](#). It is ideally suited for smart home interfaces, touchless control systems, public interaction devices, and privacy-focused [IoT](#) solutions.

Edge AI Processing – Real-Time, Offline, and Privacy-Safe

All recognition tasks are handled locally by the onboard AI processor—no data is stored or transmitted to the cloud. This completely offline operation guarantees data privacy, making it ideal for sensitive scenarios such as hospital automation, bathroom controls, children's systems, or public restrooms. Despite its powerful capabilities, it consumes only 100mA (typical), suitable for power-sensitive or standalone applications.



Figure: Edge AI Processing – Real-Time and Offline

Recognizes 5 Intuitive Hand Gestures – Touchless Control Made Easy

The AI gesture and face detection sensor supports recognition of five intuitive hand gestures—including thumbs up, peace sign, and open palm—within a 0.5 to 3 meter range. Each gesture triggers a distinct RGB indicator, enhancing interaction feedback and simplifying development. Ideal for smart appliances, gesture-activated lights, assistive devices, and public kiosks.

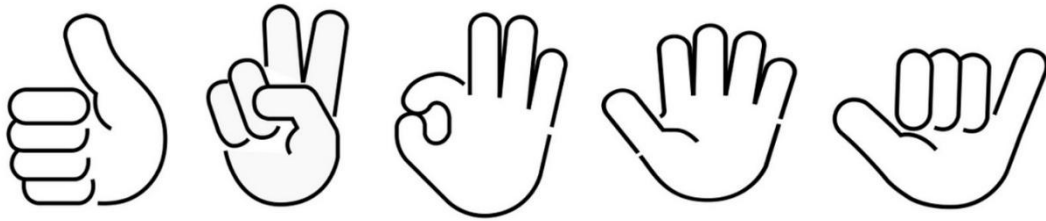


Figure: Recognizes Five Intuitive Gestures

Wide Detection Range with Optimized Field of View

With an **85° diagonal field of view** and **up to 3 meters detection range**, the AI gesture and face detection sensor ensures consistent performance whether installed on walls, ceilings, or desks. Its wide coverage allows use in compact enclosures, hallways, or open rooms, serving multi-user environments such as classrooms, conference areas, or interactive displays.

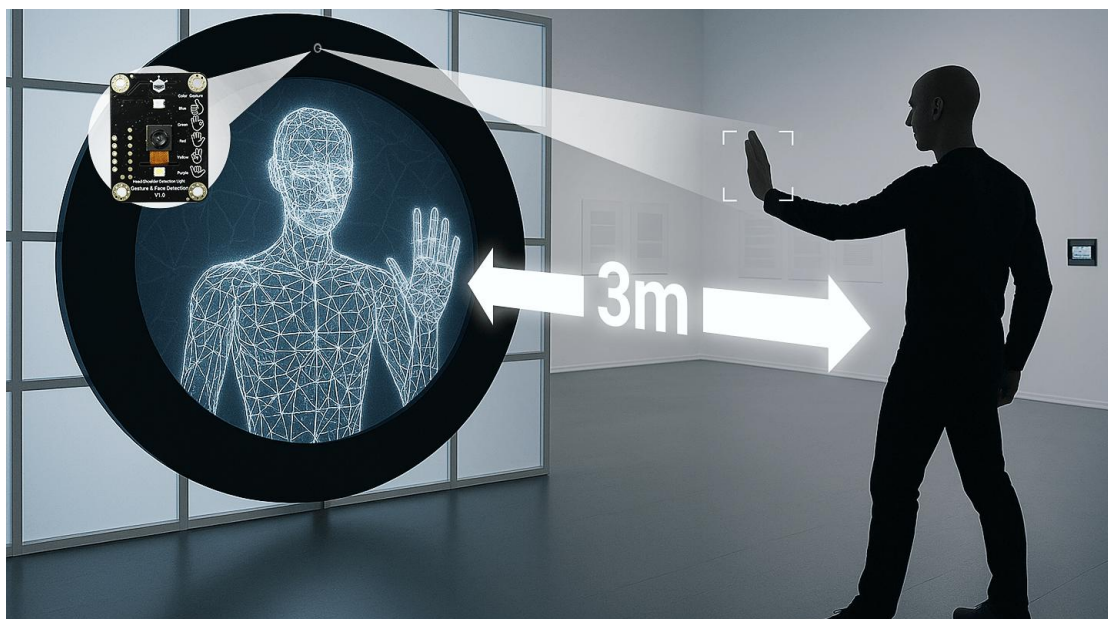


Figure: Offline Gesture & Face Detection Sensor with 3m detection range

Upper-Body and Face Detection with Real-Time Count

Beyond gesture control, the sensor detects head-and-shoulder patterns and can recognize up to **10 human presences or faces simultaneously**, providing position and count output in real time. Perfect for occupancy-based HVAC, lighting automation, and people counting in offices, shops, and smart spaces—all with full offline privacy assurance.

Features

- Offline AI gesture & face detection with fast, accurate response
- High-sensitivity detection of five hand gestures
- Reliable face and body presence detection up to 3 meters
- Simultaneous recognition of up to 10 faces or upper-body presences
- Dual communication interfaces: I2C and UART
- Compatible with both 3.3V and 5V systems
- Supports graphical coding environments including MakeCode and Mind+

Applications

- Wireless Smart Home Gesture Controller System
- Gesture-Enabled Remote Control Systems for Healthcare
- Interactive Art Device
- Smart People Counting Device



Figure: Applications of Gravity: Offline Edge AI Gesture & Face Detection Sensor

Specification

Electrical Specifications

Operating Voltage: 3.3V – 5V

Logic Level Voltage: 3.3V

Current Consumption: 100mA

Communication & Interface

Connector Type: PH2.0-4P / 2.54mm pin header

Communication Protocols: I2C / UART

I2C Address: 0x72

Default UART Baud Rate: 9600bps

UART Protocol: Modbus - RS485

Interrupt Output: 2.54mm pin header

Recognition Capabilities

Supported Gesture Types (5):

- Thumbs up
- Extend the middle, ring, and little fingers
- Open palm facing outward
- Extend the index and middle fingers

Extend the thumb and little finger

Maximum Recognizable Faces & Head-Shoulder Count: 10

Detection Area for Face & Shoulders: Recognizes upper-body presence within camera range

Face Recognition Confidence Score: 0 – 100

Position Coordinate Output: Supported

Gesture Recognition Distance: 0.5m – 3m

Face Recognition Distance: 0.5m – 3m

Camera Field of View (FoV): 85° (diagonal)

Camera Focal Length: 1.56mm

Visual Indicators

Gesture Recognition RGB Indicator:

Blue: Thumbs up

Green: Extend the middle, ring, and little fingers

Red: Open palm outward

Yellow: Extend the index and middle fingers

Purple: Extend the thumb and little finger

Presence Detection LED: Illuminates when a person is detected, turns off when no presence is detected

Mechanical Dimensions

PCB Dimensions: 42mm × 32mm

Mounting Hole Spacing: 25mm × 35mm

Mounting Hole Diameter: 3.1mm

Documents

[Product wiki](#)

[Arduino Tutorial](#)

[2D CAD](#)

[2D DXF](#)

[3D STP](#)

Shipping List

Gravity: Offline Edge AI Gesture & Face Detection Sensor x1

Gravity PH2.0 - 4P connecting line x1