



# ZED 2i



## ZED 2i Camera and SDK Overview

The ZED 2i stereo camera combines powerful hardware and intelligent software to create an unrivaled solution in terms of performance, functionality and design.

Designed to function efficiently in harsh environments, the IP66-rated ZED 2i stereo camera with its robust aluminum body withstands severe conditions with high particulate content, and water ingress, making it ideal for industrial applications such as agriculture, manufacturing, pharmaceuticals and many more.

The ZED 2i covers the entire spectrum of applications from robotics and spatial analytics to interactive experiences.



# ZED 2i | General Specification

## Wide-Angle 3D AI Camera

Combine long-range depth perception with AI to perceive your environment in 3D with up to a 120° wide-angle field of view.

## Multiple Lens Selection with Polarizer

Select a 2.1mm or a 4mm lens depending on your application. Add a built-in CPL polarizing filter when working outdoors.

## IP66-rated Enclosure

Resistant to dust, water and humidity, the new ZED 2i is designed for outdoor applications and challenging medical, industrial, agricultural environments, and more.

## Multiple Mounting options

With its multiple mounting options and flat bottom, the ZED 2i can be easily integrated in any system and environment.

## Built-in IMU, Barometer & Magnetometer

Featuring 9-DoF sensors for spatial and positional awareness. Factory calibrated on 6-axis with robotic arms.

## Secure USB Type-C Connection

Use a highly reliable USB 3.0 type-C cable with thumbscrew locking connectors and ensure a secure interconnection for your systems.

### General Specifications

|                       |                                                                                                                |
|-----------------------|----------------------------------------------------------------------------------------------------------------|
| Output Resolution     | Side by Side<br>2x (2208x1242) @15fps<br>2x (1920x1080) @30fps<br>2x (1280x720) @60fps<br>2x (662x376) @100fps |
| Interface             | USB Type C - External cable (up to 10m)                                                                        |
| Baseline              | 12cm (4.72 in)                                                                                                 |
| RGB Sensors           | Dual 1/3" 4MP CMOS<br>2688 x 1520 pixels<br>2µm x 2µm<br>Rolling shutter<br>YUV 4:2:2 - UYV (8bits)            |
| Motion Sensors        | Gyroscope, Accelerometer, Magnetometer                                                                         |
| Environmental Sensors | Barometer<br>Temperature                                                                                       |
| Warranty              | 2-year hardware warranty                                                                                       |
| In the Box            | ZED 2i stereo Camera<br>1.5m long USB Type-C cable                                                             |

### Physical

|                 |                                       |
|-----------------|---------------------------------------|
| Dimension       | 175.25x 30.25x 43.1 mm (6.90 x 1.69") |
| Weight          | 166g (0.36 lb.)                       |
| Operating Temp. | -10°C to +45° (14°F to 113°F)         |
| Power           | 380mA / 5V USB powered                |

### System Requirements

|     |                                                                                                                                                         |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| GPU | NVIDIA GPU ≥ 2GB Memory<br>NVIDIA Compute capability ≥ 3.0<br>Compatible with:<br>- NVIDIA Jetson Nano<br>- NVIDIA Jetson TX2<br>- NVIDIA Jetson Xavier |
| CPU | Dual-core ≥ 2.4GHz processor<br>Minimum 4GB RAM                                                                                                         |
| OS  | Windows 10 - 64bit Ubuntu<br>16.04/18.04 - 64 bit Debian<br>CentOS (via Docker) Jetson L4T                                                              |



# ZED 2i | Lens Options

## Focal Lengths available



### 2.1mm

The 2.1mm fixed focal lens provides an ultra wide field of view with optically corrected distortion for increased image quality.

### 4mm

If you need even better resolution and depth accuracy at longer range, select the 4mm focal length lens.

## No More Reflections with Polarizing Filters.

Benefit from the highest possible image quality with a built-in polarizing filter when working outdoors. This filter helps reduce glare and reflections and enhances color depth and quality as well.



## ZED 2i Available models

| Specifications    | ZED 2i 2.1mm<br>w/o Polarizer    | ZED 2i 2.1mm<br>with Polarizer | ZED 2i 4mm<br>w/o Polarizer      | ZED 2i 4mm<br>with Polarizer |
|-------------------|----------------------------------|--------------------------------|----------------------------------|------------------------------|
| Reference         | ZED2i21MM                        | ZED2i21MMP                     | ZED2i40MM                        | ZED2i40MMP                   |
| Polarizer         | Not available                    | Built-in Polarizer             | Not available                    | Built-in Polarizer           |
| Focal Length      | 2.12mm (0.008")                  |                                | 4mm (0.16")                      |                              |
| Field of View     | Max.110°(H) x 70°(V) x 120°(D)   |                                | Max.72°(H) x 44°(V) x 81°(D)     |                              |
| Aperture          | f/1.8                            |                                | f/1.8                            |                              |
| TV Distortion     | 5.07%                            |                                | 5.07%                            |                              |
| Depth Range       | 0.3 m to 20 m<br>(1 to 65.6ft)   |                                | 1.5 m to 35 m<br>(4.9 to 115ft)  |                              |
| Depth Accuracy    | < 1% up to 3m<br>< 5% up to 15m  |                                | < 2% up to 10m<br>< 7% up to 30m |                              |
| Object Detection  | Up to 20m (3D)<br>Up to 40m (2D) |                                | Up to 35m (3D)<br>Up to 55m (2D) |                              |
| Skeleton Tracking | Up to 8m                         |                                | Up to 15m                        |                              |



# ZED 2i | Sensor stack specifications

The ZED family of depth cameras is a multi-sensor platform. The cameras have built-in sensors to add position and motion-assisted capabilities to your app, from accelerometer and gyroscope sensors to temperature, barometer, magnetometer and more.

The sensors can be used to detect camera movements, compute the camera orientation according to the north magnetic pole, detect relative altitude variations, analyze external weather conditions, and much more.

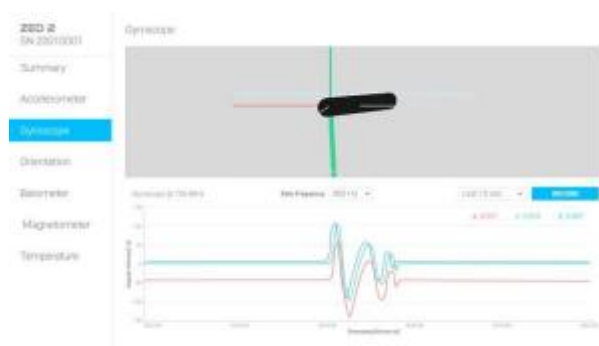
## Dual Image Sensors

### Sensors

|                                  |                                                                                                                                                                                      |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sensor Type                      | 1/3" 4MP CMOS                                                                                                                                                                        |
| Array Size                       | 2688 x 1520 pixels                                                                                                                                                                   |
| Pixel Size                       | 2μm x 2μm                                                                                                                                                                            |
| Shutter                          | Electronic synchronized rolling shutter                                                                                                                                              |
| Output Resolution (Side by Side) | 2x (2208x1242) @15fps - cropping mode<br>2x(1920x1080) @15/30fps - cropping mode<br>2x (1280x720) @15/30/60fps - binning 2x2 mode<br>2x(662x376) @15/30/60/100fps - binning 4x4 mode |
| Output Format                    | YUV 4:2:2 - UYV(8bits)                                                                                                                                                               |
| Max S/N Ration                   | 38.3 dB                                                                                                                                                                              |
| Dynamic Range                    | 64.6 dB                                                                                                                                                                              |
| Sensitivity                      | 1900 mV/Lux-sec                                                                                                                                                                      |
| Baseline                         | 12cm (4.72 in)                                                                                                                                                                       |

## Sensors API

You can access these sensors and acquire sensor data by using the **Sensors API**.



## Motion/Environmental Sensors

### Temperature Sensors

|                           |               |
|---------------------------|---------------|
| Temperature Range         | -40 to 125 °C |
| Abs. Temperature Accuracy | +/-0.5 °C     |
| Output Data Rate          | 25 Hz         |

### Inertial Measurement Unit

|                             |              |
|-----------------------------|--------------|
| Accelerometer Range         | +/- 8G       |
| Accelerometer Resolution    | 0.244 mg     |
| Accelerometer Noise Density | 3.2 mg       |
| Gyroscope Range             | +/- 1000 dps |
| Gyroscope Resolution        | 0.03 dps     |
| Gyroscope Noise Density     | 0.16 dps     |
| Sensitivity Error           | +/- 0.4%     |
| Output Data Rate            | 400 Hz       |

### Magnetometer

|                           |                                      |
|---------------------------|--------------------------------------|
| Magnetic Field Range      | +/- 2500 μT (z)<br>+/- 1300 μT (x,y) |
| Magnetic Field Resolution | 0.3 μT                               |
| Output Data Rate          | 50 Hz                                |

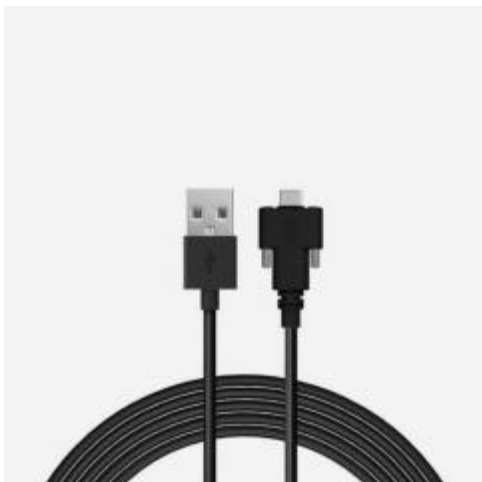
### Barometer

|                            |                 |
|----------------------------|-----------------|
| Pressure Range             | 300 to 1100 hPa |
| Pressure Resolution        | 0.18 Pa         |
| Relative Pressure Accuracy | 0.12 hPa        |
| RMS Noise                  | 0.2 Pa          |
| Output Data Rate           | 25 Hz           |



## ZED 2i | Accessories

### USB 3.0 Dual Screw Locking Cables



For many applications of the ZED 2i, longer distance between the camera and host computer are often needed. This USB 3.0 cable allows you to extend the ZED camera range by up to 10m (32.8ft) without any external power supply.

| Length        | Reference    |
|---------------|--------------|
| 0.3m (0.98ft) | CBLZED2i30   |
| 3m (10ft)     | CBLZED2i300  |
| 5m (16.4ft)   | CBLZED2i500  |
| 10m (32.8ft)  | CBLZED2i1000 |

### Embedded Systems - NVIDIA® Jetson™ powered



The Stereolabs ZED Box is an industrial AI gateway offering powerful edge computing capabilities for autonomous robotics and spatial analytics. Specifically designed to use with the ZED 2 and ZED 2i cameras, it is powered by an NVIDIA® Jetson™ embedded GPU, enabling deployment of state-of-the-art AI and 3D vision solutions.

| Available options               | General Specifications                                                                                                                                        | Reference   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| ZED Box Nvidia Jetson Xavier-NX | NVIDIA® TX2 NX<br>Power: PoE+(30W) or DC-IN 5A 12-48V<br>Aluminum case passively cooled<br>Dimensions: 109 x 92 x 52 mm (LxWxH) / 4.3 x 3.6 x 2.0 inches      | GTWTX2NX256 |
| ZED Box Nvidia Jetson TX2-NX    | NVIDIA® Xavier NX<br>Power : PoE+ (30W) or DC-IN 5A 12-48V<br>Aluminum case passively cooled<br>Dimensions: 109 x 92 x 52 mm (LxWxH) / 4.3 x 3.6 x 2.0 inches | GTWXNX256   |



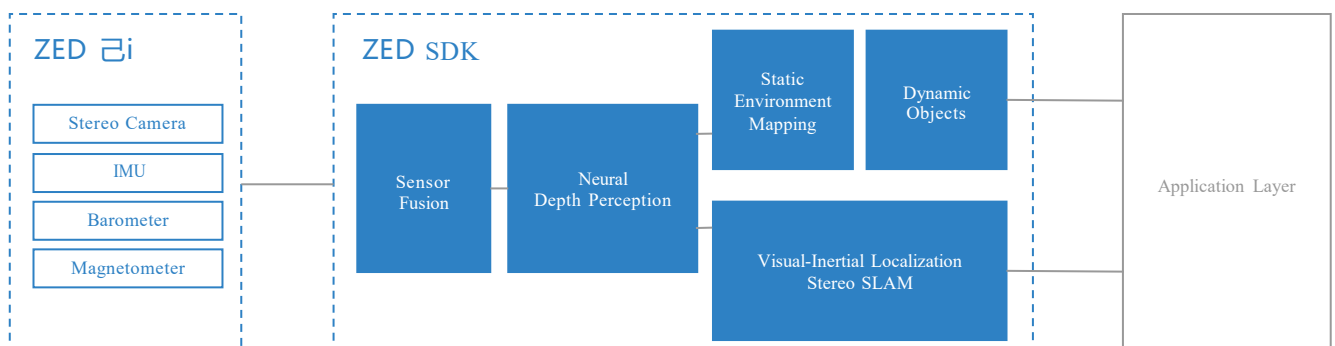
# ZED 2i | ZED SDK

## General SDK Description

### SDK Modules

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stereo Capture      | The ZED 2i is a camera with dual lenses. It captures high-definition 3D video with a wide field of view and outputs two synchronized left and right video streams in side-by-side format on USB 3.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Depth Sensing       | <p><b>Depth Map</b><br/>Depth maps captured by the ZED 2i store a distance value (Z) for each pixel (X, Y) in the image. The distance is expressed in metric units (meters for example) and calculated from the back of the left eye of the camera to the scene object.</p> <p><b>3D Point Cloud</b><br/>Another common way of representing depth information is by a 3-D point cloud. A point cloud can be seen as a depth map in three dimensions. While a depth map only contains the distance or Z information for each pixel, a point cloud is a collection of 3D points (X,Y,Z) that represent the external surface of the scene and can contain color information.</p> |
| Positional Tracking | The ZED 2i uses visual tracking of its surroundings to understand the movement of the user or system holding it. As the camera moves in the real-world, it reports its new position and orientation. This information is called the camera 6DoF pose. Pose information is output at the frame rate of the camera, up to 100 times per second in WVGA mode.                                                                                                                                                                                                                                                                                                                    |
| Spatial Mapping     | The ZED continuously scans its surroundings and creates a 3D map of what it sees. It updates this map as the device moves around and captures new elements in the scene. Since the camera perceives distances beyond the range of traditional RGB-D sensors, it can quickly reconstruct 3D maps of large indoor and outdoor areas.                                                                                                                                                                                                                                                                                                                                            |
| Object Detection    | <p>Object detection is the ability to identify objects present in an image. Thanks to depth sensing and 3D information, the ZED camera is able to provide the 2D and 3D position of the objects in the scene.</p> <p>Since ZED SDK 3.6, a custom detector can be used with the API. The 2D detection are ingested and 3D informations such as position, 3D bounding box and more are computed. More informations in the Custom Detector page</p>                                                                                                                                                                                                                              |
| Body Tracking       | Body tracking module focuses on skeleton bone detection and tracking. A detected bone is represented by its two end points also called keypoints. The ZED camera provides 2D and 3D information for each keypoint as well as local rotation. The ZED SDK supports two body formats: 18 or 34 keypoints.                                                                                                                                                                                                                                                                                                                                                                       |

## Functional SDK Diagram





## ZED 2i | Technical Drawings

