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.

STEREOLABS

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 Mounting options

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

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.

Built-in IMU, Barometer & Magnetometer

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

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.

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 2x (2208x1242) @15fps 2x (1920x1080) @30fps 2x (1280x720) @60fps 2x (662x376) @100fps
Interface	USB Type C - External cable (up to 10m)
Baseline	12cm (4.72 in)
RGB Sensors	Dual 1/3" 4MP CMOS 2688 x 1520 pixels 2µm x 2µm Rolling shutter YUV 4:2:2 - UYV (8bits)
Motion Sensors	Gyroscope, Accelerometer, Magnetometer
Environmental Sensors	Barometer Temperature
Warranty	2-year hardware warranty
In the Box	ZED 2i stereo Camera 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 NVIDIA Compute capability ≥ 3.0 Compatible with: - NVIDIA Jetson Nano - NVIDIA Jetson TX2 - NVIDIA Jetson Xavier
CPU	Dual-core≥2.4GHz processor Minimum 4GB RAM
OS	Windows 10 - 64bit Ubuntu 16.04/18.04 - 64 bit Debian 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 increase image quality.

4mm

If you need increased 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 increases color depth and quality as well.

ZED 2i Available models

Specifications	ZED 2i 2.1mm w/o Polarizer	ZED 2i 2.1mm with Polarizer	ZED 2i 4mm w/o Polarizer	ZED 2i 4mm 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 (1 to 65.6ft)		1.5 m to 35 m (4.9 to 115ft)	
Depth Accuracy	< 1% up to 3m < 5% up to 15m		< 2% up to 10m < 7% up to 30m	
Object Detection	Up to 20m (3D) Up to 40m (2D)		Up to 35m (3D) 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 (Syde by Syde)

2x (2208x1242) @15fps - cropping mode
2x(1920x1080) @15/30fps - cropping mode
2x (1280x720) @15/30/60fps - binning 2x2 mode
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

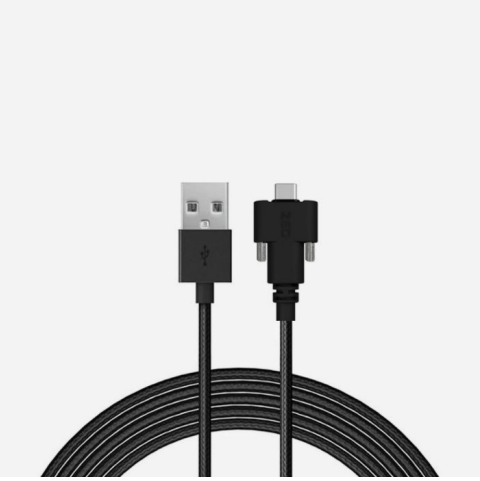
Temperature Sensors	
Temperature Range	-40 to 125 °C
Abs. Temperature Accuracy	+/-0.5 °C
Output Data Rate	25 Hz

Inertial Measurement Unit	
Accelerometer Range	+/- 8G
Accelerometer Resolution	0.244 mg
Accelerometer Noise Density	3.2 mg
Gyroscope Range	+/- 100 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) +/- 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

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.

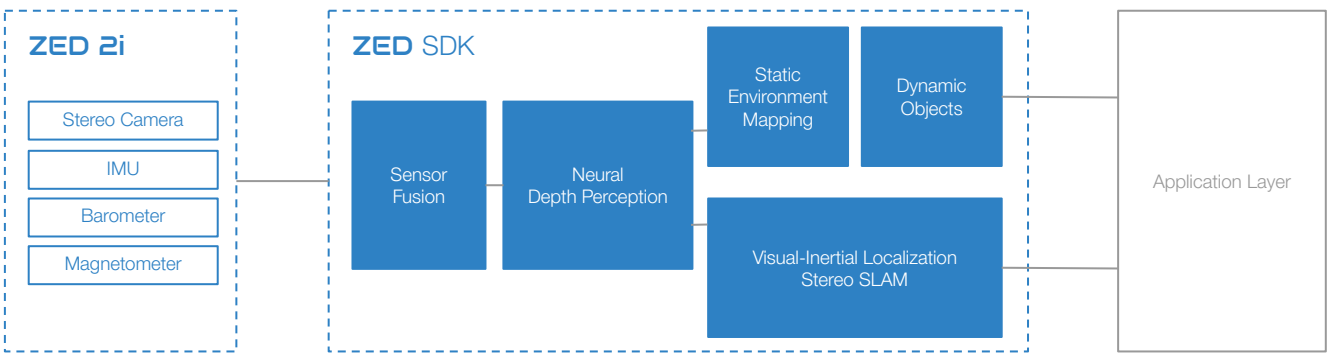
Available options	General Specifications	Reference
ZED Box Nvidia Jetson Xavier-NX	NVIDIA® TX2 NX Power: PoE+(30W) or DC-IN 5A 12-48V Aluminum case passively cooled Dimensions: 109 x 92 x 52 mm (LxWxH) / 4.3 x 3.6 x 2.0 inches	GTWTX2NX256
ZED Box Nvidia Jetson TX2-NX	NVIDIA® Xavier NX Power : PoE+ (30W)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

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	Depth Map 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. 3D Point Cloud 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.
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	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. 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
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 Drawing