Intel D455

Intel RealSense D455 Depth Camera User Manual

Model: D455

1. Product Overview

The Intel RealSense D455 Depth Camera is an advanced stereo camera designed for various applications requiring accurate depth perception. It features an extended baseline for improved depth accuracy, a global shutter RGB sensor matched to the depth field of view, and an integrated Inertial Measurement Unit (IMU) for enhanced environmental awareness.

Key Features:

- **Extended Range:** The D455 features a 95 mm baseline, improving depth error to less than 2% at 4 meters.
- **Matched RGB and Depth FOV:** The RGB sensor includes a global shutter and is matched to the depth Field of View (FOV), both having an 86° FOV.
- **Integrated IMU:** An internal IMU refines depth awareness, particularly useful in applications where the camera is in motion, such as robotics and drones.
- **High Resolution and Frame Rate:** Supports a maximum video resolution of 1280 x 800 at 90 frames per second.
- **USB 3.1 Connectivity:** Utilizes a USB 3.1 host interface for high-speed data transfer.
- **On-chip Self-Calibration:** The Intel RealSense SDK 2.0 provides an on-chip self-calibration option, allowing calibration in under 15 seconds without specialized targets.
- **Cross-Platform SDK:** Compatible with Windows, Linux, Android, and macOS, with wrappers for various platforms, languages, and engines.

Figure 1: Front view of the Intel RealSense D455 Depth Camera, showing the stereo depth sensors and RGB camera.

2. Setup and Installation

2.1 Package Contents

Verify that your package contains the Intel RealSense D455 Depth Camera and a compatible USB 3.1 cable.

2.2 System Requirements

- Operating System: Windows, Linux, Android, or macOS.
- Processor: Intel Core i5/i7 equivalent or higher recommended.
- RAM: 8 GB or more recommended.
- USB Port: Available USB 3.1 (Type-C or Type-A with adapter) port.

2.3 Connecting the Camera

1. **Connect USB Cable:** Plug one end of the USB 3.1 cable into the USB-C port on the Intel RealSense

D455 camera.

2. **Connect to Computer:** Plug the other end of the USB 3.1 cable into an available USB 3.1 port on your computer. Ensure it is a USB 3.1 port for optimal performance.
3. **Power On:** The camera will draw power directly from the USB connection. No external power supply is typically required.

2.4 Software Installation

To utilize the full capabilities of the D455, install the Intel RealSense SDK 2.0.

1. **Download SDK:** Visit the official Intel RealSense website (www.intelrealsense.com/sdk-2/) to download the latest version of the Intel RealSense SDK 2.0 for your operating system.
2. **Install SDK:** Follow the on-screen instructions to install the SDK. This typically includes drivers and development tools.
3. **Verify Installation:** After installation, run the RealSense Viewer application (included with the SDK) to confirm that the camera is detected and streaming data correctly.

3. Operating the Camera

3.1 Basic Operation with RealSense Viewer

The RealSense Viewer is a graphical tool provided with the SDK for testing and visualizing camera streams.

1. **Launch Viewer:** Open the Intel RealSense Viewer application.
2. **Select Device:** Your D455 camera should appear in the "Connected Devices" panel. Select it.
3. **Enable Streams:** In the "Stereo Module" and "RGB Camera" sections, enable the desired streams (e.g., Depth, Infrared, RGB).
4. **Adjust Settings:** You can adjust various parameters such as resolution, frame rate, and exposure settings within the viewer.

3.2 On-Chip Self-Calibration

The D455 supports on-chip self-calibration to maintain depth accuracy over time.

1. **Access Calibration:** Within the RealSense Viewer, navigate to the calibration section or use the SDK's API for calibration.
2. **Follow Prompts:** The software will guide you through the calibration process, which typically involves pointing the camera at a flat, textured surface.
3. **Completion:** Calibration usually takes less than 15 seconds.

3.3 Integration with Applications

The Intel RealSense SDK 2.0 provides APIs and wrappers for integrating the D455 into custom applications using languages like C++, Python, and C#, and platforms such as ROS, Unity, and Unreal Engine.

- Refer to the official Intel RealSense SDK documentation for detailed programming guides and examples.
- Explore the librealsense GitHub repository for open-source examples and community support.

4. Maintenance and Care

4.1 Cleaning the Camera

- **Lenses:** Gently wipe the camera lenses with a soft, lint-free cloth. For stubborn smudges, use a lens cleaning solution designed for optical surfaces. Avoid abrasive materials or harsh chemicals.
- **Body:** Clean the camera body with a dry or slightly damp soft cloth.

4.2 Storage

When not in use, store the D455 camera in a clean, dry environment, away from direct sunlight and extreme temperatures. Protect the lenses from scratches.

4.3 Firmware Updates

Regularly check for firmware updates through the Intel RealSense SDK. Firmware updates can improve performance, add features, and resolve issues. Follow the SDK's instructions carefully when performing updates.

5. Troubleshooting

5.1 Camera Not Detected

- **Check USB Connection:** Ensure the USB 3.1 cable is securely connected to both the camera and a compatible USB 3.1 port on your computer. Try a different USB 3.1 port or cable.
- **Restart Computer:** A simple restart can often resolve connectivity issues.
- **Reinstall Drivers/SDK:** If the issue persists, try reinstalling the Intel RealSense SDK 2.0, which includes the necessary drivers.
- **Check Device Manager (Windows):** Verify that the camera appears in Device Manager without any error symbols.

5.2 Poor Depth Quality or Image Issues

- **Lighting Conditions:** Ensure adequate and even lighting. Avoid very dark or overly bright environments, and direct sunlight.
- **Surface Texture:** Depth cameras perform best with textured surfaces. Very smooth, reflective, or transparent surfaces can cause issues.
- **Lens Cleanliness:** Clean the camera lenses as described in the Maintenance section.
- **Recalibrate:** Perform an on-chip self-calibration to ensure optimal depth accuracy.
- **Firmware:** Ensure the camera firmware is up to date.

5.3 Software/SDK Issues

- **SDK Version:** Ensure you are using the latest stable version of the Intel RealSense SDK 2.0.
- **System Resources:** Close other demanding applications to free up system resources.
- **Community Support:** For complex software issues, consult the Intel RealSense community forums or GitHub repository for solutions and support.

6. Technical Specifications

Feature	Specification
Model Number	82635DSD455
Maximum Video Resolution	1280 x 800
Maximum Frame Rate	90 fps
Host Interface	USB 3.1
Product Dimensions (L x W x H)	4 x 1 x 1.1 inches (101.6 x 25.4 x 27.94 mm)
Item Weight	13.4 ounces (379.9 grams)
Depth Sensor Baseline	95 mm
Field of View (FOV)	86° (Depth and RGB)
Integrated Components	IMU (Inertial Measurement Unit)
Manufacturer	Intel

7. Warranty and Support

7.1 Warranty Information

The Intel RealSense D455 Depth Camera is manufactured by Intel. For specific warranty terms and conditions, please refer to the official Intel warranty documentation provided with your product or visit the Intel support website. Warranty coverage typically includes defects in materials and workmanship under normal use.

7.2 Technical Support

For technical assistance, software downloads, documentation, and community forums, please visit the official Intel RealSense support page:

Intel RealSense Developer Website

This resource provides comprehensive information, FAQs, and contact options for support related to your D455 camera.