

Camera SDK

A Camera SDK is a set of pre-built software tools, libraries, and APIs that allow developers to integrate camera functionalities directly into their apps. We all know that camera hardware can have huge differences among different devices, depending on their manufacturer, cost and internal architecture. This can make the implementation of camera features a complex process since it demands in-depth knowledge of native APIs and the ability to overcome or workaround device-specific issues.

Therefore, using SDKs for cameras can make this process easier by becoming a layer between the app and the hardware and offering easy access and control over camera features. By using SDKs, companies can save important resources like time, developer hours and ultimately money.

The choice of an SDK is highly dependent on the target application:

1. **Consumer/Prosumer Photography:** Canon and Sony SDKs are ideal for tethered shooting, remote control, and automation.
2. **Industrial/Machine Vision:** Basler's pylon SDK is the industry standard, offering high performance, multi-camera support, and compliance with industry-specific protocols like GenICam.
3. **Broad-based Imaging Applications:** LEADTOOLS offers a comprehensive, general-purpose toolkit with a wide range of features beyond basic camera control, including advanced image processing, OCR, and medical imaging.

I. Consumer/Prosumer Camera SDKs

These SDKs are designed for integration with consumer-grade DSLR, mirrorless, and compact cameras, primarily for photography and videography applications.

Canon Camera SDK: Canon provides two primary SDKs for developers: the older EOS Digital Software Development Kit (EDSDK) and the newer Camera Control API (CCAPI).

1. Functionality:

- a. EDSDK: A C-based SDK for tethered control via USB. It provides robust functions for remote live view, taking photos/videos, changing camera settings (shutter speed, aperture, ISO), and transferring files to a computer. It is well-established and supports a wide range of older and newer camera models.
- b. CCAPI: A modern, cross-platform HTTP-based REST API that enables wireless control of Wi-Fi-enabled cameras. It allows for similar functionality to EDSDK but over a network, making it suitable for applications on various operating systems, including mobile.

2. Integration Capabilities & Ease of Use:

- a. EDSDK: Requires a USB connection and is primarily used for desktop applications on Windows and macOS. Its C-based nature may require more boilerplate code.
- b. CCAPI: The RESTful nature makes it very easy to integrate with any programming language or platform that can make HTTP requests, simplifying cross-platform development.

3. Limitations:

- a. EDSK: Limited to USB connectivity, making wireless applications impossible.
- b. CCAPI: The wireless nature introduces potential latency and slower file transfer speeds, especially for high-volume data like RAW images or for multi-camera rigs in photogrammetry. Neither SDK provides access to the camera's shutter count, a common developer request.

II. Industrial/Machine Vision Camera SDKs

These SDKs are designed for high-performance, real-time applications in fields like manufacturing, robotics, and quality control.

Basler pylon Software Suite

Basler is a leading provider of industrial cameras, and its pylon suite is an all-in-one software package for camera integration and control.

1. Functionality:

- a. Adheres to the **GenICam** and **GigE Vision** standards, ensuring interoperability across a wide range of compliant cameras, not just Basler's own.
- b. Provides powerful features for multi-camera synchronization, high-speed image capture, and real-time processing.
- c. Includes a visual tool called pylon Viewer for camera setup and testing, and a pylon vTools library for low-code/no-code image processing.
- d. Supports advanced vision tasks with pylon AI for deep learning.

2. Integration Capabilities & Ease of Use:

- a. Provides SDKs for C, C++, .NET/C#, and Python, making it accessible for a variety of development environments.
- b. The GenICam standard simplifies integration by providing a unified API for different camera brands.
- c. The vTools library significantly reduces development time for common image processing tasks.

3. Limitations:

- a. Primarily focused on the industrial market, making it less suitable for consumer-grade applications.
- b. Performance and data integrity can be affected by specific hardware configurations, which is a known issue documented by the vendor.

III. Comprehensive Imaging & Vision Toolkits

These are not limited to a single camera brand but provide a broad set of tools for a wide range of imaging tasks.

LEADTOOLS Imaging SDK

LEADTOOLS is a highly mature and comprehensive SDK for developers building imaging, document, medical, and multimedia applications.

1. Functionality:

- a. Provides a massive toolkit with over 200 image processing functions, support for more than 150 file formats, and advanced features like OCR, DICOM (medical imaging), and barcode recognition.

- b. The SDK includes robust camera-related features such as support for TWAIN/WIA scanning and screen capture.

2. Integration Capabilities & Ease of Use:

- a. Offers a modular architecture, allowing developers to purchase only the toolkits they need.
- b. Supports a vast number of platforms, including .NET, C++, Java, and web (HTML5/JavaScript), making it highly versatile.
- c. Known for its extensive documentation and responsive technical support.

3. Limitations:

- a. As a comprehensive, professional-grade toolkit, LEADTOOLS can have a high licensing cost compared to brand-specific, free SDKs.
- b. Its broad feature set may be overkill for simple camera control tasks.