APPLICATION NOTE

Embedded ARM Systems

A guide to the use and support of embedded platforms using ARM based processors

APPLICATION & PLATFORM SUPPORT USING LUMENERA CAMERAS

Lumenera is a leading industrial camera manufacturer providing solutions to numerous industries. Over the last few years, there has been a significant increase in the availability, performance, and support of embedded platforms using ARM based processors, largely driven by advances in portable electronic devices such as tablets, smartphones, wearables and IoT devices.

SUITABLE APPLICATIONS

Embedded ARM systems lend themselves very well to applications that are size and power constrained, and do not require significant computing power. Common applications include Unmanned Aerial Vehicles (UAV), ITS (Tolling, red light and speed enforcement), security and surveillance applications, as well as all-in-one purpose built systems such as label validation.

UAV Example

Embedded systems with Lumenera cameras can be used for reliable image acquisition and storage to non-volatile memory. Depending on the resolution and frame rate, ARM-based UAV systems can convert RAW images to high quality image files ready for processing upon the UAV's return. Alternatively, the system can send a periodic downsampled or compressed image to the ground station for validation. More intensive image processing, such as image stitching, inspection, or creating normalized difference vegetation index (NDVI) images will require post processing after flight operations are concluded.

ITS Example

Embedded systems, in conjunction with Lumenera cameras, can be used in ITS applications to trigger the camera using two methods. The first, using a software trigger, allows for the configuration, analysis and evidence retention of rules violations such as such as red light violation, or intersection encroachment. Alternatively, existing hardware can trigger the camera, such as the case of a radar detector for speed enforcement. In addition, both of these triggering mechanisms can be used simultaneously to allow for a multi-use approach to the ITS system. The embedded system can also post-process the image to overlay metadata including GPS data, vehicle speed, and timestamp. Depending on the camera's resolution and frequency of violations or inspections, the system can perform ALPR (Automated License Plate Recognition) with software such as OpenALPR, which provides compressed images that are enforceable to a processing center. This strategy is beneficial for locations that rely on low bandwidth cellular data connections.

SOFTWARE DEVELOPMENT KIT

Lumenera developed the Linux 2.1 SDK specifically targeting Linux ARM systems. The SDK is compatible to the Linux x86 SDK and cross-functional to the Windows SDK allowing customers to create common code between platforms.

PLATFORMS

Given the wide range of SBC (Single Board Computer), SoC (System on Chip), and different available versions of Linux, Lumenera has focused its attention on supporting the following popular configurations:

- Raspberry Pi 2/3 (Ubuntu 12.04.05 LTS or 14.04.02 LTS)
- NVidia Jetson TK1 (Ubuntu 12.04.05 LTS or 14.04.02 LTS)
- ODroid XU3/4 (Ubuntu 12.04.05 LTS or 14.04.02 LTS)
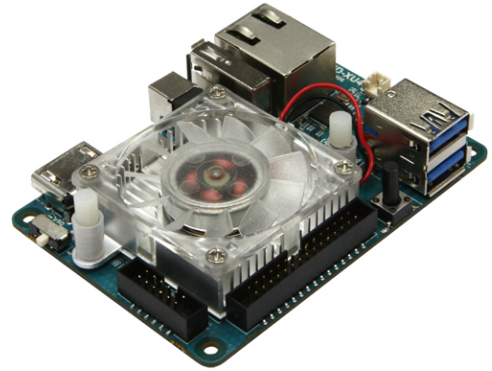
NOTE:
- Raspberry Pi does not have USB 3.0 ports and has limited processing power.
- All three SBC's are readily available, work well for integration and as small system deployments.
- For larger deployments or systems requiring specialized environmental or long-term availability, other industrial grade SBC's or COM/SOM devices should be considered.

SUPPORTED CAMERAS

Camera models that have been tested under the ARM-specific version of the SDK and are officially supported include our Lt USB 3.0 cameras (Lt225, Lt425, Lt365R, Lt665R, Lt965R, Lt1265R, Lt16059H). Most of our USB 2.0 models such as the Lw and Lm series of cameras are compatible with the SDK and specific functions can be supported on a case-by-case basis.

FOR ADDITIONAL INFORMATION

For additional information and for assistance with your embedded vision system, please contact a Lumenera sales representative: info@lumenera.com