Evaluation of Halcon and VPAR on Linux with an Atom Motherboard
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Introduction

Usually the 3rd party software platforms Halcon from MVTec, and VPAR from Neural Labs run on a Windows based PC, to which one or more cameras are connected. The following white paper shows how to run Halcon and a VPAR application (license plate recognition software) on an Atom based motherboard running Linux. In each application, The Imaging Source cameras capture images via either their V4L2 or GigE Vision interface.
System Characteristics

The PC board features the following components:

- MIO-2261 Intel Atom N2600/ N2800 Pico-ITX SBC
- CPU: Intel Atom Dual Core 1.6 Ghz (N2600)
- System chipset: Intel Atom N2600/ N2800 + NM10
- System memory: 4 GB, 1x 204-pin SODIMM socket DDR3 800 Mhz
- L2 cache: 1 MB on die
- BIOS: AMI EFI 16 Mbit Flash ROM
- Watchdog timer: 255 level interval timer
- Battery: Lithium 3 V/210 mAh
- Serial ATA: One SATA II interface, up to 300 MB/s
- USB: Four USB 2.0 compliant ports
- Audio: High definition audio (HD), line-in, line-out
- GPIO: 8-bit general purpose input/output
- Expansion interface: Half size Mini PCIe, MIOe
- VGA: Up to 1920 x 1200 (WUXGA)
- LVDS: Single channel 18/24-bit LVDS, up to 1366 x 768 (WXGA)
- Ethernet: Intel 82583V (GbE1), single 10/100/1000 Mbps interface
- Dimensions: 100 x 72 mm (3.9” x 2.8”)
- Power requirement: Single 12 V DC Power input
- Power consumption: 0.76 A @ 12 V (9.12 W)
The motherboard runs Ubuntu 14.04 LTS, which has been installed on a 32 GB ScanDisk memory stick. The installation was performed on a Windows system, using the “Linux Live USB Creator” software. As the USB stick has a write speed of 10 MB/s, and a read speed of 30 MB/s, more than sufficient performance is available for the task at hand. On the contrary, the graphics output (GUI) is slow.
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The NEURALLABS VPAR application allows vehicle registration plates to be read from either images on disk, or from a live video stream. For the latter purpose, a sample application was implemented, using the 'Simple' coding sample included with the 'tiscamera' package.

The following image demonstrates the recognition of two vehicle registration plates in one image (e.g. from two lanes). The camera image on the top left, which was captured with a DMK 72AUC02, is processed continuously by an application, which feeds each captured image into the VPAR library, and which subsequently prints found characters to the terminal window, along side runtime information on the right:

The runtime information reports that two vehicle license plate could be read in about one second. In the case of there being only one license plate in the image, the resulting processing time is about half a second. Similarly, it is possible to use a reduced ROI of 640 x 480 and read one vehicle license plate within half a second.
In the following figure, Halcon version 11.0.3.1 has been installed along with some sample images. The GUI is almost identical to the Windows version. When opening a GigE camera with the Image Acquisition Assistant, or by using a script, the screen looks as follows:
Halcon samples can be started as usual and run same as on Windows:
The following figures for barcode reading were captured using Halcon and a DMK 23GP031, set to VGA resolution, running on a Linux system. The results represent the average of 100 loops, comprising image acquisition and barcode reading. They were then compared to the same setup on an i7 3.4 GHz PC, running Windows 8.

Barcode 'Code 128' on a PC board with Linux
When reading an unknown barcode type, the runtime is 100 ms:

Barcode 'auto 128' on a PC board with Linux
An unknown barcode is analyzed and the barcode read in sync with image acquisition (8 ms / 120 fps):

Reference: Barcode 'auto' on an i7 / 3.4 Ghz platform running Windows 8
The 3D positions of widgets can be determined based on Halcon's comprehensive 3D capabilities. In the following example, the position of five widgets is found in 885 ms:
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