EMBEDDED VISION: Real time target tracking algorithm

Polytech'Clermont-Ferrand, a French Engineering school, ran a university project in partnership with Sundance. The main work was focused on building a standalone embedded system based on the Sundance advanced video system: SMT8039.

This system is able to detect a person or an object in a public area from a video camera input. The application executes a tracking algorithm in real time. The targets are identified by a cross and a rectangular frame. The processing is implemented on the Texas Instruments DM642 DSP and the Xilinx Virtex-4 FX60 FPGA.

The embedded application was designed with the 3L Diamond software to give best performance. The algorithm is split into four DSP software tasks and the frame-grabbing is done in the FPGA firmware:

- *Acquire the current image and store it into a buffer,*
- *Subtract every pixel of the current image from every pixel of the first image (stored at the beginning of the process),*
- *Compare each result with a threshold to get a black and white image. So the moving objects will be illustrated in black.*
- *Calculate the barycentre of all the black points, and display the result on a console screen with a cross and a rectangle around the person.*

Typical video applications illustrated by this concept are:

- *Human and object detection, recognition and identification,*
- *Person or object counting,*
- *Traffic monitoring,*
- *Security and Surveillance IP Cameras…*

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