

INO uses SBC6x in Smart Laser Profiler (SLP)

To meet industry's diverse 3D inspection needs, the National Optics Institute (INO) of Quebec, Canada, has developed a line of smart, modular 3D laser profilers. These 3D sensors were designed for the inspection and measurement of fast moving objects or materials in web-type applications. The Smart Laser Profilers (SLP) are capable of acquiring 350 full 3D profiles per second.

The SLPs are composed of a laser line projector, collection optics, a high frame rate digital camera and an SBC6x Stand-Alone DSP board. A laser line is projected on the profile to be inspected. The camera is oriented at a slight offset angle from the light source and captures the light reflected by the object. The shape of that line, viewed at an angle, is a direct representation of the object topology in this direction. Set-up is repeated at different angles around the object and the full shape of the object is measured by integrating the successive 3D profiles. The speed and flexibility of the DSP is the key to this technology as it can quickly translate simple 2D line profile images into an accurate 3D characterization. The SLP has several pre-programmed functions on the DSP that implement basic shape algorithms for tasks like volume measurement or shape conformance checking. For complex analysis the DSP can transfer the raw 3D profiles to a PC via a USB link.



Innovative Integration's SBC6x boards were selected by INO because they integrate all the critical functions required for the system on a powerful stand-alone controller:

- FIFOPort to receive data asynchronously from the digital camera
- Digital I/O to synchronize camera control and simultaneous multi-axes image capture that can be synchronized to an external source
- USB port to communicate with laptop during development and "teach" sequence
- Flash EEPROM for self-booting
- C6701 DSP processor for fast, dedicated math processing allowing sub-pixel resolution

The FIFOPort is an elegant, versatile interface to port data bi-directionally to/from the DSP board. In the SLP case, the FIFOPort is used to receive data from the digital camera. The camera output controller writes data to the SBC6x receiving FIFO, using its own clock to "strobe" the FIFO buffer. The almost full flag of the FIFO enables an interrupt of the DSP to drain the data from the FIFO to the SDRAM with the assistance of a DMA channel at a mean transfer rate of 37 MBytes per second. The external hardware (in this case the camera) can work completely asynchronously from the DSP board timebase.

For this demanding video co-processing application, the dedicated DSP provides superior performance and flexibility compared to a PC-based frame grabber solution. With a 3U stand-alone format, the SBC6x contains all the functions required in a very affordable package. Full flexibility is maintained for development under USB communication and reliable, self-contained operation is delivered, tether-free, in industrial environments.

