ARGON360

Hardware-based real time video stitching

What it is:
- High quality video stitching
- Real time
- Compact
- Low power consumption
- Scalable for number of sensors and resolution
- IP core for chip or FPGA

What it's for:
- 360° camera products
- Live streaming
- Live preview
- 360° stitching for existing multi-camera rigs

The prominence of 360° video (immersive video, Cinematic VR) is increasing with users at all levels from consumer to film studio. Stitching of video output from multiple sensors is key to creating 360° content. Real-time stitching is a requirement for applications such as live streaming of sporting events or news, and will increasingly be in demand for consumer products, where users will expect a single output file, simple workflow and real-time 360° streaming. Until now there has been a choice between speed and quality. Currently available real-time stitching techniques typically achieve a basic level of stitching. Post-production tools can produce excellent results, at the cost of time and effort of skilled operators.

Argon360 offers the best of both worlds, implementing its sophisticated stitching and blending of high resolution video using custom-designed hardware logic in a compact package with low power consumption.

Argon Design's patent pending **Argon360** technology is available as an IP core building block for incorporation into an ASIC, offering ultimate performance for volume produced products. It is also available for an FPGA implementation, suitable for lower volume products.

Real-time

A fundamental design feature of **Argon360** is that it operates at video frame rate with very low latency between the incoming video from the sensors and the outgoing stitched video. This makes possible applications such as 360° streaming for immersive social media interaction using consumer devices, and high quality live panoramic coverage offering the viewer a front row seat for sports, concerts and news.

High quality

Argon360 uses multiband blending techniques to avoid visual discontinuities whilst still preserving detail across a stitch line. Depth dependent parallax correction is under development. This will mitigate artefacts that can occur when objects near the camera span a stitching seam.

Scalable

Argon360 technology is designed to be scalable, so whether you have two sensors or many, or your resolution is for a consumer product or professional quality, **Argon360** can be configured to meet your needs.

Specifications

Key Technical Characteristics

- Tile based design easily adaptable to different numbers of sensors, camera configurations, input resolution and output resolution

- Uses a combination of internal memory for caches, line buffers and data tables and external memory for frame buffers

- Processing performed in a stream fashion wherever possible to minimise memory requirements

- 10-bit RGB input/output

- Performance is set by external memory bandwidth and silicon area (number of parallel blocks used for key stages)
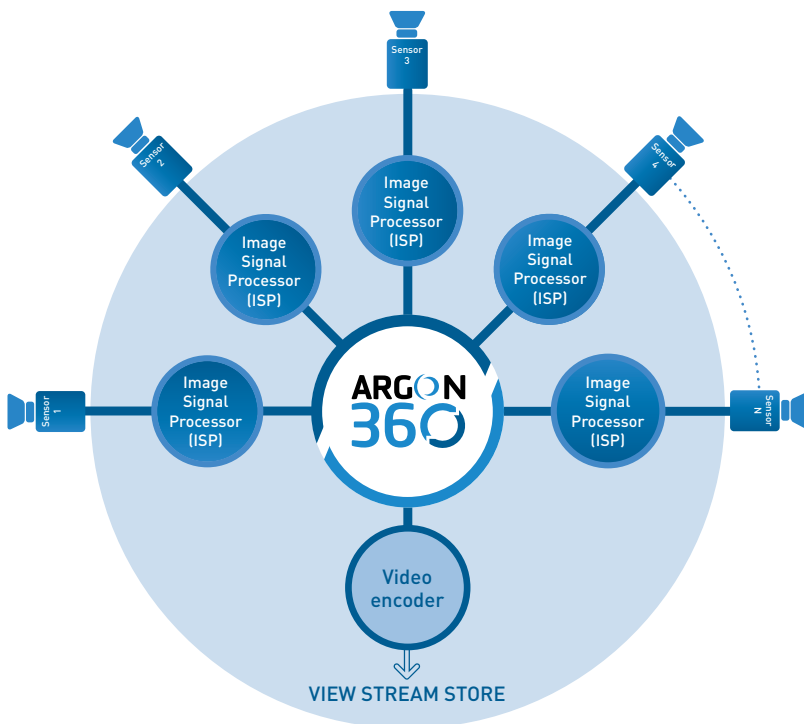
Example Arrangement for 6 Sensor Camera

Input format	10-bit RGB in external memory
Input resolution	1440 x 1080 per sensor
Input frame rate	30fps
Number of input channels	6
Output format	10-bit RGB streamed data
Output resolution	3840 x 1920
Output frame rate	30fps
Controllable parameters	Input sensor calibration Output projection type Output projection orientation and zoom Output resolution
Output projection types	Equirectangular Rectilinear Azimuthal

FPGA Implementation

FPGA	Xilinx Kintex UltraScale XCKU115-2FLVA1517
Clock rate	200MHz
LUTs (K), Register blocks (K), DSPs	140, 165, 530
Block RAM (Mb)	10
External memory bandwidth	8.6Gbyte/s (Dual 64-bit 800MHz DDR4 buses)

ASIC Implementation (estimate)

TSMC 28nm	2.9mm^2

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