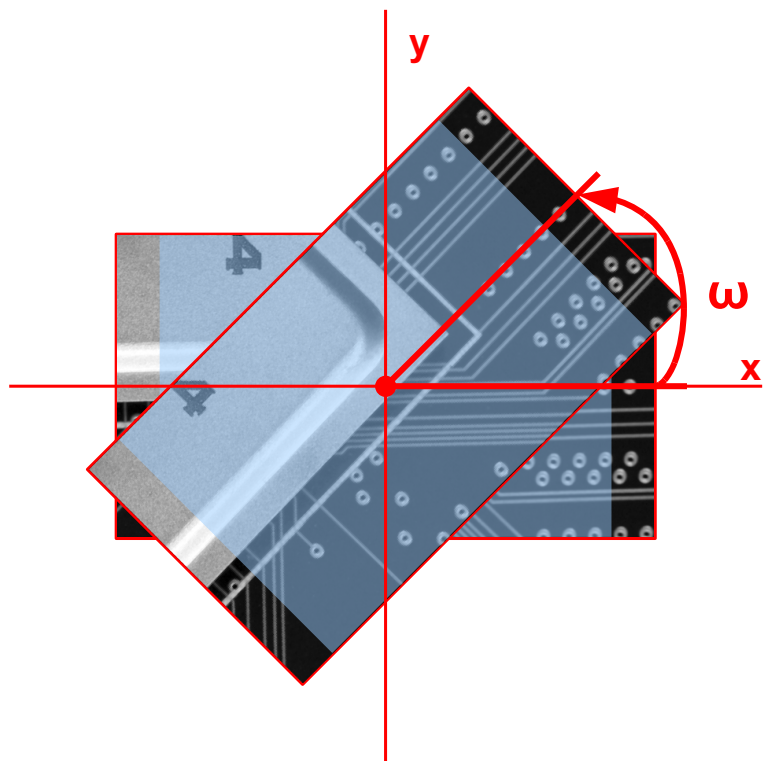


IV-ROT Picture Rotation

Features:

- Free programmable full picture rotation (0-360°)
- Resolution up to 2048x2048
- 1pixel per clock throughput
- Programmable Angle
 - $\Delta\omega = 0.022^\circ$
- Programmable Base
 - $x/y = 1\text{pix}$
- Cropping option selectable
- Padding options
- Rotation Shape
 - Rectangular
 - others (opt.)
- Bandwidth efficient architecture
- Low processing delay
 - ~1 Frame



Applications

Industrial

Medical

Automotive

Overview:

The IV-ROT IP implements a full rotation (0-360°) algorithm for high resolution images like HD (1920x1080p30/ 1920x1080p60). The maximum resolution is 2048x2048.

The throughput of the design is 1 pixel per cycle on 3 components 8bit each (e.g. RGB or YUV444). The rotation process requires about 1 frame delay through external SDRAM/DDR. The picture content can be interlaced or progressive. De-interlacing is recommended (iv-deint)

Programmable parameters are:

- pictures size xy
- rotation base xy
- rotation angle $\Delta\omega$
- rotation size xy

Program parameters changes are applied during vertical blanking. The algorithm requires about 3 full frame storage. Rotation starts when one full picture is written to memory. Processed pixel are directly displayed.

The design is written in verilog and easily portable to either FPGA or ASIC. It uses generic system interfaces for programming and DMA channels which can be easily adapted to any interface standard.

With the processing speed of 1 pixel per cycles, speed requirements of the design are:

Resolution	MHz
2k 2048x1080p60	134
HD 1920x1080p60	125
UXGA 1600x1200/60	116
WXGA 1280x768/70	69
Prog. PAL 720x576p50	22
Prog. NTSC 720x480p60	22
VGA 640x480/60	19

