Line/Lane Detection

https://github.com/noureddine-as/hw_lane_detection

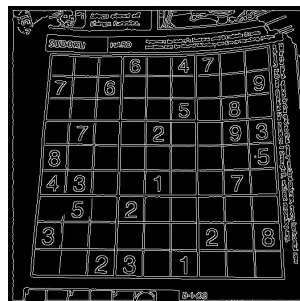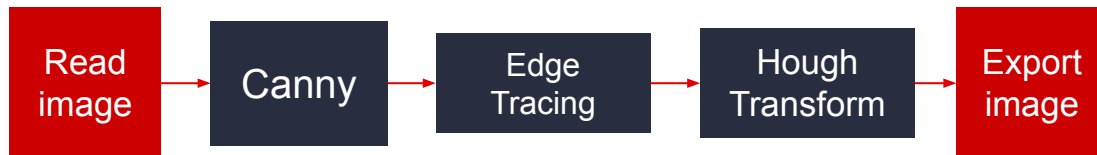**Noureddine Ait Said - Univ. Grenoble Alpes - FR, Ayatallah El Akhras - EPFL - CH ,**

4 Summary

- Start from the edge canny template
- Integrate a SW+HW hough transform implementation for line detection
- 3 separate HW kernels: Canny, Edge tracing, and Houghlines.
- ~~Tried to combine 2/3 kernels~~

- HW/SW integration in FPGA
- Functional validation (in software simulation)
- Reusing existing xfOpenCV blocks
- Difficulties:
  - xf::cv:: Vs. cv:: / interfacing different HW kernels
  - HW debugging (matrices dimensions, interfaces..)

4 Block diagram / Results `SW` `HW`

```
Read image → Canny → Edge Tracing → Hough Transform → Export image
```


4 Results **(HW build took 7h:59m:4s.523ms)**

	Latency (ns)	BRAM	DSP	FF	LUT
Canny	2.343E6	22	8	12714	17665
Edge Tracing	3.149E6	30	8	5394	12389
Hough Transform	**1.794E6**	**187**	**11**	**64387**	**1849111**

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