Temporal Mapping and Temporal Prediction based Ultra-low Delay Object Tracking Computing Architecture for Visual Feedback System

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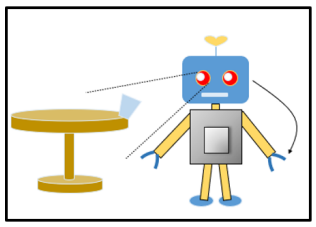
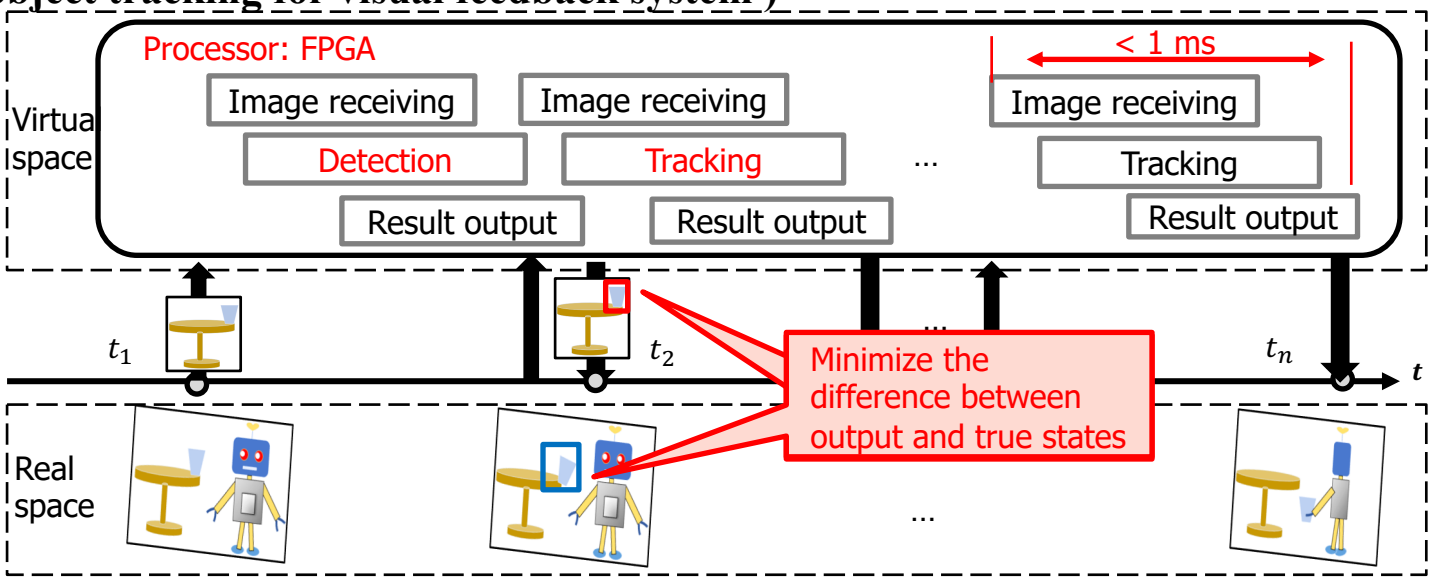
➢ Background (1-ms object tracking for visual feedback system)

Application case in robotics



Falling glass picking



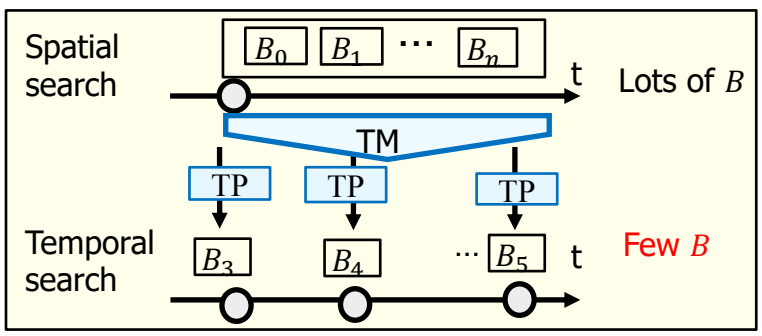
➢ Proposals

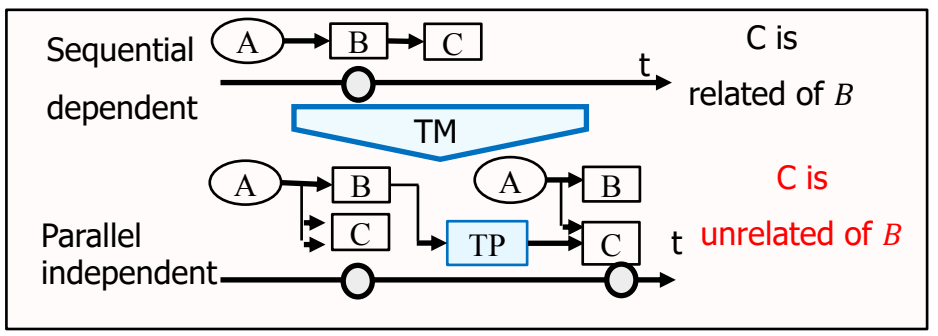
Temporal mapping (TM) ✖ Temporal prediction (TP)

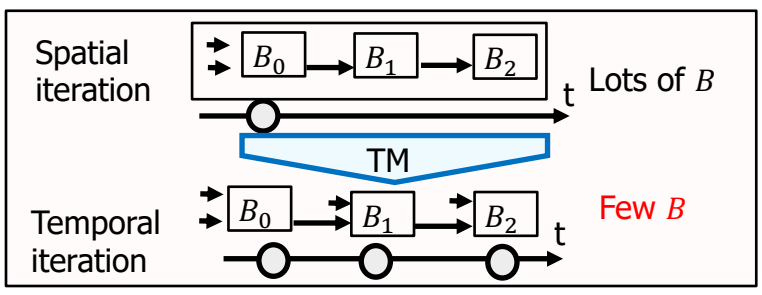
□ :Detection

□ :Tracking

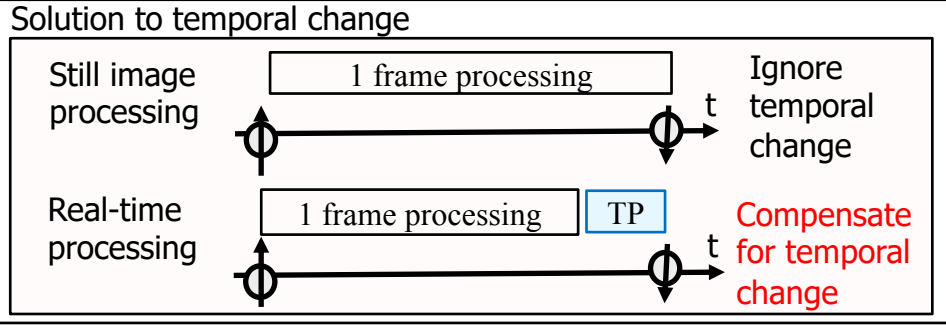
Solutions to complex spatial processing





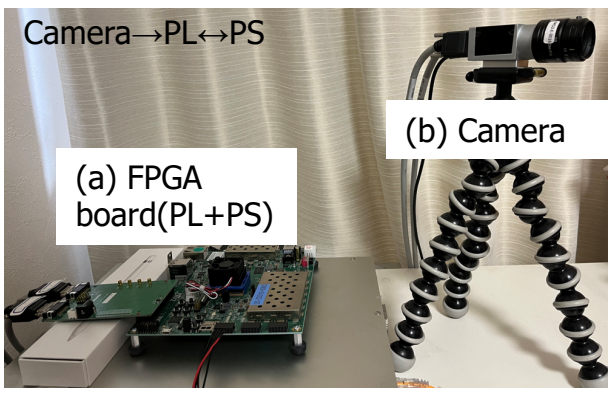


Solution to temporal change



➢ Experiment Result

Item		Detection core	Tracking core
Logic utilization	# of LUT	167,938	54,595
	# of FF	139,486	78,493
	# of BRAM	45	247
	# of DSP	36	373
Speed	Frequency (MHz)	100	200
	Process time(ms/frame)	0.97 (<1)	0.94 (<1)



(a) Xilinx ZYNQ MPSOC ZCU104 / ZCU102
(b) BASLER acA2000-340: 1000 fps, 640x360

➢ Conclusion

The proposed 1-ms object tracking system (includes detection and tracking) highly integrates virtual and real spaces, allowing it to handle changing situations in real space. It plays an important role in FA and robotics applications.

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