CPS: Medium: GOALI: Real-Time Computer Vision in Autonomous Vehicles: Real Fast Isn't Good Enough

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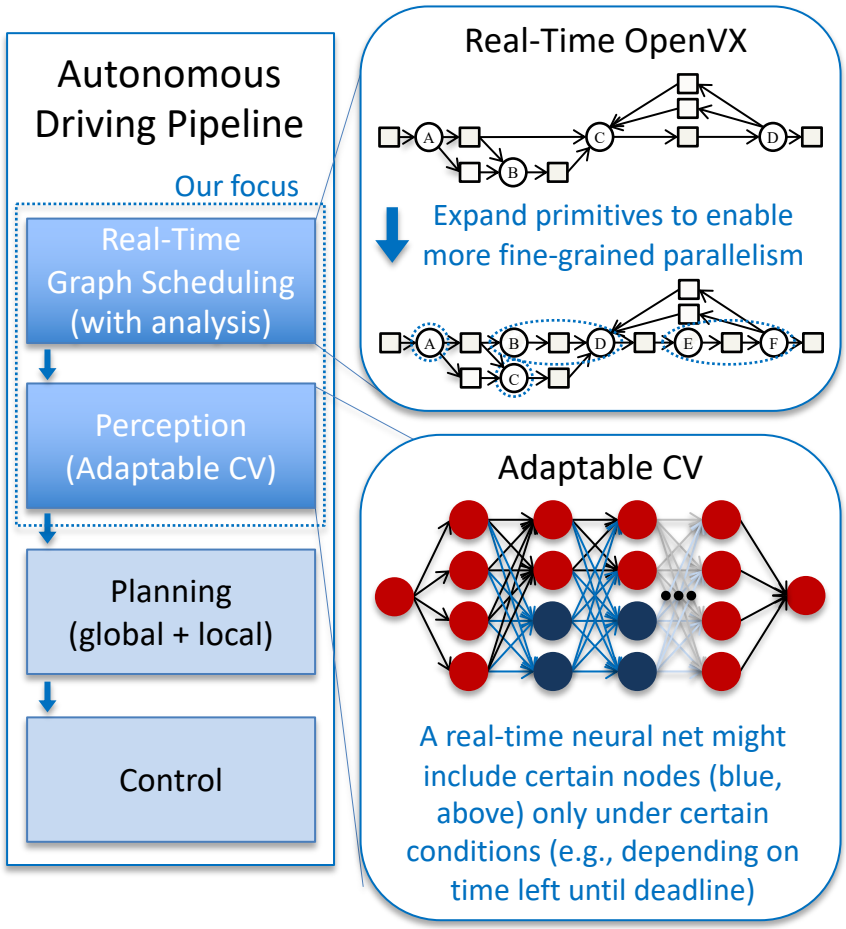
Description

Motivation: Want to bridge a major disconnect affecting autonomous vehicles: *when computer-vision (CV) researchers refer to "real time," they usually mean "real fast"; in contrast, certifiable automotive systems must be "real time" in the sense of being predictable.*

Goals of This Project:

- Develop a real-time-aware CV API, by extending OpenVX.
- Devise real-time schedulability analysis targeting this new API.
- Develop real-time CV algorithms that exploit the new features of this API.



Findings

- OpenVX graphs for CV tracking can have cycles.
- *Not schedulable if cycle utilization exceeds 1.0!*
- **Solution:** Enable partial parallelism in cycle execution.
- With this, graph response-time bounds can be computed [RTSS 2019].