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Title: Architectural support for agile control design in CPS

Abstract: The traditional design setting for control systems, i.e., given a plant and closed-loop performance specification, design a controller which will then run largely unmodified, will not be applicable in cyber-physical systems. Due to the possible dynamic changes to their requirements, structure, composition and interconnection, the boundary between design and run time will blur. These changes will be partly unforeseeable and discrete in nature, such that pre-designed adaptation mechanisms will not suffice to cope with them. Instead, it will be necessary to frequently re-design or re-configure cyber-physical controllers during their lifetime, possibly by the user. Such agile re-design steps need to be supported by the control software architecture. In particular, it must be possible to quickly switch between testing environments and target platforms. We propose abstraction layers as an architectural solution to this problem. The approach will be illustrated by applications in automotive control systems and medical support systems.