CPS: Medium: Quantitative Analysis and Design of Control Networks (NSF CNS-0931239)

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Abstract: Control networks are wireless substrates for industrial automation control, such as the WirelessHART and Honeywell's OneWireless, and have fundamental differences over their sensor network counterparts as they also include actuation and the physical dynamics. The approach of the project is based on using time-triggered communication and computation as a unifying abstraction for understanding control networks. Time-triggered architectures enable the natural integration of communication, computation, and physical aspects of control networks as switched control systems. The time-triggered abstraction will serve for addressing the following interrelated themes: Optimal Schedules via Quantitative Automata; Quantitative Analysis and Design of Control Networks; Wireless Protocols for Optimal Control; Quantitative Trust Management for Control Networks. Our results have been integrated into control networks that are compatible with both WirelessHART and OneWireless specifications.