If the first generation of control systems can be regarded as analog control, and the second generation as digital control, then we may be on the cusp of what could be called the third generation of control systems. Due to the rapid technological changes of the past decade, there is the possibility of deploying distributed control systems consisting of sensors and actuators connected by shared wired or wireless networks, and involving powerful computational nodes as well as software services.

We address the issue of how to facilitate the proliferation of such next generation control systems. We explore the issue of what are the appropriate abstractions and what is the matching architecture for the (re)convergence of control with communication and computation. We propose an abstraction of Virtual Collocation to be manufactured by the supporting middleware. We advocate a principle of local temporal autonomy for enhancing reliability. We provide an overview of efforts in the Convergence Laboratory at the University of Illinois.

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