

The Art of Control System Design

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Foreword - Often in the business of electronic control system design, while the tools of the trade change and shift to meet an ever-accelerating technological landscape, the methodology behind the designs tend to permeate well into the future. Such is the case with semi-custom control system design, which in fact is more effective now than ever before, with the growing prevalence of community-based support and higher focus on powerful development tools by hardware developers. Because the concepts detailed in this paper are as relevant now as they were when this paper was written 20 years ago, it is being republished with only aesthetic revisions as of January 2021.

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The problem is... no two applications should have the exact same control system. Industries, machines, and intended users, are all different and one of the goals of the system designer is to deal with the differences and provide results that are "intuitive". Most control systems address these differences by using "off the shelf" circuit boards and modules that can be configured in different ways. What if the application really needs something that isn't available off the shelf? What if your "vision" and creative inspiration yields a solution that surpasses the current state of the art, but there is no "module" that does what you want?

Architecting a control system for an application is as much an art as a science. Simple applications (i.e. temperature control) require less artistic input, but multi-function applications have complex interactions that must be managed by the control in a consistent, easy to understand manner. This is where artistic vision can have a huge impact and create the illusion of simplicity to something that is inherently complex.

Unfortunately, artistry and engineering rarely come together. Think again about the "off the shelf" control components that are available and you will see that they are all about "function" and "technology". These are critical issues to be sure, but the artist in me says that "how" the control is applied and used, is more important. In other words, the "function" and "technology" should be flexible, and subservient to the "form" of the implementation.

This is one of the fundamental ways that ProductMaker is different from other control systems. The "function" and "technology" have been designed to be virtually invisible to the designer, relieving him of the underlying complexity, yet they remain flexible, allowing him to concentrate on the "form" of the implementation. This is further augmented by the "development platform" nature of ProductMaker whose intended purpose facilitates "custom" packaging thus allowing the designer to "free his mind" beyond the constraints of "off the shelf" components and allowing artistry and creativity to take place.