Simplifying the Migration of Architectures in Embedded Applications Introducing a Pattern Language to Support the Workforce

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Abstract : There are two main architectures used to develop software for modern embedded systems: these can be labelled as "event-triggered" (ET) and "time-triggered" (TT). The research presented in this paper is concerned with the issues involved in migration between these two architectures. Although TT architectures are widely used in safety-critical applications they are less familiar to developers of mainstream embedded systems. The research presented in this paper began from the premise that–for a broad class of systems that have been implemented using an ET architecture–migration to a TT architecture would improve reliability. It may be tempting to assume that conversion between ET and TT designs will simply involve converting all event-handling software routines into periodic activities. However, the required changes to the software architecture are, in many cases rather more profound. The main contribution of the work presented in this paper is to identify ways in which the significant effort involved in migrating between existing ET architectures and "equivalent" (and effective) TT architectures could be reduced. The research described in this paper has taken an innovative step in this regard by introducing the use of 'Design patterns' for this purpose for the first time.