Towards a robust control theory for switches and clocks

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The talk presents a control-theoretic framework geared towards systems that switch and oscillate. While such systems are ubiquitous in nature, science and engineering, the analysis and design of robust behaviours away from equilibrium is often still challenging. The talk illustrates that complex (global) behaviours and their robustness properties can be engineered, in a tractable fashion, by combining tools from classical robust control with recent advances in dominance theory, a young and exciting area of research which generalises Lyapunov stability theory to systems with low-dimensional attractors. We show that our framework offers a compositional approach, where robustness certificates and control laws are computed via standard convex optimisation. Furthermore, we show that our framework allows one to study multistable and oscillatory behaviours using classical frequency-domain tools, including Nyquist diagrams, Bode diagrams and H-infinity norms. The theory is illustrated by means of a textbook electro-mechanical example.

More information at: https://bit.ly/2X9SwSm