

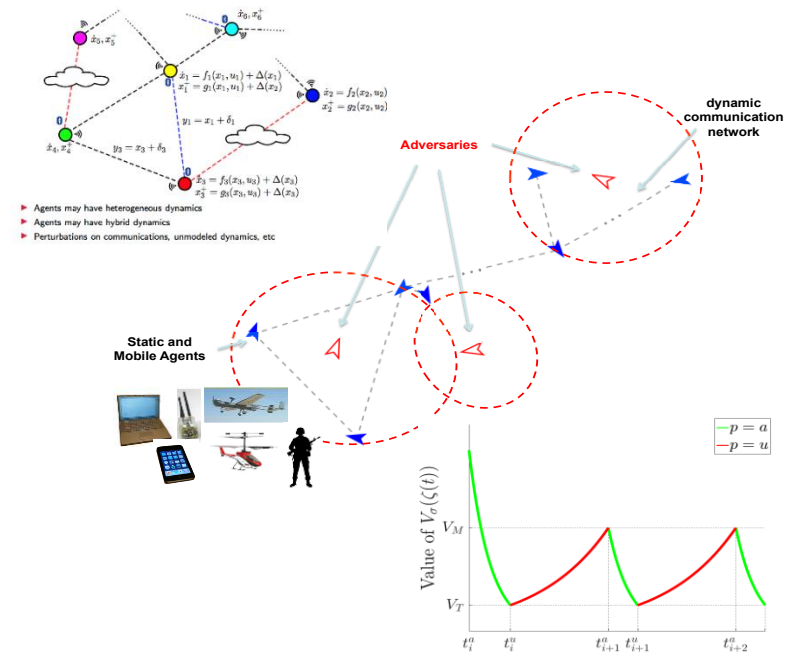
Nonsmooth Systems



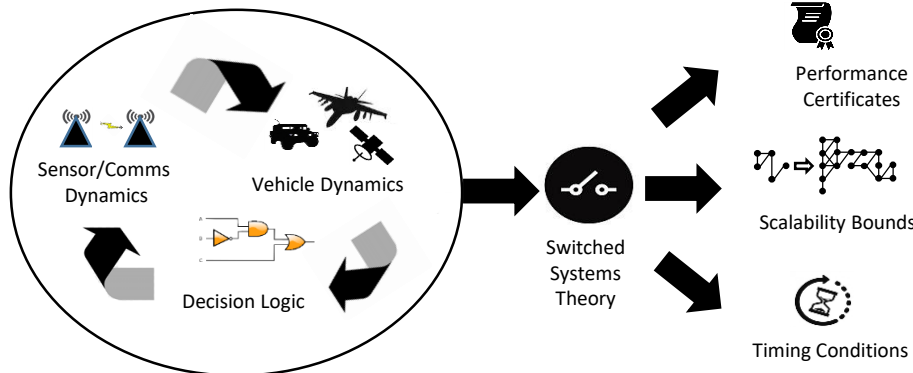
Nonsmooth Systems

- New hybrid systems tools to analyze the stability and robustness of nonlinear uncertain systems with continuous and discrete subsystems (agents, algorithms, networks, sensors)
- Certify properties for interconnections of hybrid systems (asymptotic stability, input-to-state stability, and invariance) via Lyapunov functions as well as barrier functions, including the effects of switching, even between stable and unstable subsystems

Key outcomes for RT1 include an advanced framework for interconnected systems with hybrid dynamics that model the complex union of physics, algorithms, and information and the development of new generalized analysis methods for nonlinear hybrid dynamic systems



Representative illustration of a switched Lyapunov function.





Nonsmooth Systems



- Motivation and overview
- How to develop models?
 - Switched, impulsive, differential-algebraic equations, hybrid automata
- How to define trajectories?
 - Hybrid time domain, hybrid arc
- Synchronization over a network
- Dynamical Properties
- Analysis Design Tools



Nonsmooth Systems



- Switched systems for nonstrict Lyapunov functions (adaptive, output feedback)
- Open challenges
- Examples that provide a foundation