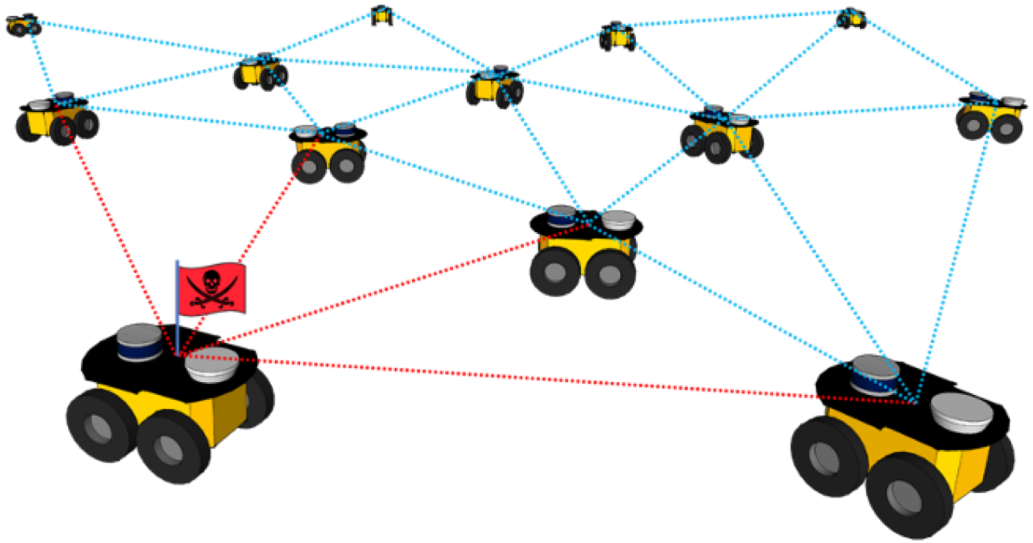
Detection and Inference of Non-random Behavior for Resilient Multi-vehicle Coordinated Operations.

Paul J Bonczek and Nicola Bezzo

Motivation:

- Autonomous multi-vehicle systems are susceptible to cyber-attacks that may replace or block communication broadcasts. Attackers may obtain vital information by intercepting communication broadcasts and/or hijack the entire system.



Goal:

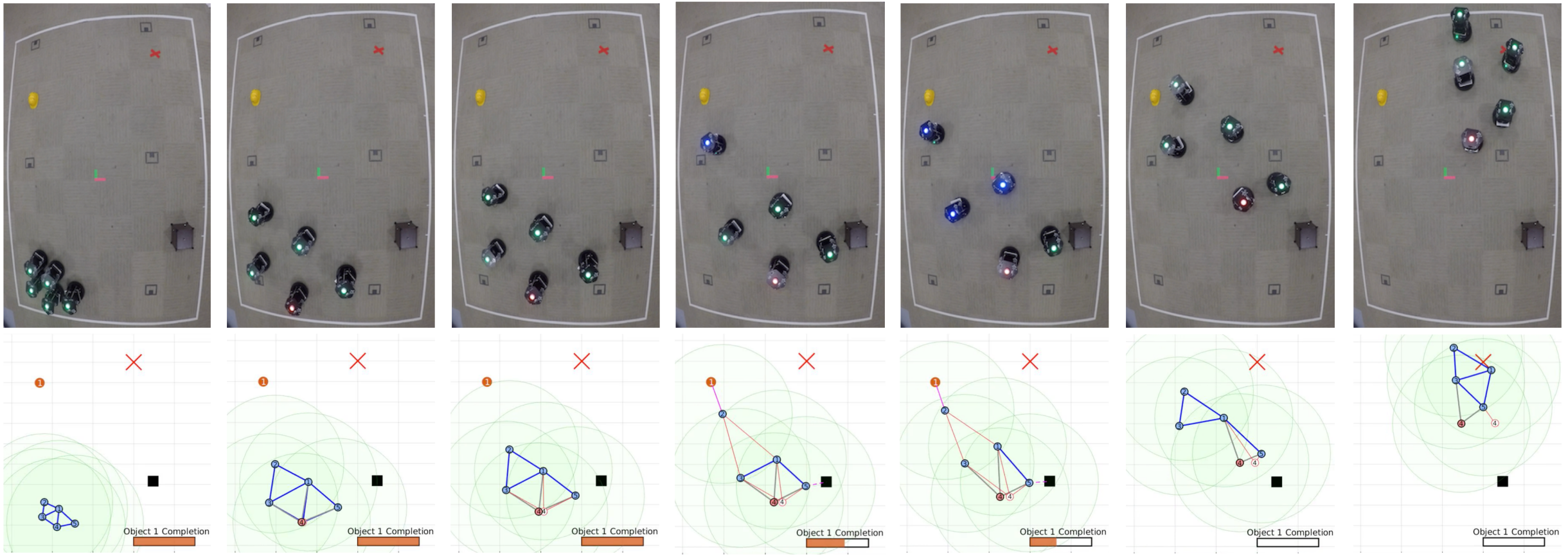
- How can we detect compromised vehicles due to cyber-attacks and discover hidden signature behavior from neighboring vehicles, without explicitly broadcasting this information?

Approach:

- We leverage virtual-spring physics along with Gabriel Graph rule to coordinate the multi-vehicle system and implementation of hidden behaviors.
- Run-time monitor on the residual to identify if the received information from neighboring vehicles are behaving inconsistently, i.e., not in a random manner.

Detection and Inference of Non-random Behavior for Resilient Multi-vehicle Coordinated Operations.

Paul J Bonczek and Nicola Bezzo



- A multi-vehicle experiment performing a go-to-goal operation with one vehicle (in red) subject to a communication attack.
- Neighboring vehicles detect inconsistent information from this compromised vehicle, while simultaneously detecting hidden signature behavior as an object of interest has been found by a vehicle in the environment.