Group 3

3.2 Synchronizing Finite State Machine Controllers for Distribution Systems, PI: D. Kagaris, SIUC

Project Overview and Description

- ## Project Description

  Distribution system: Suppliers (or "generators")
                                   Consumers (or "loads")
                                   Network of Switches.
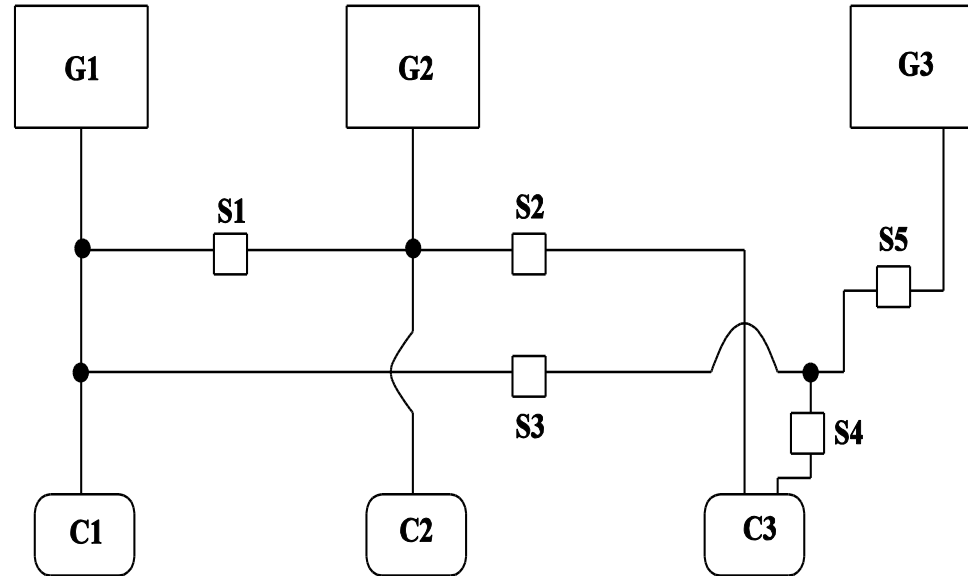   generators and switches controlled by FSM

- ## Problem

  Response to Failure and/or Reconfiguration Triggering Events

  - Synchronize individual FSMs
  - decentralized/distributed scheme
  - message passing
  - consensus

Approach

- Approach to the problem

Initial States:

G1 : Supply_C1,

G2 : Supply_C2 & C3,

G3 : Standby

Event:

G2 fail.

Transitions

G1: Supply_C1➔

Supply_C1&C2

G3: Standby ➔

Supply_C3.

Novelty

Existing work:

Fault-tolerance in Distributed Asynchronous Systems Mathematical theory on decentralized control   & coordination of Discrete-Event Systems (DES)

No experimental verification has been given in the literature for specific systems. The proposed work will develop a practical methodology for a real-world industrial problem, namely the control/reconfiguration of the power supply system of an aircraft. The synchronization, consensus, and reconfiguration procedures will be simulated in OPNET.

- Potential member company benefits

o General model of a distribution system   ("suppliers," "consumers," "network of switches") :

o General reconfiguration events ("failure," "load balancing")

it can be useful in many situations.

Project Tasks/ Deliverables

	Description	Date	Status
1	Development of the Distribution System (DS) and the FSM for each controller and the consensus and reconfiguration order strategies.	Q1	Ongoing
2	Implementation of OPNET models to simulate the DS.	Q2	Not yet started
3	Simulation of different scenarios and efficiency evaluation	Q3	Not yet started
4	Refinement of the DS formulation and simulation package and writing of the comprehensive project report.	Q4	Not yet started

Deliverables:

- Comprehensive report on the DS modeling and synchronization, consensus, and reconfiguration procedures for the avionics power supply system.
- Software prototype tool in OPNET of the model.