DRIEI
PhD Program in Electronic and Computer Engineering
University of Cagliari, Italy

Course: Secret Protection in Discrete Event Systems

Instructor: Ziyue MA (maziyue@gmail.com)

SSD: ING-INF/04

Credits / hours: 2h + 2h

Language: English

Scheduling: May 28th and 30th, 3.00-5.00 pm, room R, building I

Final Exam: Written exam

Registration: Interested students should send an email to the instructor

Goal of the Course

Security issues of cyber-physical systems have drawn much attention in recent years. In this 4-hour lectures, we introduce to students a general framework to protect secrets from being visited unauthorized in discrete-event systems. Our aim is to design an event-protecting policy such that any user, either legal or unauthorized, who visits a secret state must successfully executes/hacks a number of protected events satisfying the safety requirement. Two criteria of optimality (disruptiveness and cost) of designing protecting policies will be considered.

Prerequisites: Discrete-event system, automaton

Intersection with other courses at the University of Cagliari: no significant intersection

Course Outline

1. Discrete-event Systems and Secret Protection (1 h)
Basics of discrete-event systems (automata). Secret protection concepts.

2. Secret Protection in Discrete-event Systems with Minimal Disruptiveness (1 h)
Disruptiveness of event protection. Supervisory control theory basics. Reduction from secret protection to supervisory control. Existence and uniqueness of secret protecting policy.

3. Secret Protection in Discrete-event Systems with Minimal Costs (2 h)
Cost of event protection. Cut and s-t min-cut in graph theory. Minimal cost protection in distinctly labeled automata. Centralities in networks. Minimal cost protection in non-distinctly labeled automata.