UNIMORE
UNIVERSITÀ DEGLI STUDI DI
MODENA E REGGIO EMILIA

Dipartimento di Scienze e Metodi
dell'Ingegneria

Advanced design and management of automated plants

Dr. Elia Balugani
Dr. Qian Zhao

Master's Degree in Digital Automation Engineering

Modern industrial plants are hard to manage only with theoretical models

A plant is based on the interactions of multiple systems

- Production lines.
- Job-shop floors.
- Production cells.
- Assembly lines.
- Warehouses.
- Internal transport systems.

These interactions are complex and dynamic.

Discrete event simulation shows how a plant behaves without the need for a theoretical framework and can complement the theory when available.

Discrete event simulation models a sequence of events, each one changing the system state

For example, it is possible to simulate a quality control station

- Products to be checked arrive at random times.
- The operator requires a different random time to check each product.
- The queue size before the operator changes according to the products arrival rate and the operator speed.

In discrete event simulation the moment when an event occurs can be stochastic and the changes can be as radical the designer wants

- It is necessary to obtain data from the system to define how the stochasticity works.
- Different simulated runs generate different results; the system must be launched multiple times to obtain reliable results.

The course will start from theoretical models and create related discrete event simulations

The industrial engineering topics will be

- Production lines.
- Job shop floors.
- Production cells.
- Manual assembly lines.
- AGVs transport systems.
- Manual warehouses.
- Automated warehouses.

The simulation topics will be

- Data gathering.
- Simulation data analysis.

The comparison between theoretical and simulated plants will outline the effectiveness and limits of the theoretical models.

The analysis of simulated data will provide engineering insights for industrial plants design.

Practical information

Couse page with all the course details

https://unimore.coursecatalogue.cineca.it/insegnamenti/2024/27113/2022/9999/10809?coorte=2023&schemaid=20084

Contacts

Elia Balugani

personal web page	https://personale.unimore.it/rubrica/dettaglio/ebalugan
email	elia.balugani@unimore.it
phone	+39 0522 523565
office	Reggio Emilia Technopole - Piazzale Europa, 1, 42124, Reggio Emilia, RE.
Student reception	On appointment to be agreed with the teacher by e-mail.

Practical information

Contacts

Qian Zhao

personal web page	https://personale.unimore.it/rubrica/dettaglio/qianzhao
email	qian.zhao@unimore.it
phone	+39 0522 522127
office	Reggio Emilia Technopole - Piazzale Europa, 1, 42124, Reggio Emilia, RE.
Student reception	On appointment to be agreed with the teacher by e-mail.