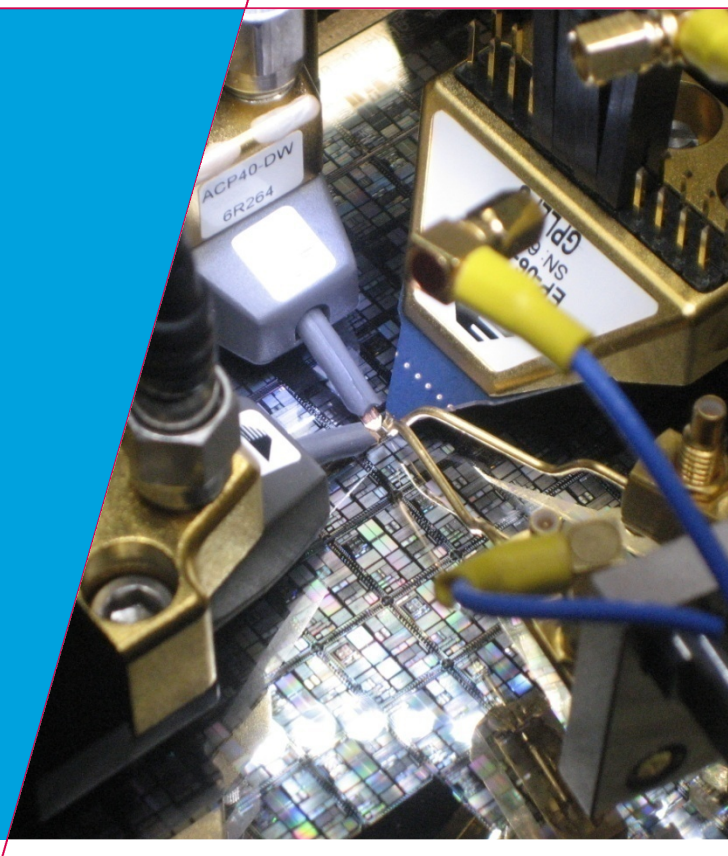
Your masters program at

Control Systems CS



Prof. dr. Siep Weiland
May 1, 2017

TU/e Technische Universiteit **Eindhoven** University of Technology

Where innovation starts

Master program in Control Systems

Core courses (15 ects in Q1)

- **Complex and functional analysis**
- Semiconductor physics and materials
- Discrete mathematics
- Classical and modern physics
- Computational physics
- **Nonlinear optimization**
- **Modeling dynamics**
- Fundamental aspects of random signals and processes

Specialization (10 ects)

- Model based control
- System identification

Professional skills (5 ects)

Elective courses (30 ects)

Internship (15 ects)

Graduation project (40+5 ects)

Organisation master

Explore your masters

Contact capacity group

planning, internships, which electives, advice, …
depending on topic → choose your coach

Decide on choice of elective courses

Decide on internship

What, where and when?
Interest, schedule and planning, topic
TU/e, company or abroad?

Decide on graduation project

Advice for control systems

Elective courses CS:

- Model reduction — 5LMA0 in Q2
- Model predictive control — 5LMB0 in Q3
- Robust control — 5LMC0 in Q3
- Selected topics in systems and control — 5LMD0 in Q4
- Advanced process control — 5LME0 in Q4

Elective courses selected from:

- Electrical Engineering
  (includes core and specialization courses)
- Mechanical Engineering
- 3TU Systems and Control Masters programme
- DISC PhD courses in Utrecht (see DISC website)

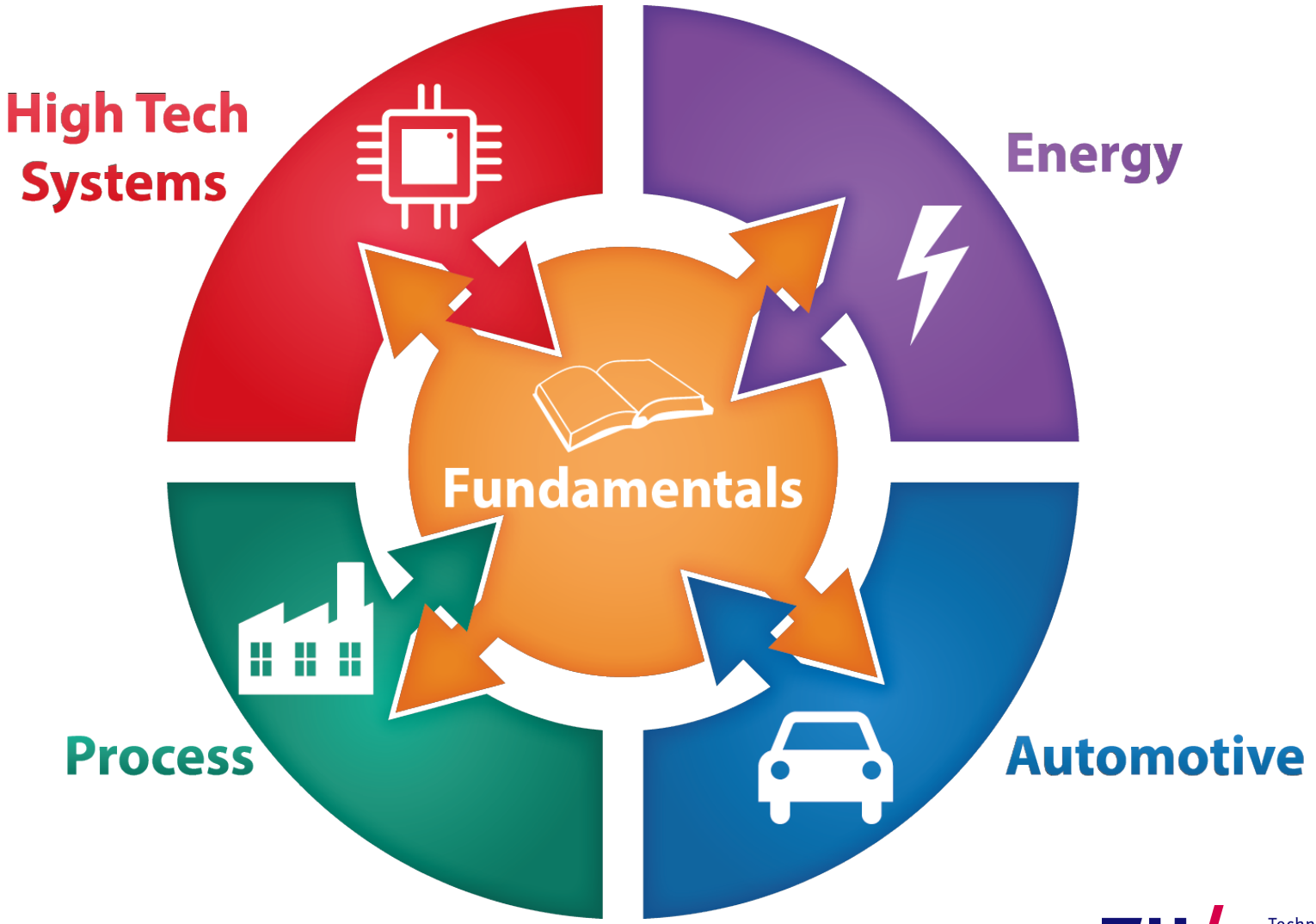
At least 15 ects need approval from your supervisor.

Not ONLY control!

Advice for graduation work

- Nice and challenging time, planning is your own responsibility!
- Select topics you really like
- Be efficient and plan to finalize in 2 years.
- Get good grades and stand out (!)
- Reserve energy and time for graduation work
- Exceed your own expectations and develop yourself as a professional
- Put maximum value to your diploma

Research at Control Systems



Application areas and people

High-tech systems

Energy networks and electrical power systems

Process control

Automotive (electrical, electromechanical, chemical)

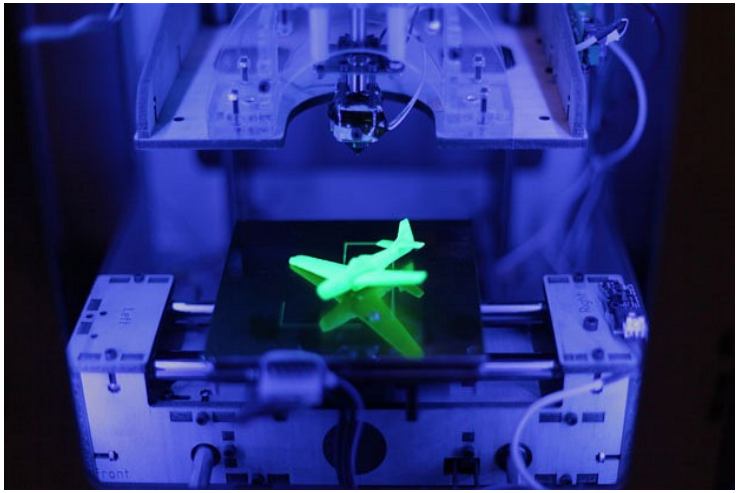
CS: Control Systems

Graduation projects: Fundamentals

- Can bad models produce optimal controllers?
- How to identify network components?
- Complete distributed synthesis of distributed controllers:
  possible or a myth ?
- Is model reduction always a comprimise with physics?
- Can computers identify physical laws?
- Why do we sample communication channels in control systems ?
- How to detects errors, faults, safety threats in systems?
- How to speed up and optimize MPC ?
- How do Li-Ion batteries really work ?
- ...
- [*insert your question here*...]

Graduation projects: High-tech systems

Robust, fast and accurate control and estimation in high-tech systems
(collaboration HTSC)

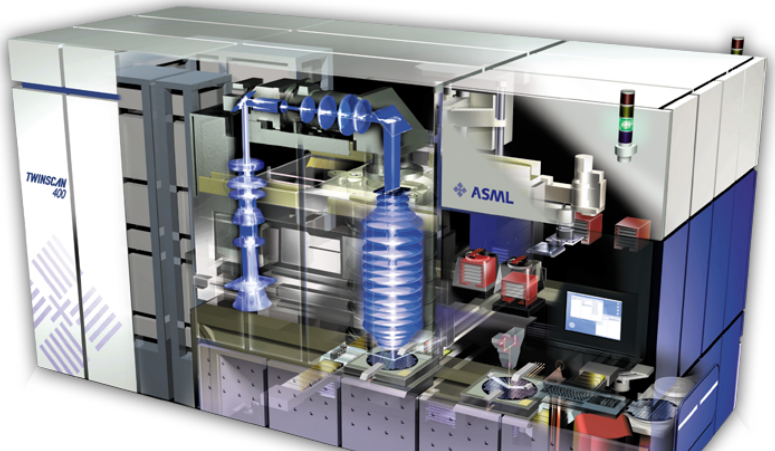


Applications in

Lithography: ASML

Jet, laser and 3D printing: Oce, CCM, Ultimaker

Electron microscopy: FEI



Graduation projects: Energy systems

Aim:

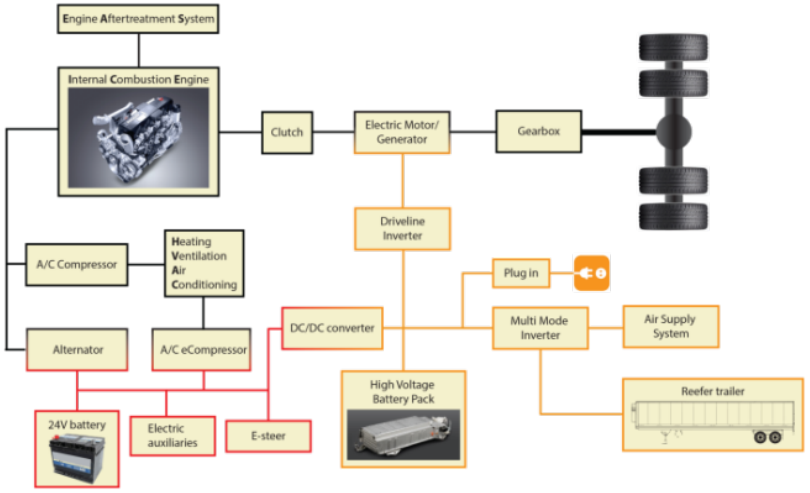
Modeling, control and identification of networked systems

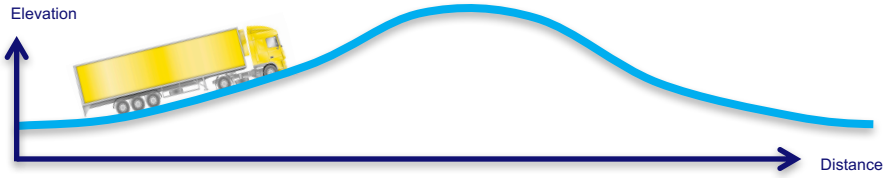
Applications in:

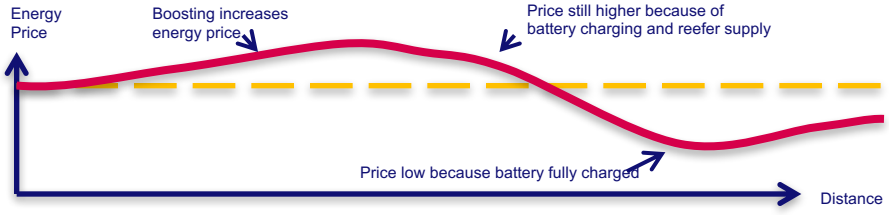
- Decentralized and distributed control (Energy companies)
- Price-based control for power and reserve capacity
- System identification for networks
- Power amplifiers (Prodrive)
- Battery modeling

Graduation projects: Automotive

- **Complete Vehicle Energy-saving Technologies for Heavy-Trucks**
- **Decentralised and plug and play methods for energy management**
- **Battery modeling and monitoring**
- **Safety**



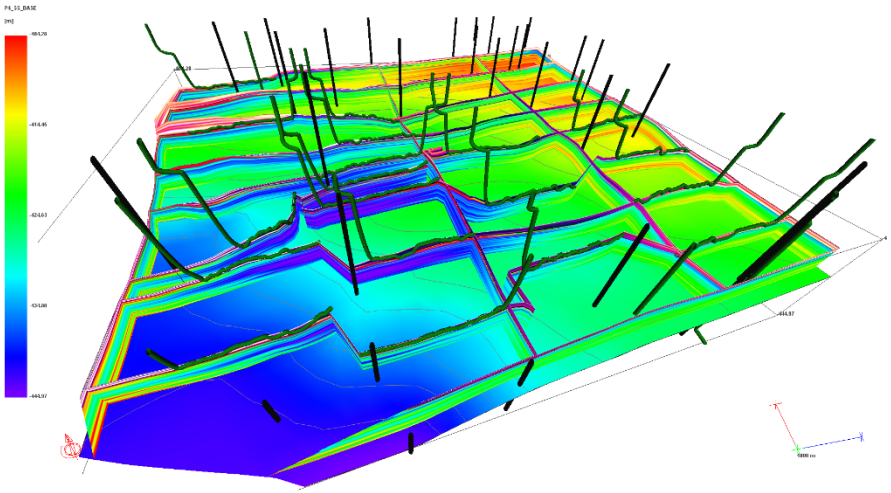




Graduation projects: Process control

Aim:

Control and monitoring of industrial processes, parameter varying systems



Applications in

- modeling and control of oil-water separation in wells (Shell)
- optimal tuning of Model Predictive Controllers (DSM)
- Process-wide monitoring and optimization (Friesland-food, Campina, DSM)

Once you started …

A typical schedule

- Literature study, preparatory phase
- Research
- Regular meetings with coaches/supervisors
- Participation and at least 2 presentations at MSc seminars
- Publications ?!
- Thesis, presentation and defense
- Diploma within 9 months (guaranteed !!!!)
- Your first job within ~~12,~~ ~~10, 5~~ 2 months: PhD, Pdeng, company.

Social events

CS: Control Systems

Be in control !

Systems and control

… investment in life …

- Industry-inspired, challenging problems
- Theory development – Applications in industry
- Prepare and challenge yourself for the (uncertain) future
- More info May 11, 2017 (13.30 hrs).

  Flux 5th floor: posters and presentations. Need registration!