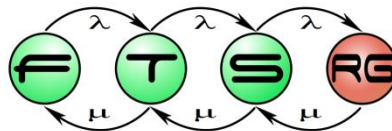# Formal Methods: Course overview

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# Lecturers

- Course coordinator:
  - István Majzik <majzik@mit.bme.hu>
- Lecturers:
  - Ákos Hajdu <hajdua@mit.bme.hu>
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  - Kristóf Marussy <marussy@mit.bme.hu>

Motivations

- Increasing costs of design faults in computer based systems and software
  - Important to prove that the design of critical system components is correct
- Formal methods offer:
  - Mathematically precise requirement specifications and design models
  - Verification methods and tools to prove that requirements are satisfied by the design model
  - Evaluation methods to derive properties of the design (like performance, safety)
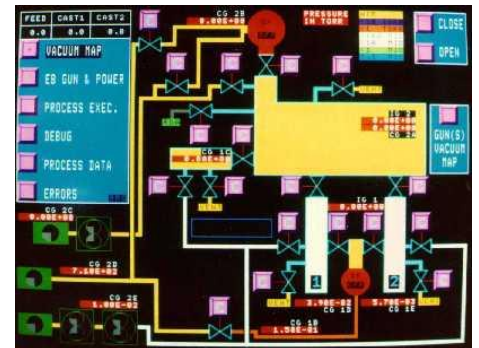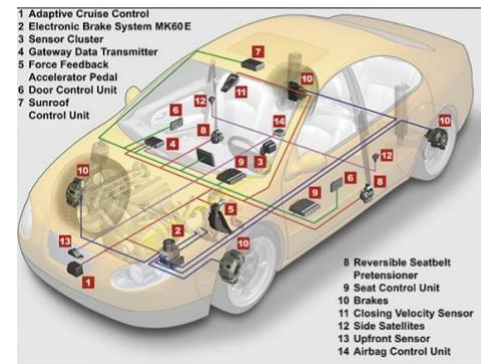
Knowledge to be obtained

- Participants of the course will be able to
  - Construct formal models and specifications on the basis of informal descriptions
  - Apply formal verification and evaluation techniques
  - Apply tools that support the application of formal methods
  - Understand the application conditions of various
    - modelling formalisms
   - verification techniques

Assessment

- Assessment: 2 midterm exams + 1 homework
  - All these shall be successful
  - Final grade calculated from
    - the grades of the midterm exams (weights 35% and 35%)
    - and the grade of the homework (weight 30%)
- Midterm exams
  - ME1: March 17 (Tuesday), 18:15
  - ME2: May 19 (Tuesday), 18:15
- Recaps: Each midterm exam can be repeated once
  - Repeated ME1: March 31 (Tuesday), 18:15
  - Repeated ME2: May 28 (Thursday), 10:15

Homework

- Goal: Modelling of a small-scale IT system + verification of its required properties using a tool

- Dates and deadlines
  - Homework assigned on the 4th week of the semester
  - Deadline for submission: May 9 (Saturday), 23:59
  - Presentation of the homework is required (from the 14th week)

- Late submission: During the repetition period
  - Deadline for late submission: May 27 (Wednesday), 23:59
  - Late submission will result in 20% decrease of the score
  - The submission of the homework cannot be replaced by a repeated midterm exam

- **Basic formal models** and their semantics
- Formalization of requirements: **Temporal logics**
- Formal verification: Model checking
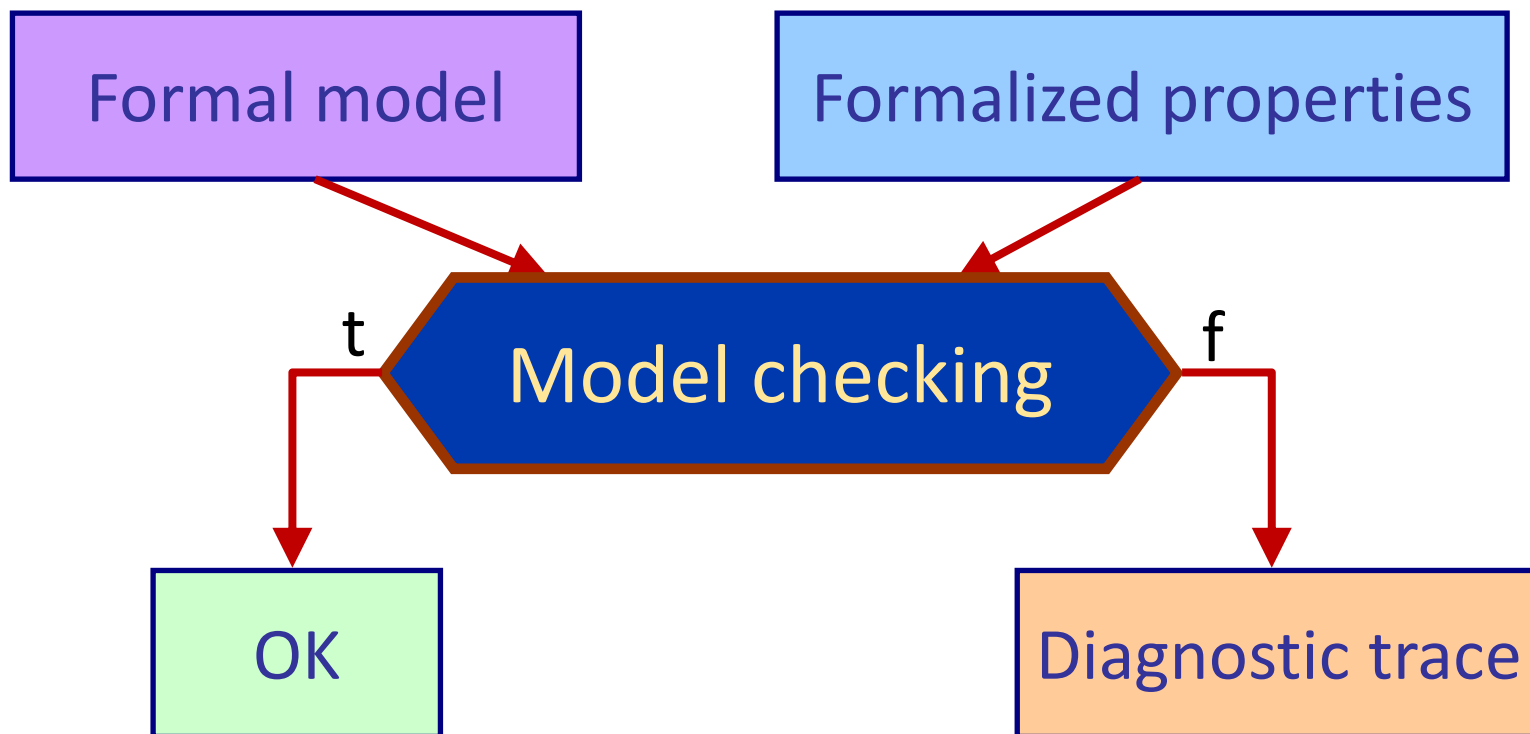
- Modelling state-dependent dynamic behavior:
  Statecharts

- Modelling and analysis of concurrent systems:
  Petri-nets

- Modelling data-dependent behavior:
  Colored Petri-nets

- Evaluation of extra-functional properties:
  Stochastic Petri-nets

Modelling formalisms + tools for verification

Important information

- Web page of the course:

  https://mit.bme.hu/eng/oktatas/targyak/vimima07

  https://inf.mit.bme.hu/en/content/formal-methods

- Expected content

  - Course material (slides) regularly updated

  - News and announcements

  - Homework assignment and related information (tool to be applied)

- In case of questions contact the lecturer or the course coordinator