Master Specialization in Digital Design: Design and Programming of Embedded Systems

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http://www.fit.cvut.cz/en
Sequential programs are not the only way

- **I will create a town for you to walk in...**
  - because I know your likes,
  - because I know your walks,
  - because it will be the best town for you.

- **I will create a computing structure for your algorithm...**
  - because I will select the **right components** for your computation
  - because their **communication structure** will naturally **match** your algorithm
  - because all the components will work **in parallel**, always
  - because the structure will be **energy-efficient**
  - because it will be **small** and lightweight
  - because I can formally **prove** it to be **correct** – at least sometimes
  - and with programmable hardware, it will be even **flexible**.
The Specialization in Design of Digital Systems

Characteristics of Graduates

Digital Design Specialization

For:
- designers of embedded (e.g. control) systems, high performance systems
- designers of safety critical systems
- verification engineers

Strengths:
- integrated system approach
- balanced software and hardware knowledge

Welcome at (local selection) and worldwide:

ASICentrum

AŽD Praha

EATON

IMA s.r.o.

ON Semiconductor

Honeywell Technology Solutions

S3 Group

ST Microelectronics

Jan Schmidt (FIT CTU)

Digital Design Specialization

Prague, Czech Republic
Keywords

- System-Level Modeling, Performance Analysis
- System-Level Design, Hardware-Software Codesign
- Dependable Systems: Reliability Prediction, Safety, Security
- Verification by Simulation
- Verification by Formal Methods
- Real-Time and Embedded Software
- Programmable and Application-Specific Devices
Prerequisites and related bachelor program modules

- Digital systems design is **not** electrical engineering: basic knowledge of circuits suffices
  
  **FIT bachelor modules**
  - Digital and Analog Circuits
  - Computer Structures and Architectures

- Digital systems design **is** based on discrete mathematics
  
  **FIT bachelor modules**
  - Linear Algebra
  - Elements of Calculus
  - Elements of Discrete Mathematics

- Digital systems description languages **are** special programming languages; basic algorithmization and programming skills needed
  
  **FIT bachelor modules**
  - Programming and Algorithmics
Core modules

- **Foundations**
  - Mathematics for Informatics
  - Statistics for Informatics
  - Combinatorial Optimization
  - Parallel Algorithms and Systems
  - Systems Theory

- **Knowledge building**
  - Design for the FPGA and ASIC Technology
  - Parallel Computer Architectures
  - Arithmetics and Codes
  - Simulation Technology
  - Security and Hardware
  - Individual and Team Projects

- **Capstone modules**
  - Systems on Chip
  - Testing and Reliability
Optional and supplementary modules

- Seminars in Digital Design
- Intelligent Embedded Systems
- Information Security
- Security and Secure Programming
- Cybernality
- Integration in Information Systems
- IT Support to Business and CIO Role
- User Interface Design
- Advanced Algorithms
- Modern Internet Technologies
Students involvement in research projects

- Advanced algorithms in logic synthesis
- Formal verification
- Special embedded systems
- Dependable and safety-critical systems
- High performance cipher breakers
- Applications of Petri nets
- High performance Internet monitoring
Partners in applied research

Industry

- ASICentrum spol. s r.o.
- ÚTIA, Akademie věd ČR
- CESNET, z. s. p. o.
- AŽD Praha, s.r.o.

Academic

- Faculty of Mechatronics, TU Liberec
- University of West Bohemia, Pilsen
- Faculty of Information Technology, VUT in Brno