

MSc *Intelligent Embedded Systems*

**Dept. of Measurement and
Information Systems (MIT)**



What kind of job will you be prepared for?

Application engineer

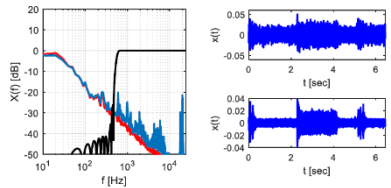
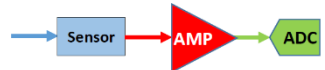
Development of intelligent applications based on embedded systems

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Perception and signal processing

(1. semester, „A1” course)

- Perception of physical quantities, sensors
- Preprocessing of signals
- Feature extraction
- Signal processing in transformed domain: DFT, Wavelet
- Filter design



Intelligent embedded systems laboratory

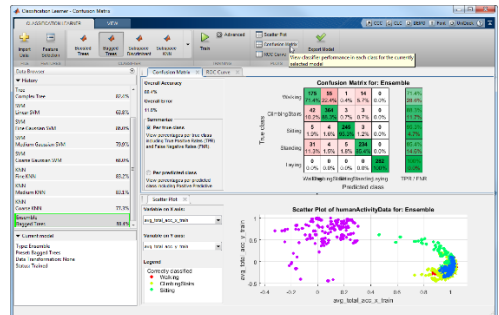
(2. semester, „A1” laboratory)

- Digital Signal Processors
- Digital filters
- Adaptive filters
- Active noise control
- Data acquisition systems
- Real-time signal processing
- Implementation in environment with low computational resources

Embedded artificial intelligence

(2. semester, „A2” course)

- Data analysis, data cleaning
- Linear and logistic regression, clustering
- Neural networks
- Convolutional neural networks
- Prediction
- special purpose hardware components



Embedded artificial intelligence laboratory

(3. semester, „A2” laboratory)

- Training of neural networks
- Neural networks on GPU
- Implementation of classification algorithms
- Kalman filter
- Sensor fusion
- Joint time-frequency analysis

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Applications of data processing

(3. semester, „B” course)

- Model-based signal processing
- Digital twin
- Predictive maintenance
- Sensorless principle



Common course for all specializations



Safety-critical embedded systems

(4. semester, „C” course)

- Development process, lifecycle models
- Design of fault-tolerant architectures
- Hazard and reliability analysis
- Safe software implementation
- Testing methods (MIL, SIL, PIL, HIL)

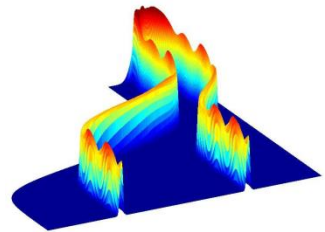
Recommended common courses

Measurement theory (common course)

- Decision and estimation theory
- Model fitting
- Filter theory, optimal filtering
- Model-based signal processing

Topics of Project laboratory and Thesis work

- Model-based artificial intelligence
- Active noise control
- Digital sound synthesis of musical instruments
- Vibration analysis of power steering
- Analysis of Neural networks for roundoff errors
- Biomedical diagnosis (smart watch, analysis of blood pressure, ECG, EEG signals)
- Identification of authors based on handwriting by means of machine learning



Elective courses

- ARM Cortex core microcontrollers
- Bioinformatics

MSc *Intelligent Embedded Systems*

Knowledge gained

- Embedded systems
- Modeling for development of intelligent applications, information processing methods
- Embedded artificial intelligence, deep learning
- Digital signal processing
- Intelligent algorithms, prediction methods
- Development process of safety-critical applications
- Knowledge immediately applicable on job market



Preparation towards PhD



Job opportunities:



Head of specialization: Prof. Tamás Dabóczi (daboczi@mit.bme.hu)