Holistic Learning by the Integration of a Test Rig into Engineering Teaching

MATLAB EXPO 2021
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Engineering happens when Prowess meets Purpose
Engineering happens when Prowess meets Purpose
Research at the AMT

Autonomous Navigation

Localization and Communication

Predictive Maintenance

Material characterization

Environmental Perception

Condition Monitoring
Teaching at AMT MATLAB EXPO 2021

Holistic Learning by the Integration of a Test Rig into Engineering Teaching

Mechanical Engineering

Machine Elements

Technical Drawing

Electrical Engineering

Electrical Motors

Introduction to MATLAB

Control Theory

Plant Monitoring & Maintenance

Operation Planning

Mechanics

Electrotechnics

Application

General

How can we educate future engineers who can solve problems instead of tasks?
Teaching at the AMT

Holistic Learning by the Integration of a Test Rig into Engineering Teaching

How can we train future engineers who can handle ever-changing requirements?

[1]: Future of Jobs Report, World Economic Forum
Study progression

Intrinsic motivation

How can we motivate future engineers for the craft of engineering?
Holistic Teaching Approach

Knowledge

Skill

Motivation

Holistic Learning

How can we train future engineers who can handle ever-changing requirements?

How can we educate future engineers who can solve problems instead of tasks?

How can we motivate future engineers for the craft of engineering?
Holistic Teaching Approach

Requirements

- Relevant to the Student
- Independent Work
- Student Interaction
- Diverse Competence
- Interdisciplinary
- Theoretical Knowledge

Motivation

Skill

Knowledge
Case Study – Pumped Storage Plant

Idea

Relevant to the Student
Independent Work
Student Interaction
Diverse Competences
Interdisciplinary
Theoretical Knowledge
Case Study – Pumped Storage Plant

Concept

Rig

- Distance Sensor
- Valve
- Flow Sensors
- Pump

PLC

- ROS

PC

- Relevant to the Student
- Independent Work
- Student Interaction
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Case Study – Pumped Storage Plant

Realization

PLC  Test Rig  Basins
Case Study – Pumped Storage Plant

Modes of Interaction

By Wire

By Code

By Interface
Case Study – Pumped Storage Plant

Example Exercise in “Data Analytics for Heavy Duty Machinery”

- Collect Flow & Distance Data at the Rig
- Determine Relationship between Flow & Distance
- Design Algorithm to convert Flow to Distance
- Implement Algorithm in MATLAB
- Test Algorithm on the Test Rig
Motivation

Skill

Knowledge

Reality check

Did we meet our requirements?

- Relevant to the Student
- Independent Work
- Student Interaction
- Diverse Competence
- Interdisciplinary
- Theoretical Knowledge

Reality check

Did we meet our requirements?

- ✔ Relevant to the Student
- ✔ Independent Work
- ✔ Student Interaction
- ✔ Diverse Competence
- ✔ Interdisciplinary
- ✔ Theoretical Knowledge
Next Steps

Going Virtual Lab
Engineering happens when Prowess meets Purpose
Thank you for your attention

Feel free to keep in touch!

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