

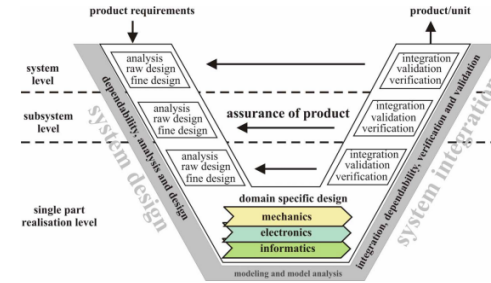
Development of an Electrical Kart for Education of Systems Engineering in Mechatronics

Rolf Roskam



Wolfenbüttel

Industrial Guideline for Mechatronics Product Design



Ref. Vasic, V., Lazarevic, M.

Master Course Systems Engineering

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Modules (10 ECTS)

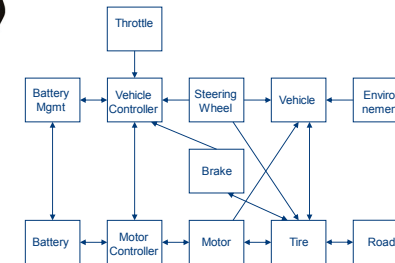
- Mathematics
 - Design of complex system,
 - Management of systems engineering,
 - Systems simulation,
 - RCP and testing,
 - **Applied system design**
- + Master Thesis (30 ECTS)



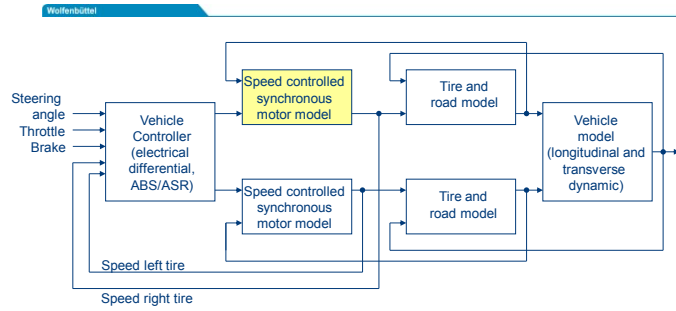
System Design

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Sub-Systems



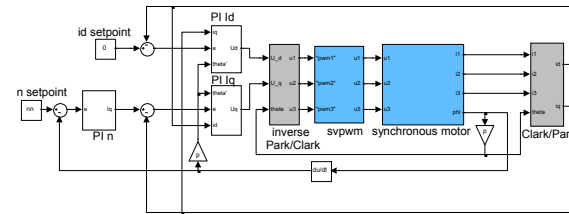
System Modelling



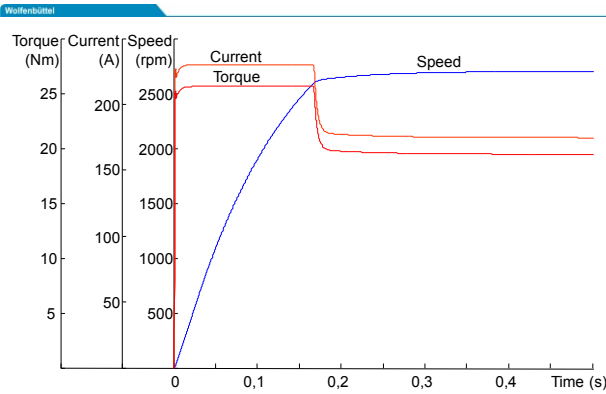
Sub-System Modelling

Speed controlled synchronous motor model

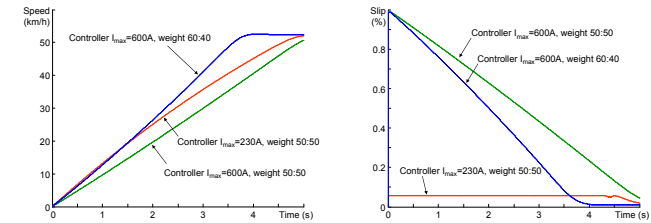
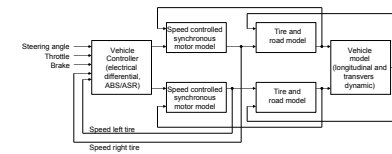
Motor	
Type	PMS120
Power	5.5kW
Speed	2700rpm
Torque	19,45Nm
Peak torque	40 Nm
Inertia	26,3kgcm ²
Weight	12,3kg
Current	123,5A
Number of poles	8
Resistance u-v	0.0151Ohm
Inductance u-v	0.056333mH



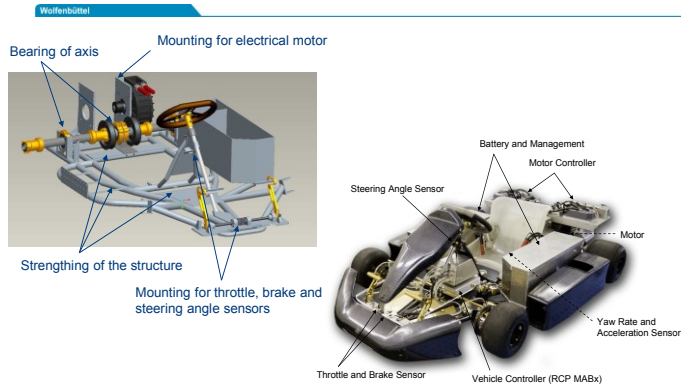
Sub-System Analysis



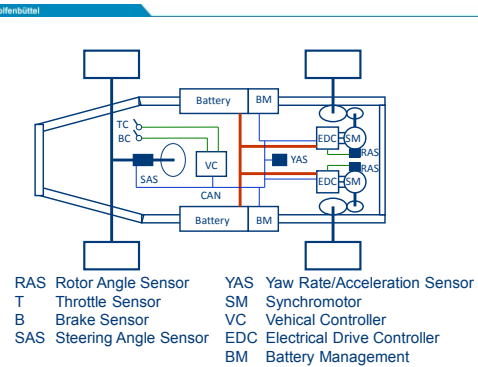
System Modelling and Analysis



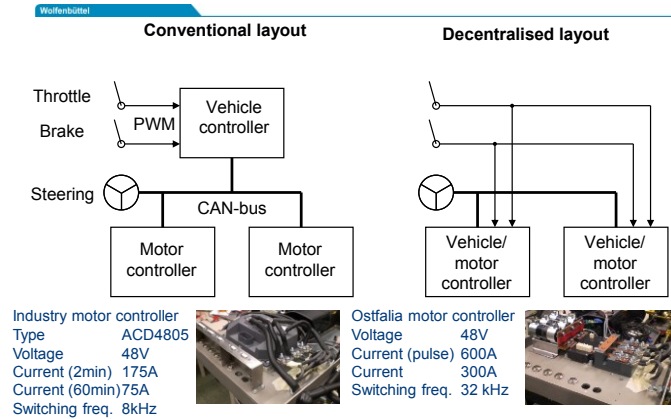
Mechanical Design



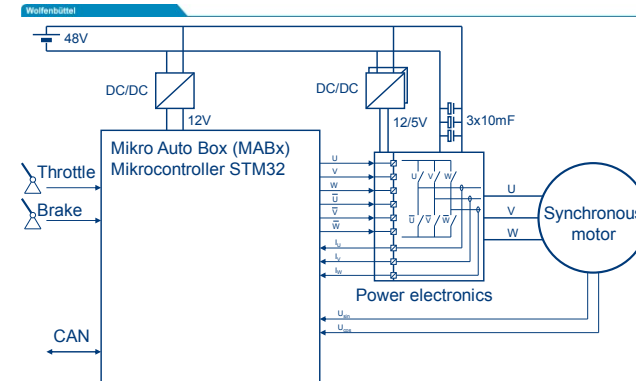
Electrical Design



Electrical Design



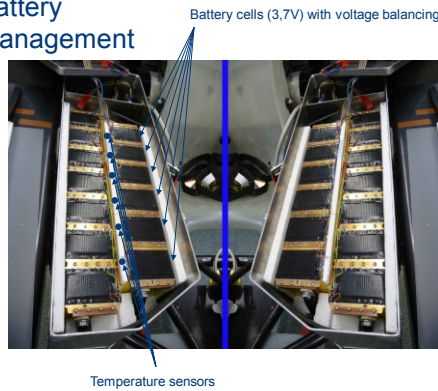
Ostfalia Motor Controller



Electrical Design

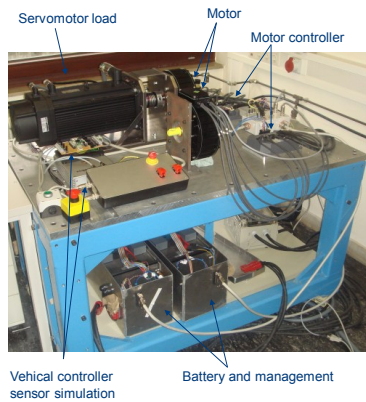
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Battery Management



Outlook HiL Test Bench

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Results

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Video



Conclusion

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- Need for Education in Systems Engineering
- Master Systems Engineering – Modules / Applied System Design
- System Analysis by Modelling and Simulation of the Electrical Kart
- Mechanical and Electrical Design of the Kart
- Results
- Outlook HiL Test Bench

Thank You for Your Attention.