# DiLa

## *Digitalisierung in der Labordidaktik*

# Design and Implement E-learning in mechanical engineering laboratory courses using extended reality environments

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Stiftung Innovation in der Hochschullehre

THU Technische Hochschule Ulm

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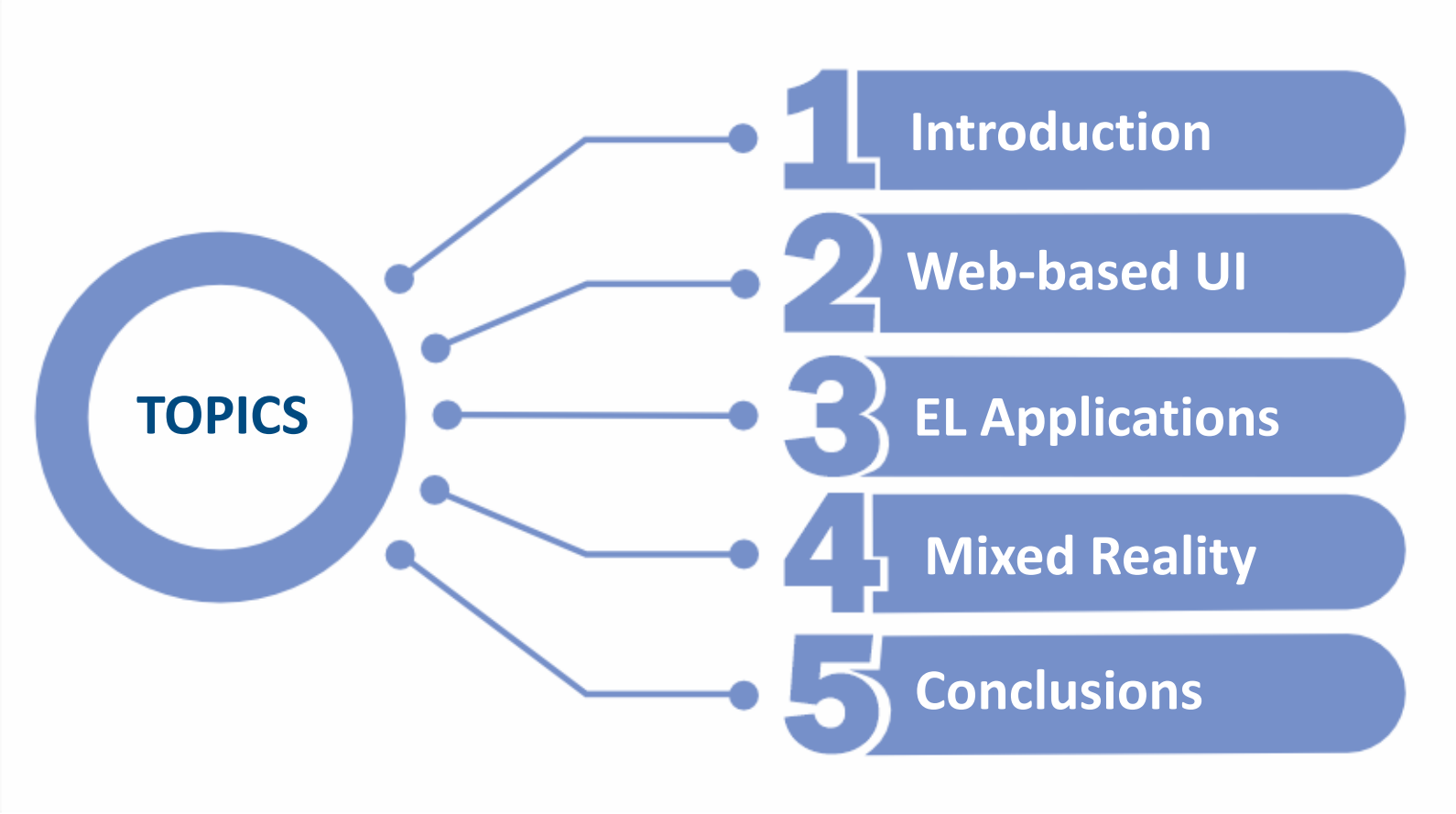
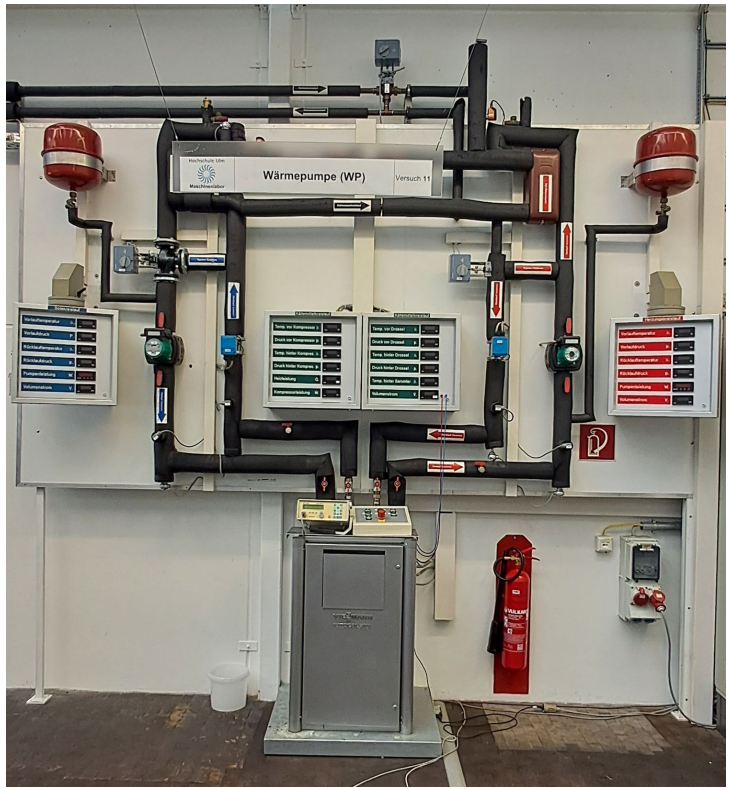
# E-Learning



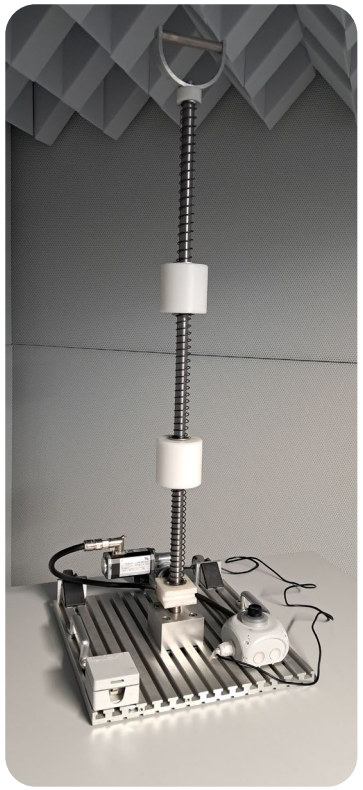
# Laboratory Experiments



## Heat Pump

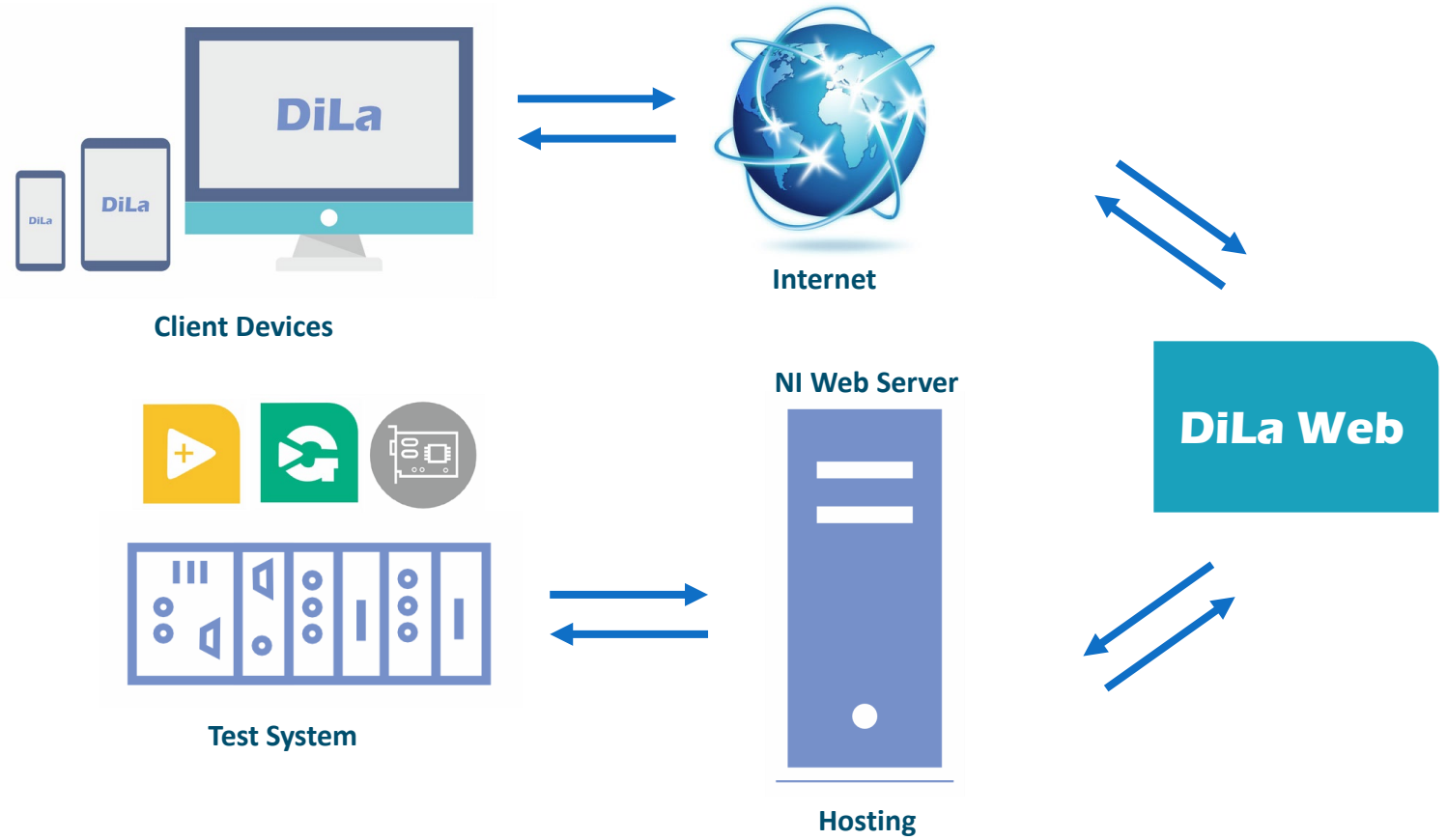



## Forced Vibration



# Architecture of Web Application





# Architecture of Web Application

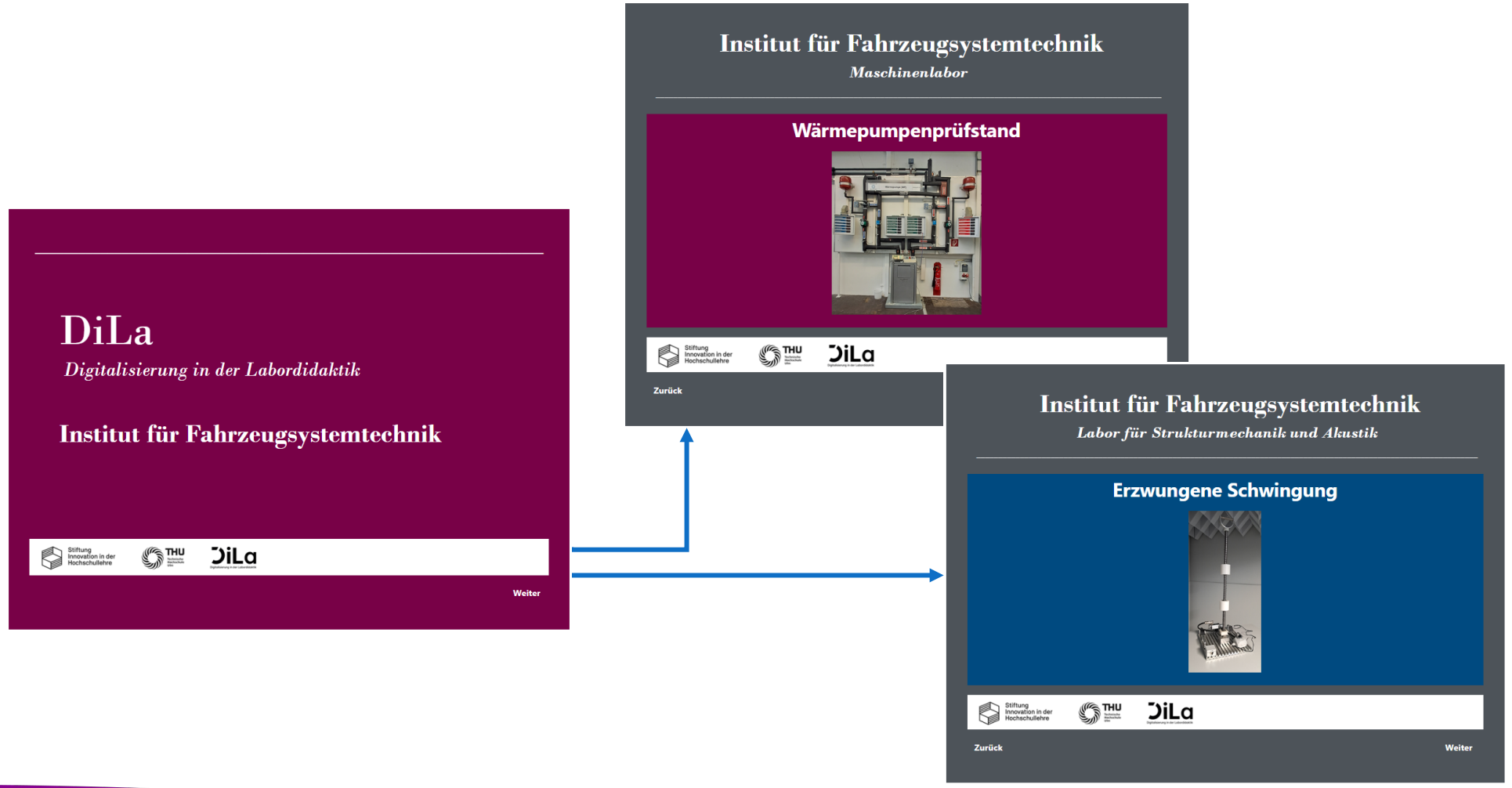



Client Devices

Brouser-based UI

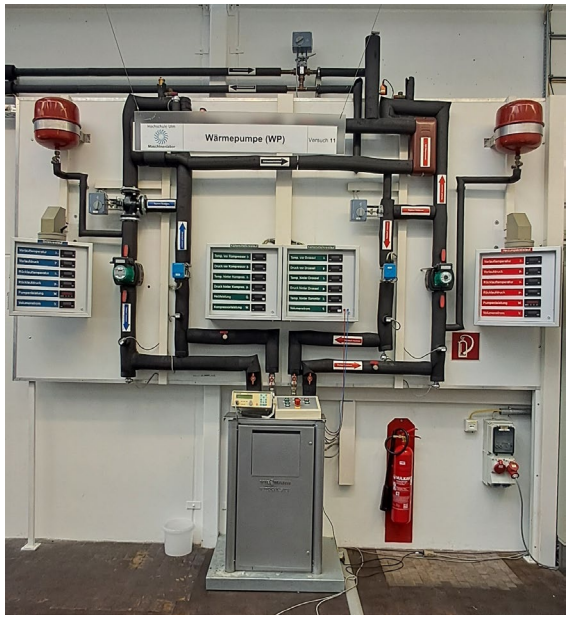
# User Interface

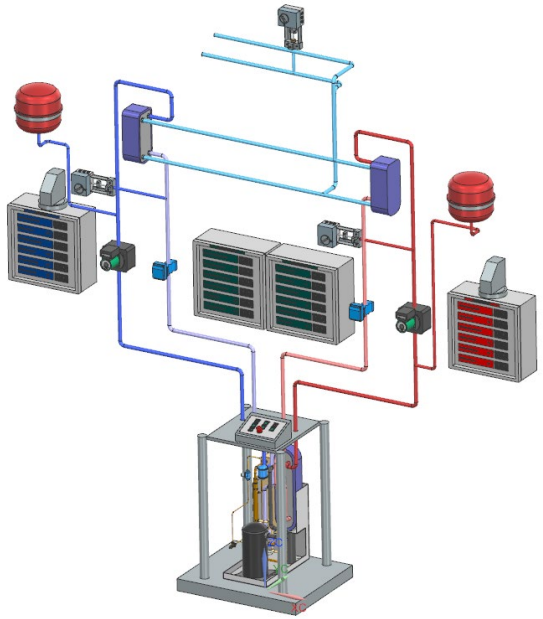


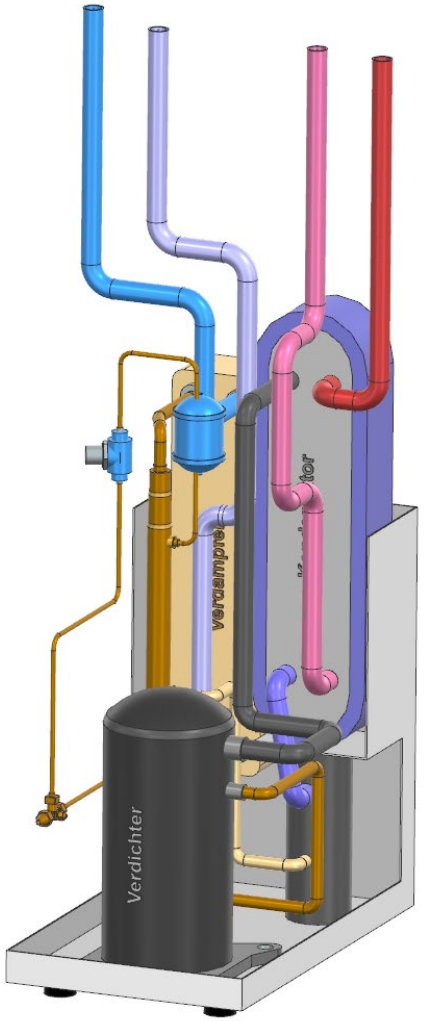


# 3D CAD Models – Heat Pump







# User Interface – Heat Pump

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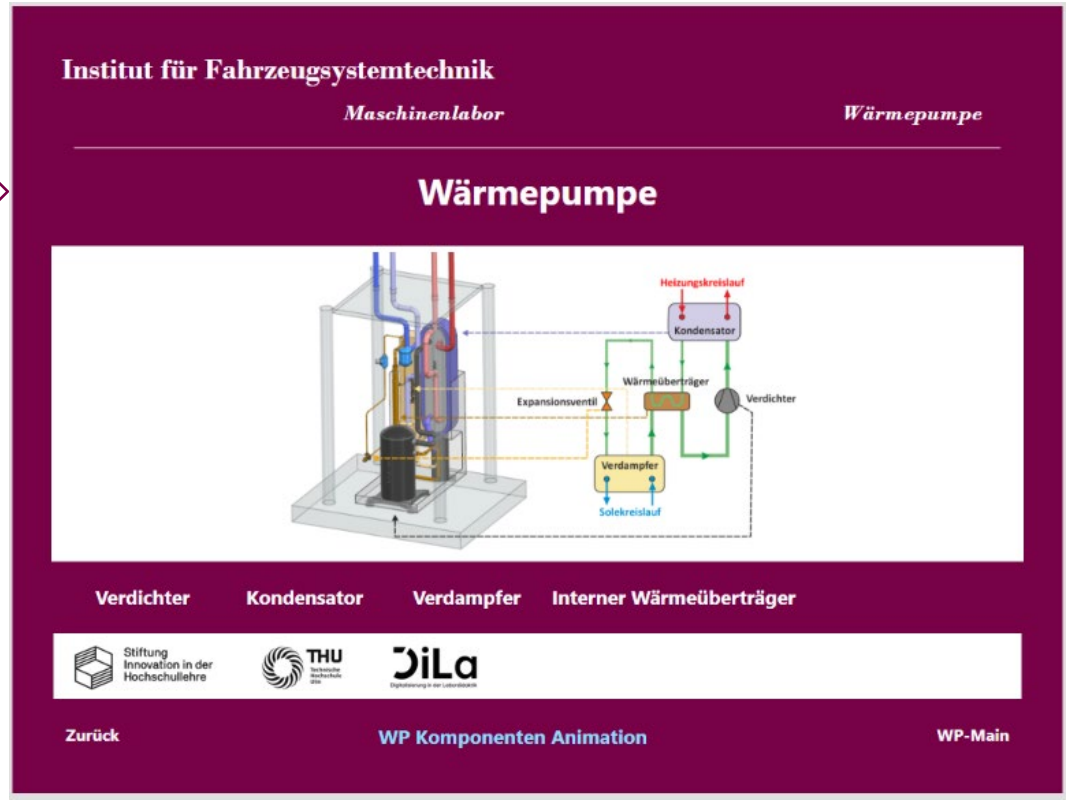

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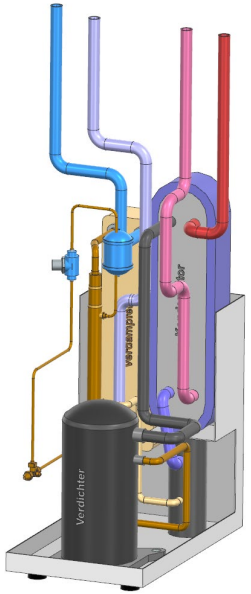


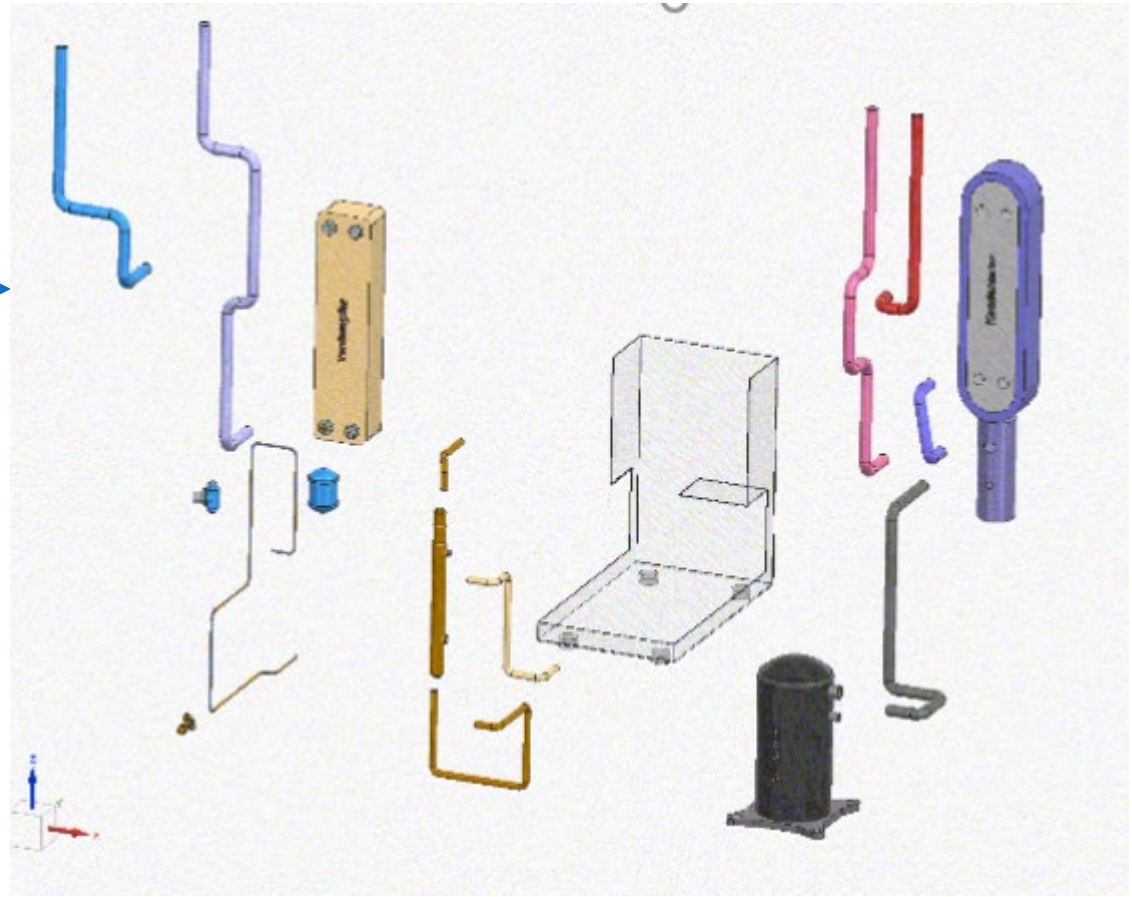

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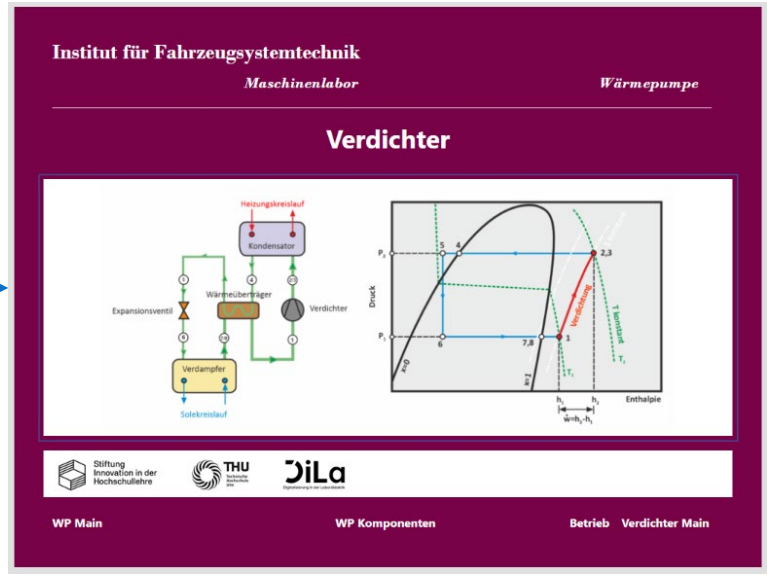
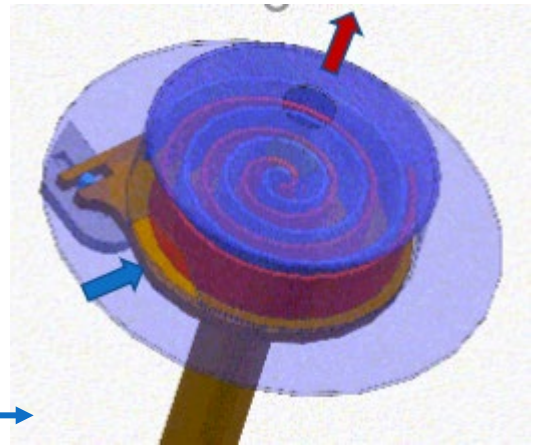
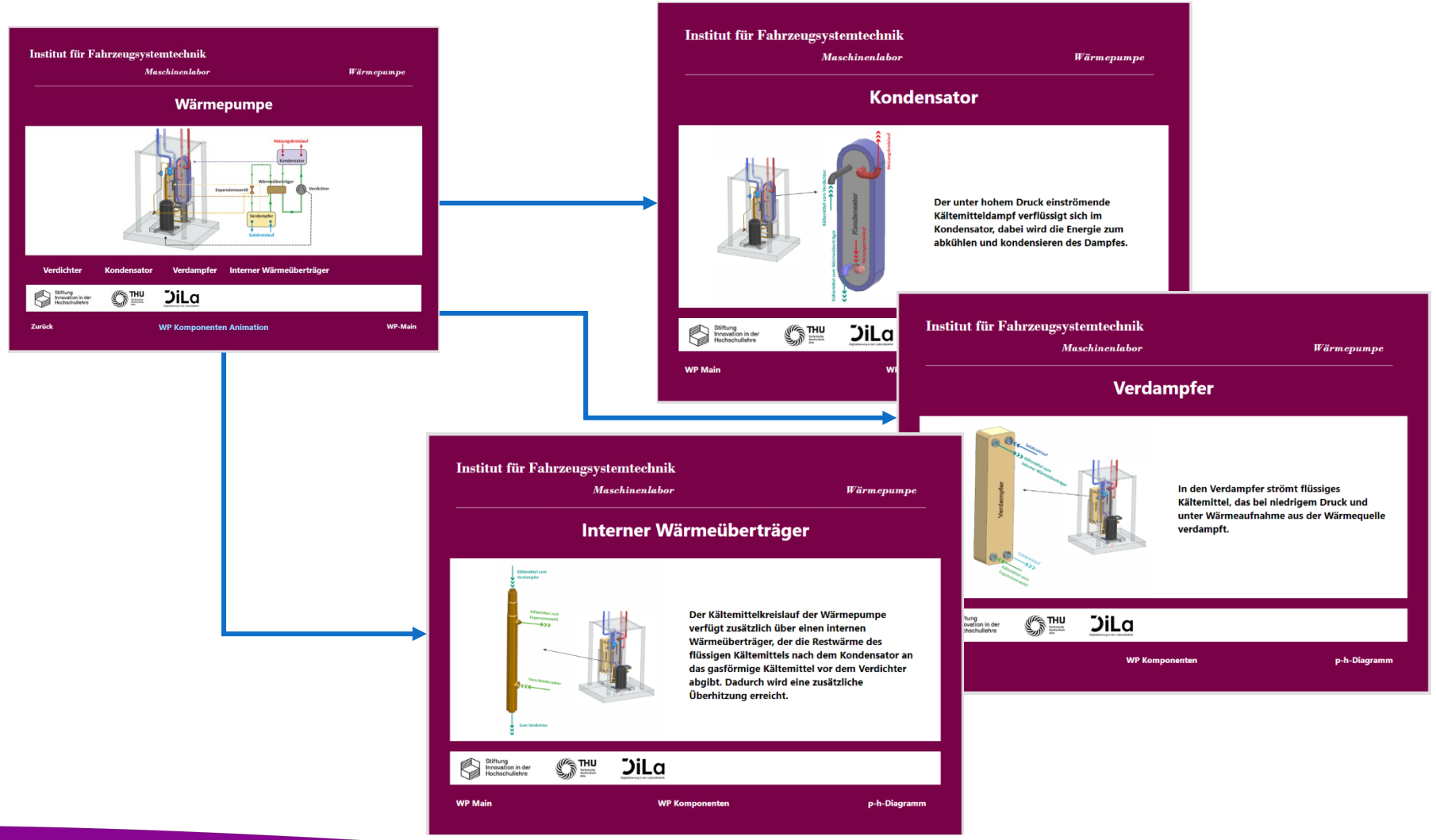


**NX Siemence Simulation**

# User Interface – Heat Pump





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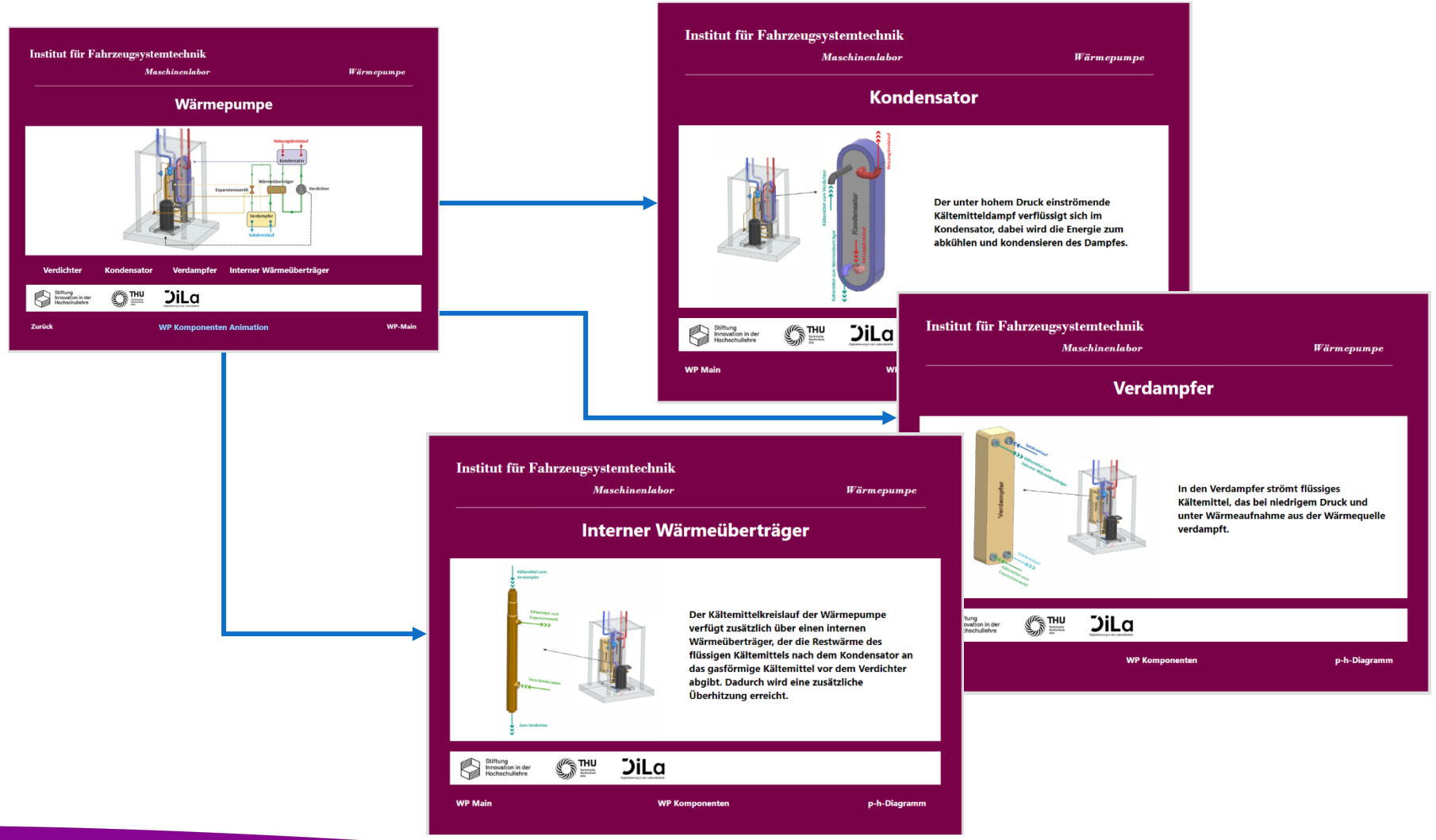
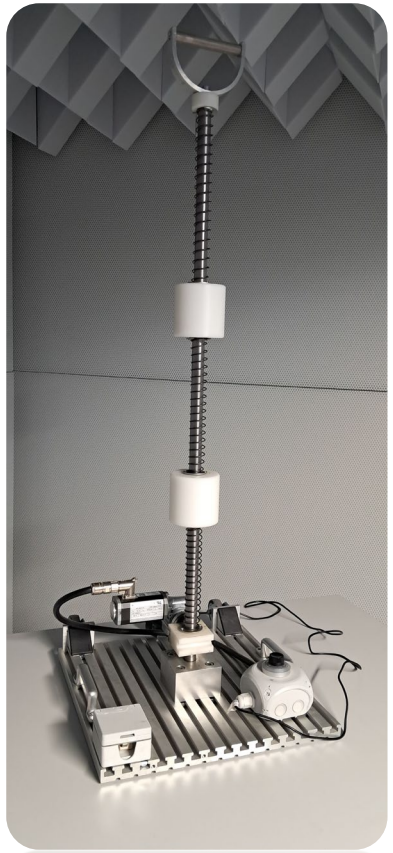
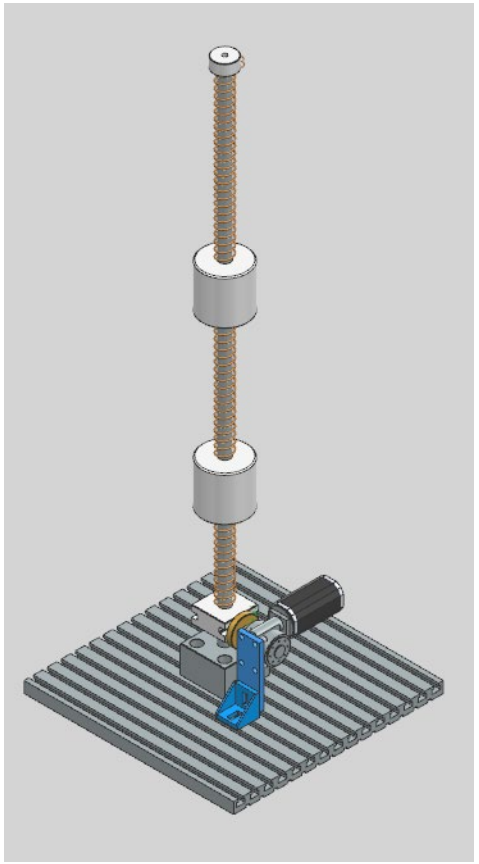


# 3D CAD Models - Forced Vibration

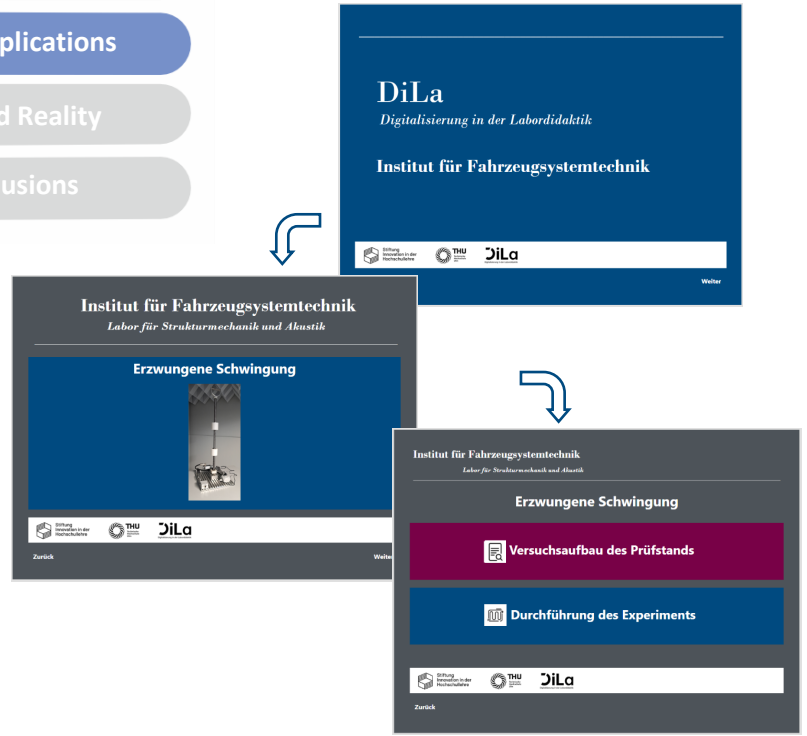






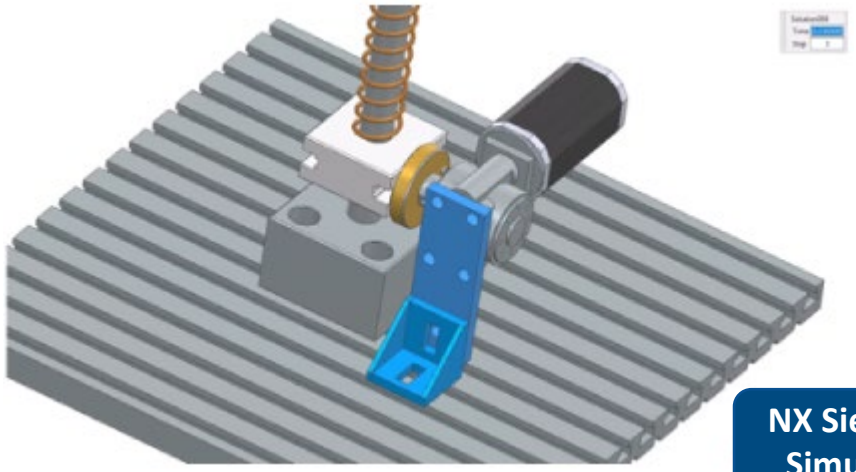
# User Interface - Modalanalyse

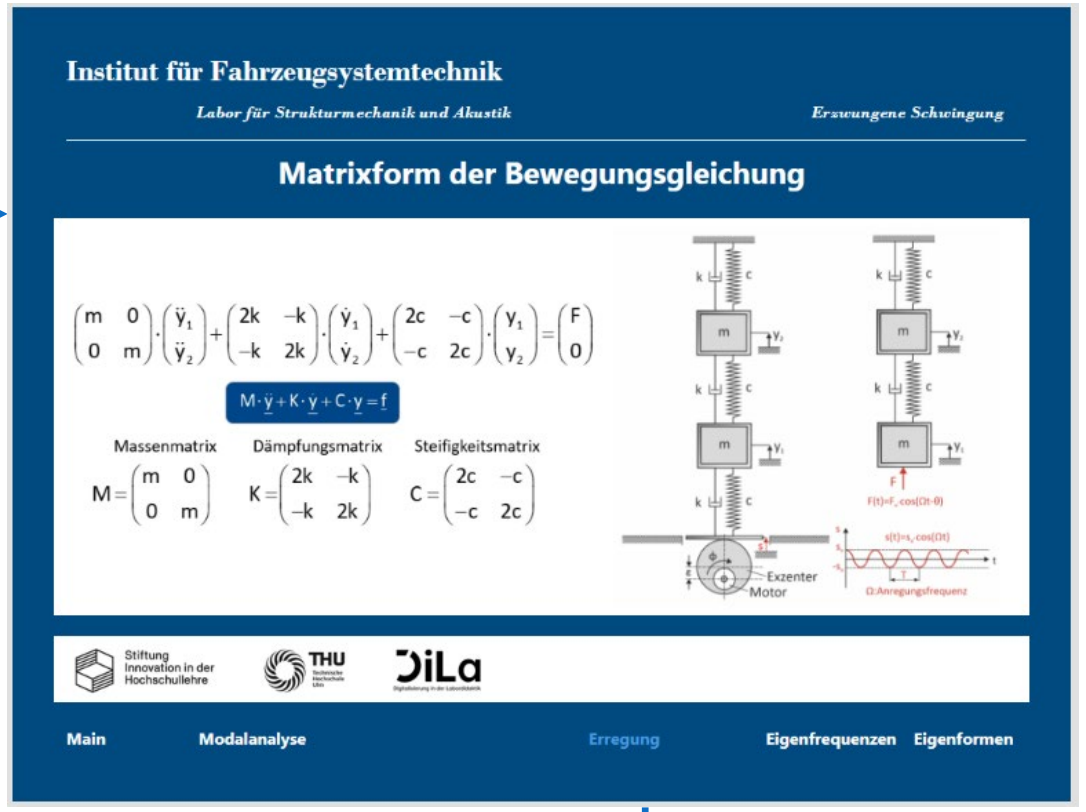





# User Interface - Forced Vibration



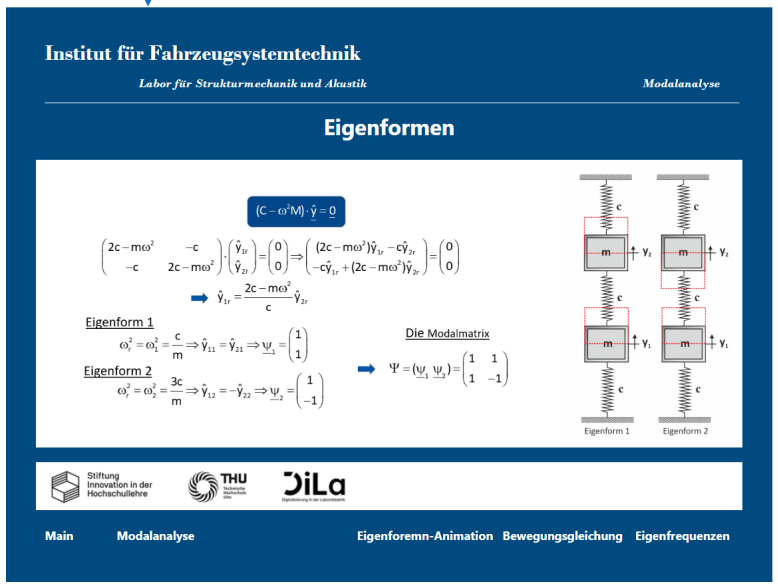



**NX Siemence Simulation**

# User Interface – Modalnalyse

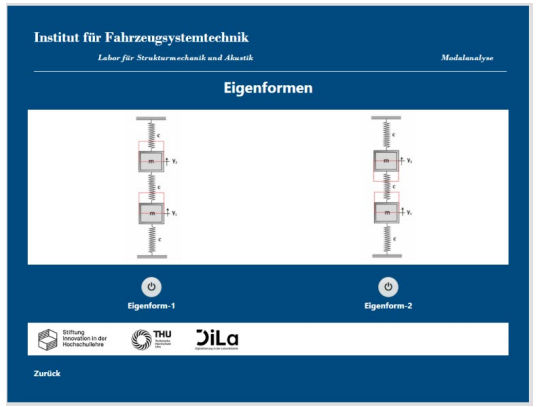


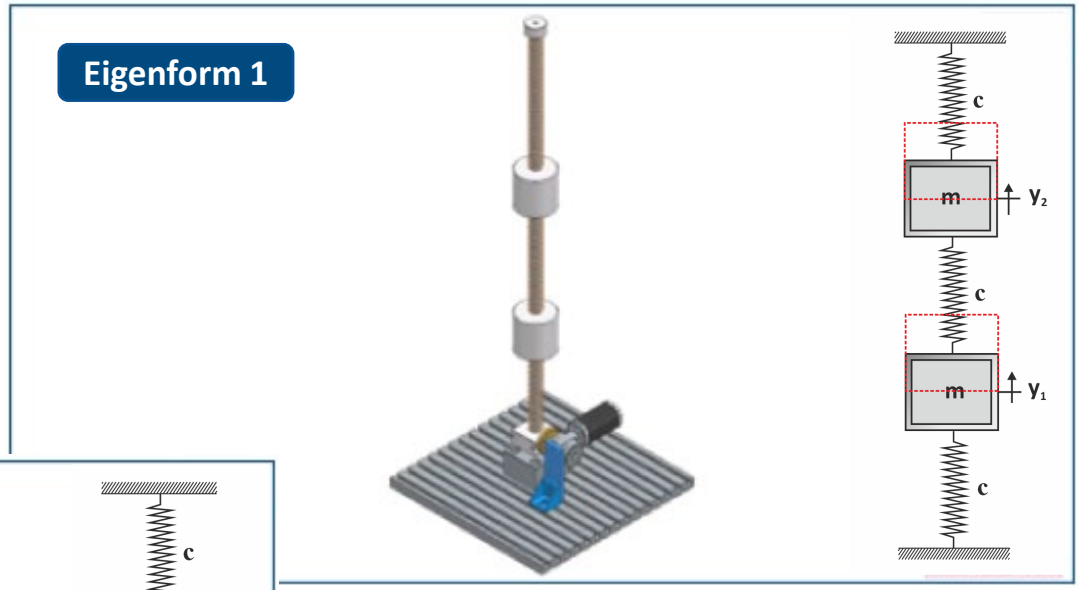


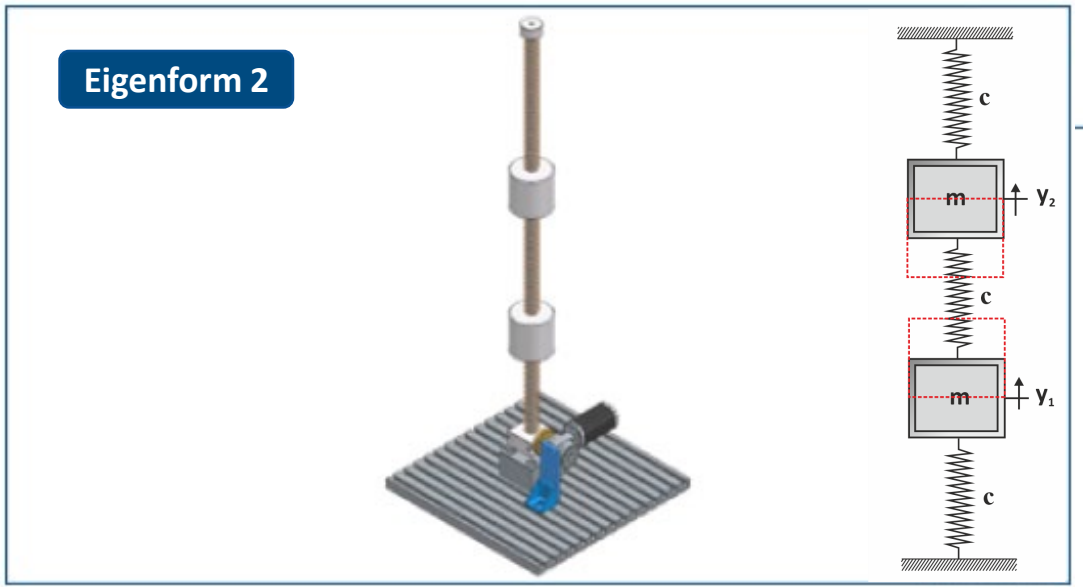


# User Interface - Modalanalyse



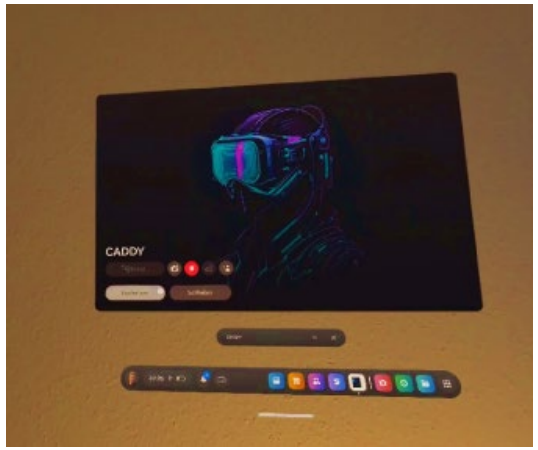


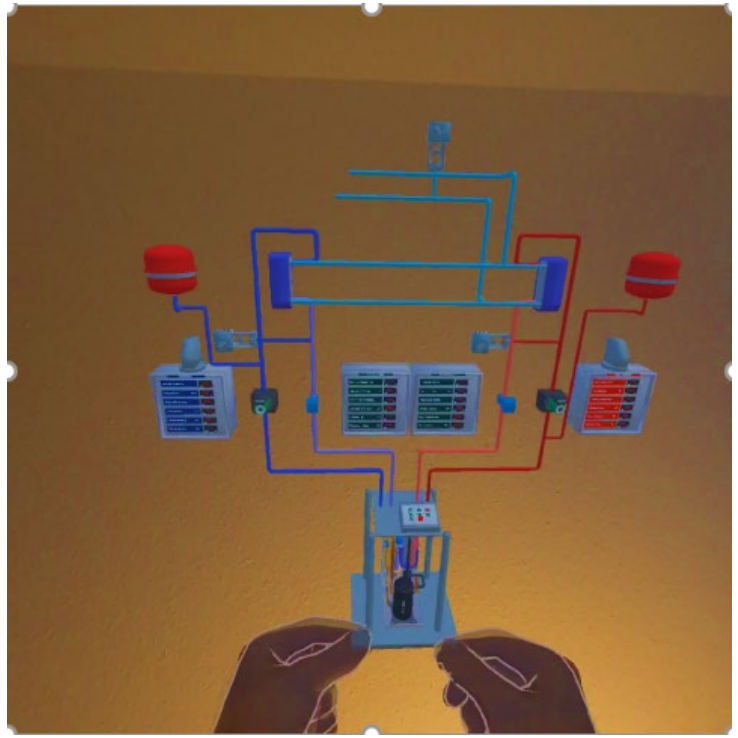



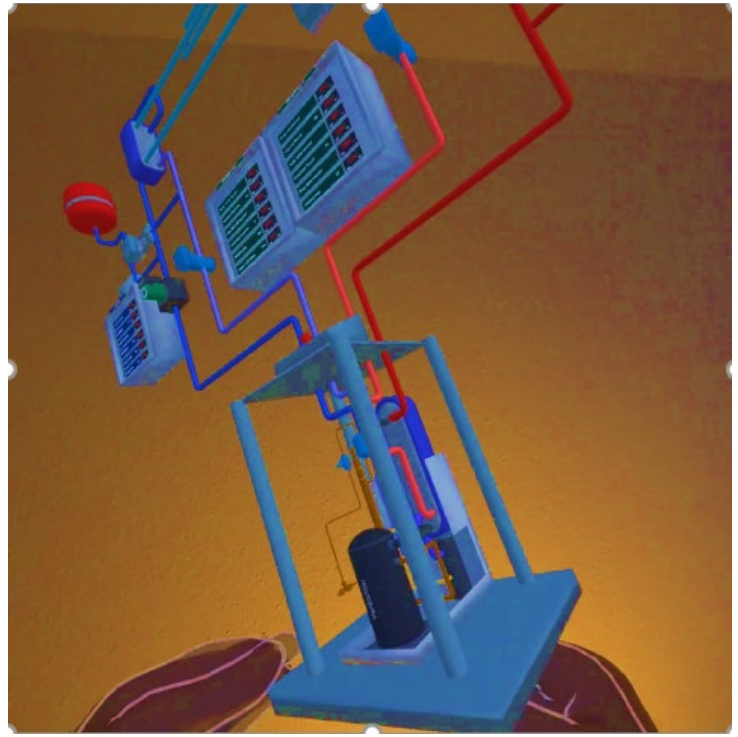



# Meta CADDY Sofware





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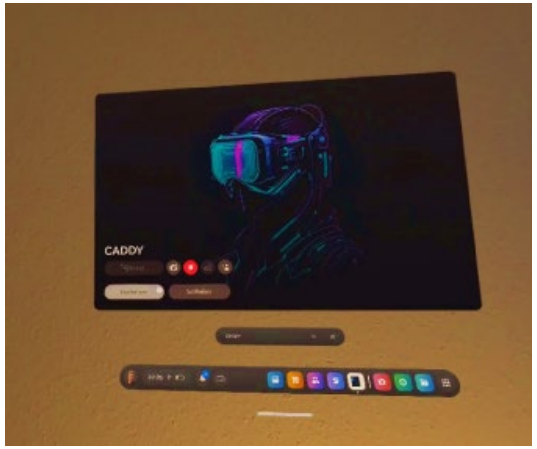


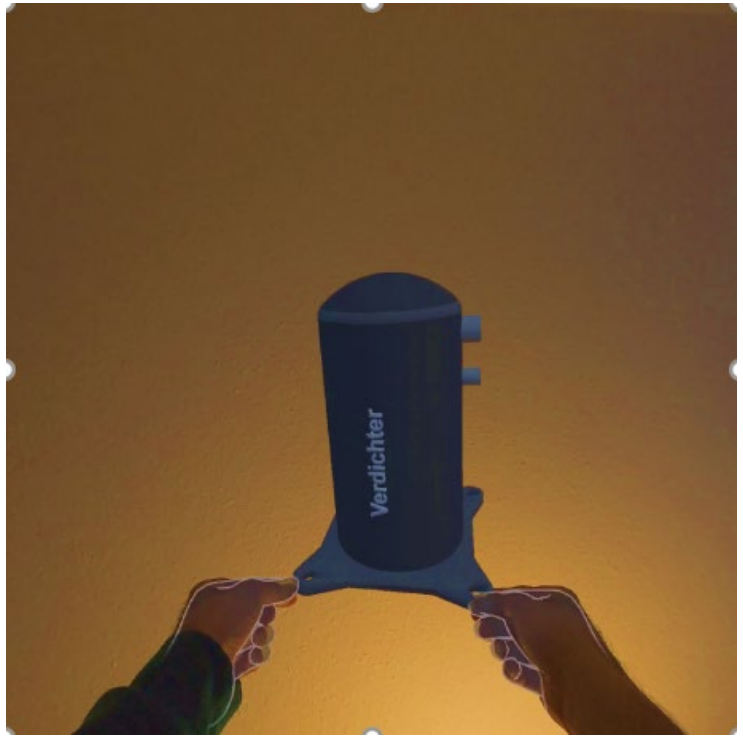


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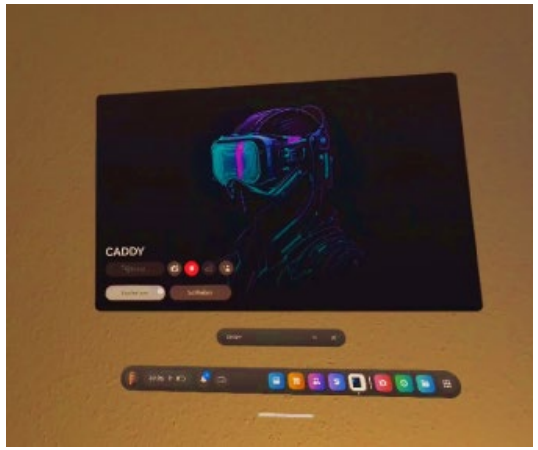


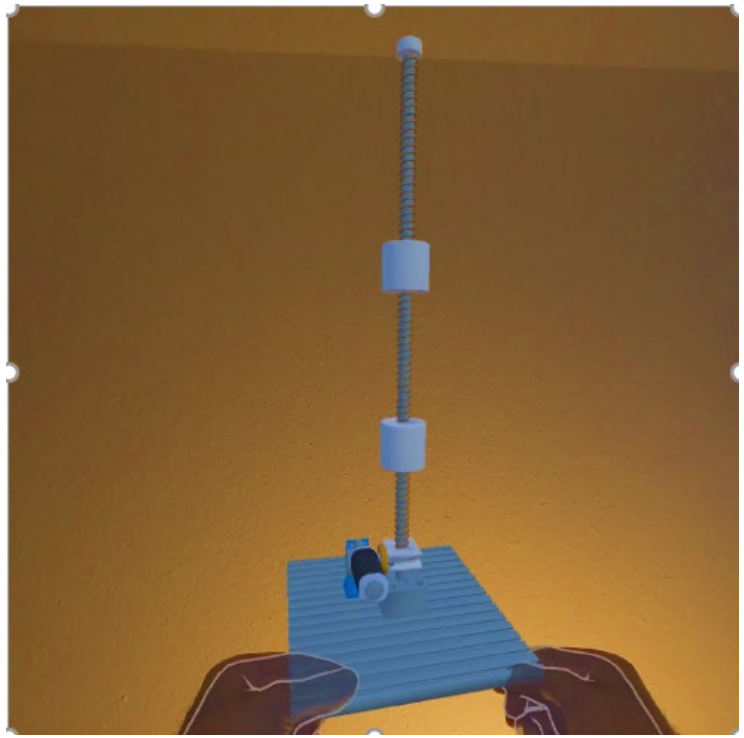

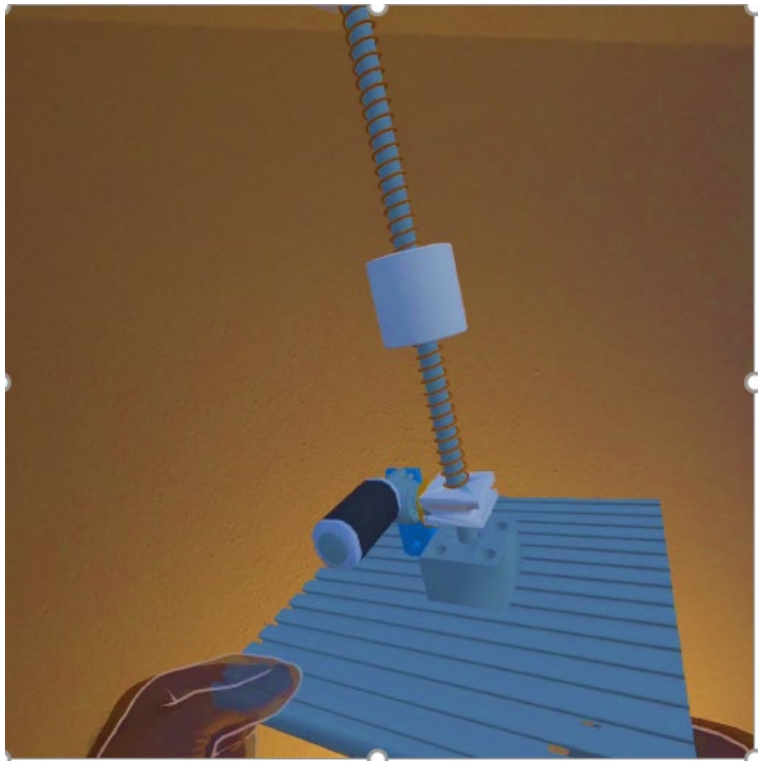

# Conclusions



The transition to e-learning as an innovation that responds to the modern digital era is the solution to addressing the problems of laboratory education.

E-learning using extended reality enviroments  has a positive impact on the effectiveness of the learning process.

Virtual lab, as one of the most innovative tools of digital education, has gained increasing importance in engineering education.