

Bachelor-Arbeiten BSc Bauing - FS 2020

Leiter der Bachelor-Arbeit:	Prof. Dr. Eleni Chatzi
Institut:	Institut für Baustatik und Konstruktion (IBK)
Fachbereich:	Professur für Strukturmechanik & Monitoring
Anzahl Themen:	6
Themen direkt auf der Website der Professur/des Instituts veröffentlicht	Link: http://www.chatzi.ibk.ethz.ch/education.html

<p>Titel der Bachelor-Arbeit:</p>	<p>Structural Identification using Vision</p>
<p>Betreuer der Bachelorarbeit:</p>	<p>Dr. Zhilu Lai, Prof. Dr. Eleni Chatzi</p>
<p>Beschreibung:</p>	<p>As illustrated by recent catastrophic events like the Morandi bridge collapse in Genoa, there is an urgent need for tools that can monitor and support the health of infrastructure. Computer vision aided structural health monitoring (SHM) has very recently gained increasing popularity in this context due to its highly beneficial features including contactless acquisition, high spatial resolution, and no requirement of bulky wiring.</p> <p>The goal of this project is to leverage recent advances in computer vision techniques for structural monitoring and assessment, identifying mode shapes from recording videos of vibrating structures (from standard cameras or drones).</p> <p>This project offers topics of hands-on experiment testing and image data processing and analysis. Students will be exposed to:</p> <ul style="list-style-type: none"> - structure vibration testing - image data processing (supported by existing tools of the group) - structural modal identification - use of cameras/UAVs (drones)
<p>Empfohlene Lehrveranstaltungen:</p>	
<p>Platzbeschränkung</p>	<p>Nein: <input type="checkbox"/></p> <p>Ja: <input checked="" type="checkbox"/></p> <p>Anzahl Plätze: 2</p>
<p>Gruppenarbeit</p>	<p>Nein: <input type="checkbox"/></p> <p>Ja: <input checked="" type="checkbox"/></p> <p>Gruppengrösse:</p>
<p>Besonderes:</p>	<p>knowledge of MATLAB or Python necessary</p>

<p>Titel der Bachelor-Arbeit:</p>	<p>Machine Learning for Condition Monitoring of Railway Infrastructure</p>
<p>Betreuer der Bachelorarbeit:</p>	<p>C. Hoelzl, Prof. Dr. E.Chatzi</p>
<p>Beschreibung:</p>	<p>Are you curious on the use of dools for data processing tools for assessment of critical infrastructure, such as railways? If so, this projects offers an opportunity to get to know basic signal processing methods, as well as machine learning tools used or the purposes of natural language processing, clustering and fault estimation for railway tracks. The data in this case comes from on board sensors, which are installed on the axl box of specialized diagnostic vehicles of the Swiss Railway Authority (SBB).</p> <p>Main tasks:</p> <p>Introduction to Machine Learning modules using Python</p> <p>Introduction to the Dynamics of Railway Vehicles</p> <p>Use of signal processing algorithms on dynamic acceleration signals</p> <p>Use of machine learning tools on the processed signals for detecting faults on the rails</p>
<p>Empfohlene Lehrveranstaltungen:</p>	
<p>Platzbeschränkung</p>	<p>Nein: <input type="checkbox"/></p> <p>Ja: <input checked="" type="checkbox"/></p> <p>Anzahl Plätze: 2</p>
<p>Gruppenarbeit</p>	<p>Nein: <input type="checkbox"/></p> <p>Ja: <input checked="" type="checkbox"/></p> <p>Gruppengrösse: 2</p>
<p>Besonderes:</p>	<p>knowledge of MATLAB or Python is necessary</p>

Titel der Bachelor-Arbeit:	Developing Educational Software for Statics & Mechanics Lectures
Betreuer der Bachelorarbeit:	Dr. Konstantinos Agathos, Dr. Vasileios Ntertimanis, Prof. Eleni Chatzi
Beschreibung:	<p>As part of this project, students will develop pieces of software (in MATLAB, Python, or other programming language) which may be used as tools for educational purposes, within the context of structural engineering and mechanics lectures. The tools should offer a friendly graphical user interface (GUI).</p> <p>Possible simulation topics can include:</p> <ul style="list-style-type: none"> - Software for calculating Axial force, shear force, torque and bending moment diagram in frame-type structures - Software for teaching the Direct Stiffness Method - Software for 2nd Order Analysis - Software for calculation of Influence Lines
Empfohlene Lehrveranstaltungen:	Baustatik II
Platzbeschränkung	Nein: <input type="checkbox"/> Ja: <input checked="" type="checkbox"/> Anzahl Plätze: 4
Gruppenarbeit	Nein: <input type="checkbox"/> Ja: <input checked="" type="checkbox"/> Gruppengröße: 2
Besonderes:	knowledge of MATLAB or Python is necessary

Titel der Bachelor-Arbeit:	Laboratory experiments on a small-scale Wind Turbine
Betreuer der Bachelorarbeit:	Dr. I. Abdallah, Prof. Dr. E. Chatzi
Beschreibung:	<p>One important aspect of structural health monitoring (SHM) is the assessment of the non-linear and non-stationary response of a structure or machine, which in turn requires an accurate estimate of the kinematics (displacement, velocity and acceleration) and structural dynamics (strain-stress, forces and bending moments). Wind turbine structures are exposed to highly dynamic and turbulent loads which have a detrimental effects on structural components (blades, tower, foundation). Direct measurements of these effects are non-trivial in actual scale systems.</p> <p>Our group have designed and built a lab-scale rotary wind turbine. The objective is to perform vibrations tests on the scaled wind turbine in controlled laboratory conditions. Apart from the experimental procedures, methods & tools for processing the dynamic response measurements will be developed. Th experimental information will then be used for the detection of abnormal operation, damage detection, and the calculation of the remaining useful lifetime of various components on the turbine.</p>
Empfohlene Lehrveranstaltungen:	
Platzbeschränkung	Nein: <input type="checkbox"/> Ja: <input checked="" type="checkbox"/> Anzahl Plätze: 4
Gruppenarbeit	Nein: <input type="checkbox"/> Ja: <input checked="" type="checkbox"/> Gruppengrösse: 2
Besonderes:	