

Personal Details

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Education

Technical University of Munich, Munich, Germany
Department of Informatics, Garching bei München, Germany
Doctorate of Computer Science, 2018 - present

Erasmus Mundus Common European Master's Course in Biomedical Engineering (CEMACUBE)
Czech Technical University in Prague, Prague, Czech Republic
Master of Science in Biomedical Engineering, September 2016
RWTH Aachen University, Aachen, Germany

Saint Louis University, St. Louis, Missouri USA
Parks College of Engineering, Aviation, and Technology
Bachelor of Science in Biomedical Engineering, December 2014
Minor in Spanish, December
Minor in Italian Studies, December 2014

Technical Skills

- Cell culture
- Sterile laboratory techniques
- Fluorescent microscopy
- Histology including staining, imaging, and cryostat
- Mechanical testing of tissue and scaffolding
- Scaffold degradation testing
- Electrospinning

Programs

- Python (Highly proficient)
- Matlab (Highly proficient)
- Microsoft Office products
- PyTorch
- CAD
- SAS

Research Experience

TU Munich Doctoral Studies (October 2018 – present)

“Deep Learning Techniques for MR Spectroscopic Imaging”

Developing machine learning techniques for analyzing and processing MR Spectroscopic Imaging data, primarily of brain tumors. Currently focusing on model generalizability and metabolite quantification models.

Master Thesis (November 2015 – August 2016, CTU)

“Evaluation of the MR-tagged images with respect to the viability of the heart based on strain analysis”

This was a pilot study attempting to implement and validate an algorithm to assess the left ventricular myocardial deformation present in tagged cMR image stacks using a modified version of the HARP algorithm. To overcome the limitations of traditional HARP, a Gabor filter bank was used. This allows the algorithm to find the optimal phase of each pixel and generate a very accurate Angle image. The process of finding the optimal phase for each pixel identifies the optimal filter as well. The parameters used to create the filters in the filter bank were stored in a lookup table. Once the optimal filter is identified, the

optimal parameters are then used to estimate the strain based on the phase. This is a non-tracking strain estimator. Validation in this study was very challenging because several methods were unable to be successfully implemented. A Wilcoxon ranksum test's p-values indicated great certainty in the results. However, significantly more comprehensive methods of validation must be developed to more accurately assess the algorithm.

Research (September 2013 – May 2014, Dr. Scott Sell, SLU)

“Fabrication and Characterization of a Polydioxanone Electrospun Scaffold for Bowel Anastomosis”

Dr. Sean Glasgow hypothesized an alternative cause for bowel anastomotic leakage. The current model is based on mechanical failure created by leaving a hole in the bowel. However, Dr. Glasgow believes that excessive mechanical pressure might cause poor vascularization of the wound leading to necrosis and subsequently mechanical failure at the resectioning site. The chosen approach to this problem was to develop an electrospun polydioxanone (PDO) scaffold impregnated with PRGF in order to promote revascularization and neovascularization. This scaffold would be used in conjunction with a transrectal stapler that reconnects the two sections of the bowel. The current work is the initial stage of the research and therefore will focus on the characterization of PDO.

First, the fiber diameter and pore size were assessed, via SEM and imageJ, for scaffolds with 5 different concentrations of PDO varying from 10 – 20 wt%. Mechanical testing assessed the degradation and suture retention of scaffolds with 10, 15, and 20 wt% PDO. Meanwhile, the cell studies looked at proliferation, infiltration, and ECM production.

Senior Design (August 2013 – April 2014, SLU)

“Human Monitoring System” (Shuhan Chu; Michael Diab; John LaMaster)

Rural areas and impoverished regions in and outside the United States struggle to provide high quality health care. Often times this is due to the lack of highly skilled and trained professionals and the necessary equipment. In order to ease the burden on these clinics, this project aimed to design a patient monitoring system that requires little to no training to use, non-invasively (contactless) monitors the patient, and will notify providers when the patient's vitals fall outside of set parameters. The ideal setup was a mat that the patient would lay on. Very complex designs were developed, but in the end the goal was to prove the concept. So, the chosen “proof of life” metric was the patient's heart beat. An acoustic monitor was selected because it was a very straightforward to determine if the patient's heart was in fact beating.. Pressure sensors were also incorporated to determine if the patient moved or left the mat. This would aid fall prevention by alerting providers when the patient gets out of the bed. Another alarm would be triggered if the patient was on the mat, but not heart beat was detected within a given period of time.

Research (Summer 2013, Dr. Scott Sell, SLU)

“Fabrication and Characterization of a Manuka Honey Eluting Electrospun Scaffold for Dermal Repair”

This work focused on assessing the mechanical and biological characteristics of PCL scaffolds electrospun with varying concentrations of Manuka honey.

Scaffold degradation testing was accomplished by soaking the dog bone cutouts of the scaffolds in PBS and testing their mechanical strength over a 28-day period. Cell studies evaluated cell proliferation and the chemotactic properties of the scaffolds, by assessing cell migration. Cell migration was assessed using cryostat sectioning and fluorescent microscopy.

This work was presented at the Biomedical Engineering Society (BMES) 2013 Annual Meeting by Ben Minden-Birkenmaier.

Research Training (January 2010 – April 2010, Dr. Cheryl Miller, SLU)

Learned and practiced sterile techniques, pipetting, cell culturing (normal human lung fibroblasts), and histology including fluorescent staining and imaging

Work Experience**Long-Term Substitute Teacher (January 2018 – May 2018)**

- Taught lectures and laboratory experiments for second semester Chemistry II and Honors Chemistry I

Community Organizer (November 2017 – August 2018)

- United Congregations Metro-East
- National Weeklong training competed in November 2017
- Local Cluster leader and Executive Board member

Substitute Teacher (March 2017 – May 2018)

- General substitute teacher. Requested for longer term assignments as well as to lecture for chemistry and labs, anatomy & physiology and dissections, fundamental science courses, math, and German courses
- Most commonly worked in the department for children with special needs and behavioral issues

Summer Schools & Workshops

- Visibility and Research Impact Seminar, TUM, Munich, DE (Mar 2019)
- Research Data Management, TUM, Munich, DE (May 2019)
- Search, Cite, Publish, TUM, Munich, DE (May 2019)
- Predatory Journals and Conferences, TUM, Munich, DE (May 2019)
- Graduate School of Bioengineering, Herrsching, DE (July 2019)
- Human Brain Anatomy, King’s College London, UK (July 2019)
- Gustav-Stresemann Institute’s 30th European Summer School (Sept 2019)
 - Bonn, DE; Luxembourg, LU; Brussels, BE - 10 days
- Routes to Publishing, TUM, Munich, DE (Sept 2019)
- Graduate School of Bioengineering Poster Session, Munich, DE (Oct 2020)
- NeuroMET MR Spectroscopy Workshop (June 2021)
- MICCAI Imposter Syndrome Workshop (July 2021)

Certificates

- Basic course in Laboratory Animal Science, RWTH Aachen
- A1 German with a note of 1,3 (very good), RWTH Aachen
- Gamaliel National Leadership Training, USA

Languages

English – Native
Spanish – C1 (no certificate)
Italian – B1 (no certificate)
German – A1
Czech – <A1