Alexander Belsten

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belsten.github.io

Education

- **Rensselaer Polytechnic Institute** — Troy, NY
  B.S. Computer and Systems Engineering; GPA: 3.78 — *August 2016 - December 2020*
- **University of California, Berkeley** — Berkeley, CA
  Ph.D. Student in Vision Science; Advisor: Dr. Bruno Olshausen — *August 2021 - Present*

Skills & Interests

- **Programming**: C/C++, Python, MATLAB
- **Technologies and Frameworks**: Tensorflow, LTspice, Visual Studio, LaTeX, git, openCV, CMake
- **Interests**: Neuroscience, Vision, Statistical Modeling, Signal Processing, Machine Learning

Work & Research Experience

- **National Center for Adaptive Neurotechnologies (NCAN)** — Albany, NY
  Research Assistant — *May 2018 - Present*
  - Improved and maintained BCI2000, a general purpose software for brain-computer interfacing.
  - Advisors: Drs. Gerwin Schalk, Peter Brunner
- **Intelligent Structural Systems Laboratory (ISSL)** — Troy, NY
  Research Assistant — *May 2020 - Present*
  - Applied time-series deep learning techniques to identify flight states of fly-by-feel aircraft.
  - Advisor: Dr. Fotis Kopsaftopoulos
- **Washington University in St. Louis, Department of Neurosurgery** — St. Louis, MO
  Research Assistant; Systems Engineer — *January 2021 - Present*
  - Developed intracranial electrophysiology research technologies.
  - Advisor: Dr. Peter Brunner

Projects

- **Intracranial and Extracranial Stimulation with BCI2000** - Integrated multitude of electrical stimulation hardware with BCI2000, allowing for a unified framework for performing closed-loop stimulation based experiments across various recording modalities, from EEG, ECoG, sEEG, and single neuron.
- **Wireless Implant for Chronic Intracranial Neuromodulation** - Designed software package using BCI2000 for the CorTec Brain Interchange, a wireless implant intended for use in humans, that enables 24/7 intracranial recordings and the development of novel neuromodulation protocols as treatment for neurological disorders.
- **Multibranch Convolutional Neural Network (CNN) for Flight State Identification** - Designed and implemented branched, one dimensional CNN for flight state identification.
- **CNN/Recurrent Neural Network (RNN) for UCF11 Video Action Classification** - Implemented CNN for spacial feature identification and RNN for temporal feature identification to do multi-class classification (11 classes) on 30 frame video sequences. Achieved accuracy of 1.0 on training data (N=5,800) and 0.974 on testing data (N=1,472).

Publications †First Author

- **Hardware Abstraction to Facilitate the Dissemination and Validation of Electrophysiological Experiments**
  A. Belsten†, M. Adamek, P. Brunner, 2020 IEEE Engineering in Medicine and Biology Society Conference
- **Data-Driven Flight State Identification via Time-Series-Informed Features and Convolutional Neural Network**
  A. Belsten†, F. Kopsaftopoulos, 2021 AIAA AVIATION Forum

Academic Honors

- **Dean's Honor List** 2016-2020: 8 semesters.
- **Rensselaer Leadership Award** 2016: Given in recognition of an outstanding record of academic and personal achievements, a strong commitment to excellence, and illustration of intellectual curiosity

Posters †Presenting Author

- **New Depths in Brain-Computer Interfacing**
  Society for Neuroscience (SfN) 2021 - **in review**
- **BIC-BCI2000: A General-Purpose Hardware and Software Platform for Chronic Intracranial Neuromodulation**†
  Society for Neuroscience (SfN) 2021 - **in review**
- **CorTec Brain Interchange in Freely Behaving Canine**
  Society for Neuroscience (SfN) 2021 - **in review**
- **BCI2000: Software Resource for Adaptive Neurotechnology Research**
  NIH BRAIN Initiative 2021
- **Overcoming Heterogeneous Hardware to Facilitate Dissemination and Validation of Electrophysiological Experiments**†
  Society for Neuroscience (SfN) 2020
- **Evaluating the Closed-Loop Performance of Clinical Electrophysiology Recording Systems using BCI2000**
  Society for Neuroscience (SfN) 2020

Presentations

- **BCI2000 - Interacting with Peripheral Devices**
  NCAN Focus Course 2021 - Scientific and Engineering Principles of Adaptive Neurotechnologies
- **BCI2000's Robust Framework**
  Rensselaer Center for Open Source - Fall 2018

Leadership & Activities

- **HKN - Beta Nu, Honor Society for Electrical and Computer Engineers** - 2019 President; 2020 Webmaster
- **Rensselaer Outing Club Wall Leader** - Organize and run climbing wall hours for Rensselaer community.
- **Troy Bike Rescue** - Assist the local Troy, NY community repair their bicycles.
- **Member of Troy's Tech Valley Center of Gravity**

Teaching

- **Undergraduate TA for Digital Signal Processing (ECSE 4530)** - Fall 2020
- **ALAC Mentor for Data Structures** - Spring, Fall 2018
- **ALAC Mentor for Foundations of Computer Science** - Fall 2018