

Nitin Sadras - CV

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Education

PhD Student, USC Ming Hsieh Department of Electrical Engineering

GPA: 3.7 Advisor: Prof. Maryam Shanechi Started Fall 2016

BS in Electrical Engineering and Computer Science, UC Berkeley

Major GPA: 3.82 Overall GPA: 3.59 Awarded Spring 2016

Technical Skills

Experienced in Python and Matlab. Familiar with Bash/Unix, C++, Java, Javascript, SQL

Research Experience

USC Neural Systems Engineering and Information Processing Lab Aug 2016 - Present

I am working to develop a Brain-Machine Interface (BMI) that can estimate cognitive states such as attention and confidence, and use this information to enhance the ability of subjects to perform difficult tasks. To this end, I have developed a model for how neurons with spatio-temporal response fields encode information about intermittent events, such as eye movements or images presented on a screen. I then designed a novel decoding algorithm based on this model to estimate the times and characteristics of these events from spiking activity in real time. I validated this algorithm using extensive numerical simulations as well as data collected from a macaque monkey. This work has been accepted for publication in the Journal of Neural Engineering.

In order to investigate the neural correlates of confidence, I developed a stimulus discrimination experimental paradigm in which subjects must discriminate between two types of stimuli. Additionally, I have collected neural data from healthy subjects (EEG data) and epilepsy patients with invasive electrode implants (ECoG data) who performed this paradigm. I showed that an augmentative brain-machine interface based on the decoding of confidence from neural activity is a viable way to improve a user's performance on difficult tasks. Further, I used EEG Source Localization and Event Related Potential (ERP) analysis to understand the spatiotemporal properties of the neural correlates of confidence. This work is currently being prepared for publication.

UC Berkeley Computational Imaging Lab Feb 2014 - May 2015

As a Research Assistant at the Computational Imaging Lab, I implemented a phase imaging algorithm for Android devices that computes the thickness of microscope samples by taking advantage of chromatic aberration. The app will be used to help diagnose various diseases by making it easier to see transparent parasites that would normally be almost invisible. The results of this work were published in PLoS One. Additionally, I designed and printed custom parts for lab microscopes using Autodesk Inventor.

Publications

Sadras N, Pesaran B, Shanechi MM (2019). A point-process matched filter for event detection and decoding from population spike trains. Journal of Neural Engineering, Accepted Aug 2019. doi:10.1088/1741-2552/ab3dbc

Sadras N, Shanechi MM (2018). "Decoding Spike Trains from Neurons with Spatio-Temporal Receptive Fields", in Proceedings of IEEE Engineering in Medicine and Biology Society (EMBC) Conference, Honolulu, HI doi:10.1109/EMBC.2018.8512598

Fernandez-Vargas J, Valeriani D, Cinel C, Sadras N, Ahmadipour P, Shanechi MM, Citi L, and Poli R. (2020). Confidence Prediction from EEG Recordings in a Multisensory Environment. In Proceedings of the 2020 10th International Conference on Biomedical Engineering and Technology (ICBET 2020). Association for Computing Machinery, New York, NY, USA, 269-275. doi:10.1145/3397391.3397426

Phillips ZF, D'Ambrosio MV, Tian L, Rulison JJ, Patel HS, Sadras N, ... Waller L (2015). Multi-Contrast Imaging and Digital Refocusing on a Mobile Microscope with a Domed LED Array. PLOS ONE, 10(5). doi:10.1371/journal.pone.0124938

Industry Experience

Sensors Engineering Intern at Google - Nest Labs

May 2015 - Aug 2015

Designed, simulated, and built circuits for the Nest Protect smoke detector using LTSpice for simulation and Eagle CAD for PCB layout. Hand-soldered SMD components and validated functionality using an oscilloscope. Developed Arduino code to interface the smoke detector circuit with Nest's hardware test framework. Developed Raspberry Pi application to wirelessly communicate with Nest field test devices and log data to the cloud.

Integration Engineering Intern at Google - Nest Labs

May 2014 - Jul 2014

Developed an emulator for the Nest Protect smoke detector using the QEMU platform. Tasks included modeling sensors, implementing virtual time acceleration, and developing a communication interface between emulated microcontrollers. Wrote a Python API for interfacing the emulator with Nest's existing testing framework. The emulator will be used for end-to-end testing of the Nest Protect.

Software Intern at EMC Avamar

Jun 2013 - Aug 2013

Developed a C++ data generation application for the testing of EMC's Data Domain backup servers and wrote bash and python scripts to automate Data Domain log analysis. The application will be used throughout EMC's Avamar/Data Domain division.

Web Developer at the Daily Californian

Feb 2013 - May 2014

Tasked to build web pages and plugins for the Daily Californian's news website. Projects include a custom post ordering Wordpress plugin, a mobile website prototype, and a node.js server for hosting pdf versions of the Daily Cal's print paper.