# Hani Awni

*Neuroengineer & Computer Engineer*

## Education

2015–2017 **BS: Electrical Engineering**, *Univ. of Illinois*, Urbana, IL, *GPA – 3.8*.
Focused on control theory, biomechanics, and robotics.

2009–2013 **BS: Brain-Machine Interfacing (CS)**, *Univ. of Illinois*, Urbana, IL, *GPA – 3.2*.
Expanded computer science major with deep background in cognitive science, neuroscience, and signal processing. Third custom degree ever awarded by Engineering College.

### Classes

2015-16 Control Theory, State Space Control, Neuromuscular Modeling, Embedded Systems, Biomedical Imaging, Electromagnetic Field Emission & Transmission

2009-13 Program Verification, Neural Network Modeling, Cognitive Psychology, EEG Experiment Design, Computational Neuroethology, Machine Learning, Database Systems

## Publications

Title *Towards A Brain Computer Interface Based on the N2PC Event Related Potential.*

Authors Hani Awni, J. Norton, S. Umunna, Dr. K. Federmeier, and Dr. T. Bretl.

Description Demonstrates feasibility of an EEG-driven BCI of my own design, based on the heretofore unused N2pc event related potential. Unlike the more common P300Spellers or SSVEP-Spellers, this BCI does not involve a flashing interface, thus improving comfort for extended use. Presented at IEEE EMBS NER 2013.

## Experience

### Vocational

05/2016–08/2016 **EEG Data Analyst**, DAQRI, Los Angeles, CA.

- Invented 4 ERP-driven applications of EEG signals to Augmented Reality interactions. Co-invented 2 additional inventions as second author. Currently in preparation for patent application submission.
- Construct and verify labratory-grade EEG data gathering, streaming, and analysis software environment
- Design and implement interface between the OpenBCI NodeJS library and SCCN's LabStreamingLayer to enable multidevice synchronization and BCILAB-driven analytics using the low-cost OpenBCI EEG device.
- Research, analyze and interpret sleeping EEG data using Python's SciPy library.

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01/2014–05/2015 **Independent Neuroengineer & House Captain**, Self-Employed, San Francisco, CA.

- Helped direct the setup and growth of a 25-person intentional community focused in interdisciplinary intellectual interchange in San Francisco.
- Resolved or mediated inter-resident conflicts with an eye toward the overarching goal of the community.
- Worked on myriad neuroengineering projects, including Moodband, a wearable for EEG-based emotional state visualization; ley*, a MFQ-scheduler-inspired to-do system; Respectable, a social-graph analysis tool; an Abalone AI competition; and NOS, a generalized BCI analysis system in collaboration with Randal Koene.
- Self-taught and took online courses in chaos, complexity theory, and medical neuroscience.
- Researched possible BCIs and wearables, especially in the contexts of potential game designs, mental health, biological robots, and behavioral reinforcement.

05/2013–12/2013 **Software Developer**, Palantir Technologies, Palo Alto, CA.

- Expanded and maintained web interface in Javascript (Typescript and Coffeescript), and Java.
- Designed, developed, and implemented additional features to core product in Java Swing.

05/2010–08/2010 **Engineering Camp Counselor**, WYSE Summer Camp, Urbana, IL.

- Managed groups of 20-30 High School seniors and juniors through multiple presentations of different engineering majors
- Led groups on campus tours, gave extensive advice on adapting to college life, and concretized realities of college freedoms
- Taught high schoolers through a weeklong programming project in Lego Mindstorms to create robots that navigated an obstacle course.

05/2008–08/2011 **Database Architect Intern**, Baxter Credit Union, Vernon Hills, IL.

- Designed, coordinated, and implemented expansions to database processing capability.
- Collaborated with non-technical employees throughout the company to clarify the aims of various projects and subsequently implemented projects according to their specifications.
- Trained and led team of new interns in T-SQL programming on several database-improvement projects.

## Lab Experience

01/2011–05/2013, 05/2015–Present **Experiment Designer/Researcher**, Dr. Hummel's Cognitive Modeling Lab, Urbana, IL.

- Expanded LISA model of human abstract reasoning to better reason about complex situations and develop doubt in hypothetical situations.
- Designed & implemented experiment interfaces and structure to best test working theories of relational visual perception.
- Aided psychology Phd. students in coding data analysis and results interpretation in light of relevant theories.

08/2012–05/2013 **BCI Researcher**, Dr. Bretl's Applied Controls Lab, Urbana, IL.

- Researched and implemented novel EEG-based Brain-Computer Interface, the N2PCSpeller.
- Recruited and ran subjects to collect data to test and optimize N2PCSpeller.

01/2010–05/2012 **Lab Technician and Analyst**, Dr. Federmeier's Neurolinguistics Lab, Urbana, IL.

- Assisted graduate students both with writing experiment code and with data mining of ERP results despite abundance of noise and artifacts.
- Aided in setup and running of subjects in EEG experiments, enabling high subject throughput.
- Ensured a comfortable atmosphere for test subjects despite otherwise abnormal circumstances.
- Taught new research assistants and graduate students efficient procedures in use of lab equipment.

## Leadership and Membership

Member ACM, IEEE, Undergraduate Neuroscience Society, BioMedical Engineering Society

High School WYSE(Captain), JETS(Captain), Science Bowl(Captain), Math Team(President)

## Skills

Basics LaTeX, Windows, Mac OSX, Linux, Unity Engine, Office Suite

Programming Python, C, JavaScript, SQL, Java, C++, Ocaml, NetLogo

Languages English (native tongue)

## Interests

- Biosensing
- Social Justice
- Robotic Exoskeletons
- Implementations of Intelligence
- Modern Internet Communities
- Neuroengineering
- Interdisciplinarianism
- Biomechanics
- Atypicality

## Partial Project Graveyard

01/2016–05/2016 **Open-Source Simulink Upper Extremity Model of Planar Arm Motion for Real-Time Control**, *Hani Awni, M. Hernandez (PI).*

Implemented and documented 2 DOF UE model entirely in Simulink for planar arm motion with realistic muscle behavior. Superior to formerly-used OpenSIM models due to reliably differentiable (consequently discontinuity-free) muscle lengths across entire range of motion. Wrote associated brief and clarified papers documenting usage and design decisions.

Cause of Death Scooped immediately prior to submission to conferences by more advanced UE model; papers are still available upon request.

01/2016–05/2016 **Analogical Reasoning May Explain Racists Calling Idris Alba "Too Street"**, *Hani Awni, S. Wilner (Advisor), Dr. J. Hummel (PI).*

Demonstrates that pure analogical reasoning, as implemented in LISA, a neural-network model of human abstract relational reasoning from the Hummel Lab, is sufficient to cause disbelief in a hypothetical African-American Bond after exposure to numerous extant James Bond film plots.

Cause of Death Starved for time while translating additional Bond plots into propositional logic.

08/2015 - 12/2015 **Low Cost Alternative for MacromicroUAVs: Off-the-Shelf Remote-Control Beetles**, *Hani Awni*.

Adapts the Maharbiz lab's work with Jade Flowering beetles as RC UAVs to work with off-the-shelf microcontrollers and radios. Uses ATTiny microcontroller and HM11 BLE module to substantially reduce electronics cost to less than $\$0.25$ per beetle by simply scaling up the beetle to carry the heavier payload. Needs Hercules, Atlas, or Goliath beetles or similar.

Cause of Death: Electronics/Firmware prepared, yet testing delayed pending access to large beetles and lab. Will resume if I ever live in Southeast Asia.