Hani Awni

Neuroengineer & Computer Engineer

Education

2015–2017   **BS: Electrical Engineering**, *Univ. of Illinois*, Urbana, IL, *GPA − 3.6.*
Focused on control theory, biomechanics, and robotics. Participated in the Engineering & Social Justice Scholars Program and advocated for socially-conscious STEM education.

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

2015-2017   Control Theory, State Space Control, Neuromuscular Modeling, Embedded Systems, Biomedical Imaging, Robotics, Engineering & Social Justice, Signal Processing

2009-2013   Neural Network Modeling, Cognitive Psychology, EEG Experiment Design, Computational Neuroethology, Machine Learning, Database Systems, Program Verification

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Research

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

Authors/Year   Hani Awni, J. Norton, S. Umunna, Dr. K. Federmeier, and Dr. T. Bretl. 2012-2013

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. 1st Senior thesis. Presented at IEEE EMBS NER 2013.

Title   *Biomechanically-Valid Motion Capture despite Occlusion using Kinects and IMUs.*

Authors/Year   Hani Awni, D. Douglass, Dr. R. Ratnam. 2016-2017

Description   Demonstrates localizing realistic human musculoskeletal model throughout a motion despite occlusion from multiple Kinects and IMUs, in order to predict fall risk of the elderly during ecologically-valid routine motions. 2nd Senior thesis.

Title   *Open-Source Simulink Model of Planar Arm Motion for Real-Time Control.*

Authors/Year   Hani Awni, Dr. M. Hernandez. 2016

Description   Implemented and documented 2 DOF Simulink model for planar arm motion with realistic muscle behavior. Superior to formerly-used OpenSIM models due to reliably differentiable & discontinuity-free muscle lengths across entire range of motion.

Experience

Vocational

05/2016–
08/2016
EEG Data Analyst, DAQRI, Los Angeles, CA.
- Invented 4 ERP-driven applications for Augmented Reality interactions. Co-invented additional 2 as second author. Currently in preparation for patent app submission.
- Constructed labratory-grade real-time EEG recording, streaming, and analysis stack.
- 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.

01/2014–
05/2015
Solo 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 pursuant to overarching community goals.
- 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; and an Abalone AI competition.
- 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 Engineer, PALANTIR TECHNOLOGIES, Palo Alto, CA.
- Expanded and maintained graphing web interface in Javascript and backend Java.
- Designed, developed, and implemented additional features to core product in Java Swing.

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

08/2016–
Present
Researcher, DR. RATNAM'S HEALTHCARE ENGINEERING LAB, Urbana, IL.
- Created & used recording software in small team to capture elderly subjects in realistic apartment environments despite occlusion.
- Created analysis pipeline to estimate realistic biomechanically-valid body motion from noisy Kinects, force sensors, and IMUs.
- Collaborated across numerous disciplines and institutions, including Dr. Sosnoff's Fall Prevention Lab and the Jump Trading Medical Simulation Center in Peoria.

01/2011–
05/2013,
05/2015–
05/2016
Research Engineer, 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 using analogies.
- Designed & implemented experiment interfaces and structure to best test working theories of relational visual perception, attention, and memory.
- Aided Phd. students in coding, data analysis, and interpretation of relevant theories.

08/2012–
05/2013
BCI Researcher, DR. BRETL'S APPLIED CONTROLS LAB, Urbana, IL.
- Researched and implemented novel EEG Brain-Computer Interface, the N2PCSpeller.
- Recruited and ran subjects to collect data to test and optimize N2PCSpeller.

01/2010–	**Lab Tech/Analyst**, DR. FEDERMEIER'S NEUROLINGUISTICS LAB, Urbana, IL.
05/2012	○ Assisted graduate students both with writing experiment code and with data mining of ERP results despite abundance of noise and artifacts.
	○ Aided in subject preparation and running in EEG experiments for high subject throughput.
	○ Ensured comfortable atmosphere for subjects despite otherwise abnormal circumstances.
	○ Taught new lab assistants and grad students efficient procedures in use of lab equipment.

Service

08/2016–	**STEM Outreach Facilitator**, UI:CHICAGO, Chicago, IL.
12/2016	○ Taught 8th graders from Chicago Public Schools how to use MIT's Scratch visual programming language to empower students for future possible STEM careers.
	○ Established rapport with a small handful of 8th graders despite differing backgrounds to make college less intimidating and foreign.
	○ Introduced several advanced students to more powerful programming environments like NetLogo and demonstrated modeling animal behavior with their current capabilities.

11/2014–	**Visiting Lecturer & Panelist**, LIBERTYVILLE HIGH SCHOOL, Libertyville, IL.
Present	○ 3+ times per year, presented to multiple AP CS classes in Libertyville to demystify post-high-school life in light of industry life.
	○ Clarified the breadth of CS subfields, overviewed engineering majors, and characterized variety & vitality of various STEM industries and careers.
	○ Answered questions from current high schoolers about their futures and abolished common myths about life, emotional vulnerability, social connection, metal health, and adulthood.

05/2010–	**Engineering Camp Counselor**, WYSE SUMMER CAMP, Urbana, IL.
08/2010	○ 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.

Leadership and Membership

| Undergrad | 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, Git
Programming	PYTHON, C, JAVASCRIPT/NODEJS, MATLAB, JAVA, C++, OCAML, NETLOGO, MATHEMATICA, SQL
Frameworks	ROS, Simulink, PEG, Google App Engine, Jupyter Notebooks, LabStreamingLayer

Interests

- Augmentative Biotechnology
- Neuroengineering
- Social Justice & STEM
- Interdisciplinarianism
- Robotic Exoskeletons
- Progressive Transhumanism
- Emergent Intelligence
- Complex Systems
- Consciousness Pudding on a Sea of Automation

Partial Projects List

04/2014– Present **Automated, Digitized, Personal Executive Functions (GSD)**, *Hani Awni.*
Digital personal assistant allowing hierarchical project definition & tracking consisting of inbox, master project library, project prioritization, current task list, and productivity tracking/railroading tools. Automatically reduces entire library of goals, in light of current priorities and available time and context, into single current task for immediate execution while forcing focus.

Status In development. Basic project/task tracking implemented, currently automating.

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, is sufficient to cause disbelief in a hypothetical African-American Bond after exposure to numerous extant James Bond film plots.

Status Starved for time while translating additional Bond plots into propositional logic.

08/2015 - 12/2015 **Low Cost MicroUAVs: 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 scaling up the beetle to carry the heavier payload. Needs Hercules, Atlas, or Goliath beetles or similar.

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