Jonathan J. Michelson

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Education

Carnegie Mellon University — Pittsburgh, PA
M.S. Music and Technology — Aug. 2017

Binghamton University, State University of New York — Binghamton, NY
B.S. Electrical Engineering | Cum Laude — May 2015

Experience

Electro-Harmonix / New Sensor Corporation — Long Island City, NY
Software / DSP Engineer — Aug. 2017 - Present
• Delivered award-winning products: Best Effect Pedal of 2018, Gear of the Year, Premier Gear, Editor's Pick, etc.
• Coded Python, MATLAB scripts for visualizing frequency responses, parsing hex data, emulating analog equipment
• Optimized embedded C audio effects (pitch, reverb, etc.) and firmware (SPI, DMA) for real-time Blackfin target
• Oversaw product life cycle: design and UX, sourcing, development, production, QC, maintenance, customer service
Skills: CrossCore, C, MATLAB, Python, NumPy, batch, git, Jira, DAWs, soldering, oscilloscopes, function generators

Bose Corporation — Framingham, MA
Applied Research Intern — Sep. - Dec. 2016
• Updated backend components across Bose's stack for administering web-based psychoacoustic listening experiments
• Designed the DSP blocks which sent the audio stimulus to users and prompted their response
• Ingested participants' responses to Linux server and database via Node.js and Chrome App user interface
• Extracted response data from server to synthesize 3D visualizations which augmented tech for clients: Mazda, Cadillac
Skills: MATLAB, Simulink, bash, Node.js, MongoDB, Linux, Chrome App, SVN, data visualization

Research

Automatic Guitar Tablature Transcription from Audio — New York, NY
Peer-reviewed presentation at AES Convention 145 — Oct. 2018
• Published (first author) two new machine learning methods to classify guitar string IDs from audio recordings
• Trained and tested using custom and standardized (RWC database) recordings of classical, acoustic, electric guitars
• Achieved state-of-the-art accuracy of 95% (F-score) for classical and acoustic guitars
Skills: MATLAB, LaTeX, git, maximum likelihood estimation, expectation maximization, Bayesian inference

Electromagnetic Field Test Structure chip for BEOL Metrology — Tempe, AZ
Peer-reviewed presentation at ICMTS 2015 — Mar. 2015
• Published paper after participating in summer program at the National Institute of Standards and Technology
• Developed FEA model to simulate the ability of scanning microwave microscopy to image buried wires
• Visualized animations of simulation results to 60 peers at end-of-summer symposium
Skills: COMSOL, FEA, SMM, electromagnetics, technical communication

Projects

LPC Beatbox Conversion - built system that learned beatbox recordings, converted to corresponding drum samples
Skills: LPC filters, MATLAB, note onset detection, Python, NumPy, DAWs

Adaptive Filter - implemented adaptive filter that learns and cancels noise on corrupted voice recordings
Skills: MATLAB, Python, NumPy

Movie Recommendation System - coded ML routine for predicting viewers' ratings of movies based on rating history
Skills: Python, NumPy, collaborative filtering, matrix factorization

NYC Citibike Classifier - predicting gender of cyclists using neural nets on data from millions of trips
Skills: Python, NumPy, Tensorflow, Keras, Jupyter, git

Beatbox Recognition System Pittsburgh, PA
Course project at Carnegie Mellon Nov. 2015
• Built a system that converted beatbox recordings to corresponding drum patterns of kick, snare, and hi-hat samples
• Recorded custom dataset of beatbox recordings to train system in identifying drum types
• Classified unknown beatbox sounds with LPC filters and substituted the appropriate drum samples (WER = 0.0092)
Skills: MATLAB, LPC filters, DAWs, Python, NumPy, note onset detection

Guitar Tube Amp Build Binghamton, NY
Course project at Binghamton University May 2015
• Built from scratch an original vacuum tube amp design, from chassis tooling to hand-wiring the circuit
Skills: SPICE, electronics, soldering, oscilloscopes, shop tools

Movie Rating Recommendation System Pittsburgh, PA
Course project at Carnegie Mellon May 2016
• Coded an algorithm for predicting viewers' ratings of movies based on their rating history for other movies
• Evaluated on the MovieLens dataset comprising millions of user-movie ratings
Skills: Python, NumPy, collaborative filtering, matrix factorization

NYC Citibike Classifier Brooklyn, NY
Pet project Apr. 2020
• Experimenting with predicting gender of cyclists using neural nets on data from millions of trips
Skills: Python, NumPy, Tensorflow, Keras, Jupyter, git

Backup Server Huntington, NY
Pet project Dec. 2018
• Automated family computers' backups to remote RaspberryPi hard drive
Skills: Linux, bash, ssh, port-forwarding, DDNS, rsync

Relevant Coursework/Projects
[stuff CMU stuff here]

Misc. Projects

Beatbox Recognition System - built system that learned beatbox recordings, converted to corresponding drum samples
Skills: Python, NumPy, MATLAB, LPC filters, DAWs, note onset detection

Movie Recommendation System - coded ML routine for predicting viewers' ratings of movies based on rating history
Skills: Python, NumPy, collaborative filtering, matrix factorization

NYC Citibike Classifier - predicting gender of cyclists using neural nets on data from millions of trips
Skills: Python, NumPy, Tensorflow, Keras, Jupyter, git

Miscellaneous

Cycling: Volunteer mechanic at local bike shop; raised $540 for 50-mile charity ride benefitting National MS Society
Languages: Basic speaking/listening: {Spanish, Cantonese, Mandarin}
Music: Write/arrange/record/produce original music in pastime

Various Advanced DSP Projects Pittsburgh, PA
Nov. 2015

• LPC Vocoder
• Adaptive noise-cancelling filter
• Statistical signal processing
Skills: MATLAB, LPC filters, DAWs, Python, NumPy, note onset detection

LPC Vocoder | Pittsburgh, PA Aug. - Dec. 2015
• Produced functional speech vocoder using linear predictive coding filter coefficients
• Produced
Skills: MATLAB, Levinson recursion, reflection coefficients

Spoken
Programming/scripting/libraries: MATLAB, C, Python, bash, batch, NumPy, Keras, TensorFlow
Software/Web Tools: Jupyter, Jira, Trello

Spoken Languages: Beginner: {Spanish, Cantonese, Mandarin}
Programming/scripting/libraries: MATLAB, C, Python, bash, batch, NumPy, Keras, TensorFlow
Software/Web Tools: git**,** LaTeX, CrossCore, Jupyter, Jira, Trello, DAWs (Logic, Pro Tools, Audition, Audacity)

Skills

Tesnroflow??? Numpy, keraas, latex

Adaptive Noise Cancellation | Pittsburgh, PA Aug. - Dec. 2015
• Implemented noise-cancelling adaptive filter in MATLAB for use on corrupted voice recordings