Hieu Minh Nguyen

hieu@niftyhedgehog.com
(213) 537-4438
linkedin.com/in/hieuminh
github.com/cheehieu

A creative, driven engineer with experience in embedded systems, hardware prototyping, and robotics.

EDUCATION

Georgia Institute of Technology, Atlanta, GA
M.S Computer Science, *Computational Perception & Robotics* — Expected 2017

University of Southern California, Los Angeles, CA
M.S. Electrical Engineering, GPA: 3.83, *Computer Systems Architecture* — 2012
B.S. Electrical Engineering, GPA: 3.79, *Computer Architecture, Controls & Robotics* — 2011

TECHNICAL SKILLS

Engineering:	Altium, Eagle, CodeComposer, Xilinx ISE/XPS, ModelSim, ChipScope, SPICE, Nimbic
Languages:	C, C++, ARM assembly, Python, Perl, Bash, Java, Verilog, VHDL, Matlab, MicroC
Software Tools:	ROS, PCL, Android, AWS, OpenCV, Eclipse, Visual Studio, Vim, Git, Subversion
Lab Tools:	Oscilloscope, JTAG debugger, logic analyzer, spectrum analyzer, multimeter, ThermoStream, thermal chamber, surface mount assembly, laser cutter, 3D printer, CNC

WORK EXPERIENCE

Texas Instruments, Dallas, TX, *Systems Applications Engineer*, 2012 – 2015. Collaborated with digital designers, software developers, field/product/test engineers, marketers, and customers to support TI's catalog of ARM embedded microprocessors in the broad market space.

- Achieved deep, technical understanding of power, reset, and clock management architecture including ultra-low power modes, suspend/resume, DVFS, cpufreq, cpuidle, runtime PM for Linux and no-OS SDKs.
- Validated system functionality during silicon board bringups with focus on power distribution network, discrete and companion-PMIC power solutions, battery backup and charging, and timer modules.
- Lead automated bench characterization efforts for power management, thermal considerations, and DDR signal integrity across process, voltage, and temperature variables for datasheet specification.
- Managed production of Java-based tool for analyzing processor clock tree configurations and data import.
- Developed tools, user guides, and training materials to improve customer knowledge base.

NASA Jet Propulsion Laboratory, Pasadena, CA, *Intern*, 2011. Performed research work for Flight System Avionics, on the Instrument ShAred Artifact for Computing (ISAAC) and SMAP projects. Developed and implemented DSP algorithms in Verilog/VHDL to expand the library of computationally-intensive instrument control and computing functions for a modular, reusable FPGA-based platform.

CRES Interaction Lab, Los Angeles, CA, *Research Assistant*, 2010. Conducted directed research under Dr. Maja Matarić, exploring human-robot interaction and social primitives through multi-modal activity modeling. Utilized the Robot Operating System (ROS) to model and validate the human perception of robot deictic gestures from head orientation, timing data, and dynamic feedback.

RELEVANT PROJECT EXPERIENCE

- *AfternoonCape* – prototyped an inexpensive power/thermal measurement cape for the BeagleBone Black to monitor real-time power consumption in any system equipped with current shunt resistors
- *SeaBeeIII AUV* – Designed PCBs for sonar navigation, LiPo battery management, and interactive kill switch for use in an autonomous underwater vehicle for the international "RoboSub" competition.
- *Pool Safety Device* – collaborated with marketing and fine arts students to create a wireless electronic wristband alert system to prevent children from drowning in home swimming pools
- *Rocket Avionics Power System"* – designed a fault-tolerant power distribution system for navigation, communication, and telemetry equipment in a hybrid-powered rocket mission to 100k+ ft apogee

PROJECT EXPERIENCE

Handheld Gimbal – *Summer 2015* – Fabricated a 3-axis gimbal prototype to stabilize video footage from a handheld GoPro camera. Machined parts with 3D printer, CNC, and injection molder to integrate brushless motors, gyroscope, accelerometer, gimbal controller, and LiPo battery power distribution system.

Bubbly Cloud – *Summer 2015* – Built a "smart" bubble making machine with MSP430 and CC3200 WiFi MCUs to connect DC motor and fan to the Cloud. Experimented with 3D-printed bubble wand designs and fan orientation by mounting payload on a 3DR IRIS+ drone.

Thermal Printer Cape – *Spring 2015* – Prototyped a thermal printer cape reference design on the BeagleBone Black. Implemented real-time control signals for thermal print head and cutter with the PRU-ICSS interface on the AM335x microprocessor.

Stellaris Robot – *Fall 2014* – Developed control software for a maze-solving robot running a Micro-C RTOS for message passing between sensors and actuators on a TI Stellaris MCU.

Remote Thermal Daughter Card – *Summer 2014* – Designed a small, inexpensive daughter card for monitoring the junction temperature of a remote thermal diode to within ±1°C. Bash script incorporated beta compensation, series resistance cancellation, and ideality factor correction features to reduce error.

AfternoonCape – *Spring 2014* – Prototyped an inexpensive power measurement cape for the BeagleBone Black to monitor real-time voltage, current, and power consumption in any TI Sitara-based evaluation module equipped with current shunt resistors. Implemented command-line interface with standalone Bash scripts running on a Debian Linux distribution.

PM Board Zoo – *Summer 2013* – Designed a collection of animal-themed power measurement adapter PCBs for performing automated characterization on TI Sitara ARM microprocessor evaluation modules.

Smart Grid Mobile App – *Spring 2012* – Developed an Android application to encourage sustainability and energy conservation in an advanced metering infrastructure smart grid on the USC campus. Utilized informatics and cloud-hosted services (AWS, Eucalyptus) in the backend for scalability, sharing, and security.

Rocket Avionics Power System – *Spring 2012* – Designed a fault-tolerant power distribution system for navigation, communication, and telemetry equipment in a hybrid-powered rocket mission to 100km+ apogee. Utilized LiPo batteries and high-efficiency switching voltage regulators to create a redundant system for powering data-logging sensors and GPS transmitters.

(RC) Car Collision Avoidance – *Spring 2012* – Developed a real-time computer system to prevent head-on traffic collisions on a scaled hardware platform consisting of RC car, microcontroller, and Android-powered smartphone. Project encompassed analog signal processing, Bluetooth communication, motor control, interrupts & scheduling, fault-tolerance & recovery.

Autonomous Underwater Vehicle – *2008–2012* – Worked with engineering students to build an autonomous underwater vehicle to compete in the annual AUVSI international "RoboSub" competition. Oversaw the HW/SW design life-cycle for a variety of electronics projects including the PCB design, assembly, and testing of a passive sonar navigation system, LiPo battery management, interactive kill switch, and general maintenance of the electrical system.

Duplo Sensing and Manipulation with the PR2 – *Fall 2011* **–** Used ROS and PCL to capture and manipulate point clouds generated from a robot-head-mounted Microsoft Kinect sensor. Developed an algorithm that performed a series of filtering, segmentation, and clustering techniques to identify Duplo blocks by color, size, and orientation.

Micro-architecture Simulation – *Fall 2011* – Used Cacti and SimpleScalar to explore the design space of microarchitecture enhancements to an existing out-of-order superscalar processor design with dynamic scheduling, branch prediction, speculative execution, and caches. Analyzed bottlenecks and data access times, prototyped cache configurations, and benchmarked new performance/power/area designs.

Out-of-order Processor Design – *Summer 2011* **–** Implemented a Tomasulo-based processor system in VHDL on a Nexys 3 FPGA. The architecture supported basic MIPS ISA instructions, complete with IFQ, dispatch units, BPB, RAS, FRL, PRF, CFC, functional units, CDB, instruction and data caches, ROB, LSQ, store buffer.

QM-FIR Digital Filter Core – *Spring 2011* – Ported and improved a quadrature demodulation finite impulse response digital filter IP core to a custom Virtex-5 FPGA-based board using Verilog/ VHDL with Xilinx ISE/EDK. Validated and debugged using ChipScope, Wireshark, Matlab, Python, C, and simulated data streams over UART and Ethernet UDP/TCP protocols.

Pool Safety Device - *Spring 2011***–** Collaborated with EE, marketing, and fine arts students to build an electronic wristband alert system for preventing children from drowning in home swimming pools. Built a working prototype with microcontroller, water-detection circuit, RF transceiver, LCD, and power regulator/monitor. Developed software in C for interrupt-driven I/O, SPI protocol bit banging, and RF communication with a base station.

Robot Search-and-Rescue – *Fall 2010* – Used Lego bricks to build a robot to efficiently navigate a maze-like course and perform search-and-rescue tasks. The robot's sensors/actuators included sonar module, IR sensor, compass, web-camera, servo-motors, and gripper. Developed algorithms in C for object recognition, vision processing, Monte-Carlo localization particle filtering, and PID control loops.

Deixis Experiment – *Summer 2010* **–** Modeled the human perception of multi-modal robotic deictic gestures (nonverbal communication) with salient objects to explore human-robot interaction. Utilized C++ and ROS to handle an experiment involving the Bandit II robot, SICK-LMS laser rangefinder, overhead and forward-facing cameras, head tracking, Wiimote controller, OpenCV, ARToolKit, Boost. Ran experiments on 15+ human test subjects.

Touch Tone Recognition – *Spring 2010* – Implemented signal processing algorithms in Matlab to decode dual-tone multi-frequency touch tones from audio samples using FFT, signal denoising, pitch extraction, and sound visualization. Developed a GUI to manipulate and visualize data.

Cigar Box Guitar – *Fall 2009* – Constructed a 6-string electric guitar with pickup, rectifying/amplifying circuit, and distortion effects using standard passive components. Simulated design in PSPICE.

ACHIEVEMENTS

Hoffman Scholar, ACE Mentorship Scholar, NSF REU Awardee, Featured *Illumin* Author, Tau Beta Pi, Eta Kappa Nu, CSC Dive Volunteer, USC Intramural Soccer Champion, EP NEI President, USPA B-license