JOSH W. FROMM

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I am a second year PhD student at the University of Washington, advised by Shwetak Patel in the **Ubiquitous Computing Lab.** My research focuses on (1) designing and implementing **ultra-low power embedded systems** for health and interaction, (2) methods for connecting and powering **wireless networks of sensors**, and (3) developing **human computer interaction** systems using new technologies.

EDUCATION

Present
: *Doctor of Philosophy, Electrical Engineering*
University of Washington, Seattle, WA
Area: Ubiquitous Computing, Embedded Systems, Health Sensing, HCI
Advisor: Shwetak N. Patel
GPA: 4.0/4.0
September 2014 - Present

2014
: *Bachelor of Science Electrical Engineering with Honor*
California Institute of Technology, Pasadena, CA
Area: Embedded Systems, Algorithms, VLSI
GPA: 3.7/4.0
September 2010 – June 2014

2010
: *High School Diploma*
Lincoln Southeast High School, Lincoln, NE
GPA: 4.0/4.0 (Valedictorian)
August 2006 – June 2014

HONORS AND AWARDS

2016   Amazon Catalyst Fellow
2015   Qualcomm Innovation Fellowship Finalist
2014   Caltech Bachelors of Science with Honors
2013   Caltech Upper Class Merit Award
2011   Richter Scholar Fellow
2010   Lincoln Southeast High School Valedictorian

PROFESSIONAL EXPERIENCE

Present
: **University of Washington**, *Ubiquitous Computing Group*, Seattle, WA
Current projects spread a wide range of fields and topics, including through body power transfer to enable battery free health sensing, Battery free custom phone case that enables remote gesture control of a smartphone, and a mobile application that can screen for osteoporosis.

2015	**Microsoft Research,** *Sensors and Devices*, Cambridge, UK
	Research intern on Sensors and Devices team (supervisor: Steve Hodges), focusing on fusion between research and product lines. Developed novel mobile power harvesting embedded systems that enable new ways to interact with smartphones.
2013 & 2014	**Nvidia Corporation,** *GPU Division,* Santa Clara, CA
	ASIC Engineering Intern. Verified that streaming multiprocessor operation in RTL matched simulated outputs using a C++ model. Also developed a software framework that allows increased automation in bug detection and filing
2013	**NASA Jet Propulsion Laboratory,** *Robotics Division,* Pasadena, CA
	Independent Researcher, Developed an embedded system capable of mimicking the functionality of the original, much more cumbersome and power inefficient BioSleeve.
2012	**NASA Jet Propulsion Laboratory,** *Robotics Division,* Pasadena, CA
	SURF Fellow, Designed and developed the hardware and software of a system that uses an array of MEG electrodes to monitor muscle activity of a user's arm, classify the raw data using support vector algorithms, and control any of several robotic interfaces using simple trained gestures.
2011	**California Institute of Technology,** *Mechanical Engineering,* Pasadena, CA
	Richter Scholar, Studied the simulation of multiphase flow. Developed novel simulation methods and algorithms to obtain results that better agree with physical observation.

TEACHING EXPERIENCE

Instructor	**Embedded Systems Capstone,** *University of Washington EE478*
	Spring, 2015
	Developed and taught a course for senior embedded design undergraduates in which students propose, design, and build an embedded system from scratch with strict deadlines, just as might be seen in industry.
Teaching Assistant	**Embedded Microcomputer Systems,** *University of Washington EE472* (Instructor: Ishihara)
	Winter, 2015
	Redesigned the curriculum of an intro to embedded systems course to focus on creating a cohesive "RoboTank" from scratch over the quarter. Previous version of the course involved only simulation and was much less compelling for students.
	Embedded Systems Software Design Laboratory, *Caltech EE/CS 51* (Instructor: Glen George)
	Fall 2012, Fall 2013
	Intro to embedded systems that focuses on developing firmware in assembly. Primary skills developed in this course are careful planning and system design along with debugging.
	Embedded Systems Hardware Design Laboratory, *Caltech EE/CS 52* (Instructor: Glen George)
	Winter 2012, Winter 2013, Spring 2014
	Embedded systems hardware course in which students develop a voice over IP phone from scratch using both custom hardware and software (assembly).
	Microprocessor Project Laboratory, *Caltech EE/CS 53* (Instructor: Glen George)
	Spring 2013, Spring 2014

Advanced embedded systems course in which students propose and develop an embedded system of their choosing.

Introduction to Embedded Systems, *Caltech EE 5* (Instructor: Glen George)
Spring 2012
An introduction to digital logic and low level programming.

PUBLICATIONS

Conference Publications

2016	Li H, Brockmeyer E, Carter E, Fromm J, Hudson S, Patel S, Sample A. PaperID: A Technique for Drawing Functional Battery-Free Wireless Interfaces on Paper. In *CHI 2016*.
2016	Goel M, Saba E, Stiber M, Whitmire E, Fromm J, Larson E, Borriello G, Patel S. SpiroCall: Measuring Lung Function over a Phone Call. In *CHI 2016*.
2013	Wolf M, Assad C, Vernacchia M, Fromm J, Jethani H. Gesture-Based Robot Control with Variable Autonomy from the JPL BioSleeve. In the *IEEE Conference on Robotics and Automation* (ICRA)

SKILLS

Hardware   From scratch embedded system development, digital and analog circuits, RF energy harvesting and signal processing, display driver design and optimization, capacitive sensing systems, power management, FPGAs and CPLDs, VHDL, Verilog, cache and memory system design.

Software   Comfortable with all aspects of firmware development (assembly, c, c++), python, perl, java, C#, Matlab, machine learning, algorithm and complexity analysis, discrete and continuous signal processing.

REFERENCES

Shwetak N. Patel, Ph.D.
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