

Craig Hesling

Pittsburgh, PA

c...@hesling.com | craighesling.com | github.com/linux4life798



Education **Carnegie Mellon University - Pittsburgh, PA**

- M.S. Electrical and Computer Engineering | 3.78/4.0 | **May 2018**
- B.S. Electrical and Computer Engineering | 3.4/4.0 in Major | **May 2016**

Coursework Operating Systems Design and Implementation • Parallel Computer Architecture and Programming (including CUDA) • Algorithms and Advanced Data Structures • Wireless Sensor Networks • Signals and Systems • Electronic Devices and Analog Circuits • Structure and Design of Digital Systems

Experience **OpenChirp.io / Wireless Sensing and Embedded Systems Lab Summer 2016 - Present**

Lead developer and engineer of the long-range wireless telemetry network called OpenChirp

- Created a general purpose sensor platform featuring the long-range wireless technology
- Designed and deployed gateways for a citywide wireless network - 2+ years uptime
- Developed the network back-end services in Go
- Created multiple runtime serialization services (dproto and bytetranslator)
- Collaborated and authored on research publications



Teaching Assistant for Embedded Systems Capstone Spring 2016 and Spring 2017

Mentored 5 senior capstone design teams, each with about 5 members

Bosch Research and Technology Center Internship Summer 2015

Core developer and engineer for the Smart Campus project

- Developed a chat style interface that bridges environmental events and actions with users
- Ported FORK to an ARM based embedded platform (see below for more detail)

Projects SafetyFast - Go Hardware Transactional Memory Library Spring 2018

Developed and benchmarked a library to make use of Intel's Hardware Transactional Memory primitives

- Studied the real-world performance of using this library with standard Go structures
- Created a C++ benchmark to explore the extremes of what Intel's HTM can achieve

GridBallast - A Smart Water Heater for the Future Grid July 2017 - Present

Developed a controller system to manage water heaters and high power appliances in order to balance grid power demand

- Built controller platform with display and buttons plus LoRa, BLE, WiFi, and GPS radios
- Reverse engineered the control protocol for an off-the-shelf Electronic Thermostat module

Enlighten - Visible Light Communications Spring 2015 - Summer 2015

Transmitted data from LED bulbs to phones via high frequency visual light modulation

- Reverse engineered and programmed off-the-shelf smart LED bulbs to transmit data
- Combined published research and experimentation to form a resilient communication protocol

x86 Kernel and Shell Fall 2014

Designed and implemented a complete preemptive OS kernel and supporting shell software

- Gained experience with memory management, parallelism, team workflow, and x86
- Utilized git, make, Simics, QEMU, and other common development/build utilities

C Expressions Library Spring 2014

Developed a symbolic mathematical expressions manipulation library in C

JavaScript Cheat for multiplayer.com Spring 2013

The JavaScript secretly forced a win upon each round of an online multiplayer game

- The program was able to learn the current game state, devise a winning combination of selections, and execute the selection when triggered

TabletOS

Fall 2009 - Fall 2011

Designed a GNU/Linux distribution that specifically targeted x86 Tablet PCs with Wacom digitizers

- Crafted a custom boot procedure that allowed cold booting in 10 seconds directly into note taking application
- Created shortcuts and user interfaces to simplify the note taking experience
- Studied the marketability and feasibility of bringing TabletOS to market

Publications

Real-time fine grained occupancy estimation using depth sensors on ARM embedded platforms (FORK)

Munir, S • Singh Arora, R • Hesling, C • Li, J • Francis, J • Shelton, C • Martin, C • Rowe, A • Berges, M
IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), April 18-21, 2017.
Explores the potential of using depth sensors to detect, estimate, identify, and track occupants in buildings using a novel lightweight model on an embedded platform.

OpenChirp: A Low-Power Wide-Area Networking Architecture

Dongare, A. • Hesling, C. • Bhatia, K. • Balanuta, A. • Pereira, R. L. • Iannucci, B. • Rowe, A.
IEEE International Workshop on Smart Edge Computing and Networking (SmartEdge), 2017
Describes the architecture of a Low-Power Wide Area Network (LPWAN) named OpenChirp and the early experience in deploying it around CMU and Pittsburgh.

Skills

Languages: Go, C, BASH/SH, C++, OMP, OpenMPI, Python, Java, CUDA, Assembly (x86, AVR, HC12 - att, intel, plan9 syntax), SystemVerilog, JavaScript, HTML, PHP, SQL, LaTeX

Hardware: ATmegs, ARM Cortex-M chips, HC12, PIC18, ESP32, Odroid, Raspberry Pi

Software: QEMU, Simics, VMWare ESX/Workstation, Apache, MySQL, Google Sketchup, GIMP

Knowledge Areas: GNU/Linux user/administrator (very experienced), ARM porting, years of robotic/metal fabrication and building hardware+software projects