Alexander Skoglund, Ph.D. (1976-02-28)

Senior Embedded Systems Engineer, self-employed at E^2 FirmwareLabs

CONTACT INFORMATION

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EXPERIENCE SUMMARY

Methods

Scientific and engineering skills: Robotics, scientific methods, machine learning, computer vision, computer graphics, scientific writing, real time programming, embedded systems.
Programming languages: C and C++, MATLAB (and GNU Octave) and Python (basic user).
Electronics: System design, analogue design, filter design, PCB design (prototype and production), test and measurement, board bring-up.
Work methods: Agile (scrum) and lean.

Tools

Software development: GNU eco system (GCC for ARM/AVR/MSP430, make, gdb, openocd, avrdude), Atmel Studio, Microchip's XC compiler, IAR Workbench, CMake/Ninja, VSCode, Emacs, Eclipse (multiple derivatives), Jenkins, Docker Unity and Robotframework for testing.
Host environment: GNU/Linux since 2002. Several years of experience with Apple's OSX.
Version management: Git (Bitbucket, Github, Gerrit) and Subversion.
Documenting: JIRA, LaTeX, Doxygen and Wikis.
Protocols: I^{2}C, SPI, UART, RS232, CAN, USB, TCP/IP sockets.
Electronic design: KiCad, LTSpice, CadSoft Eagle, gerbview and surface mounted soldering.
Instrument: Multimeter, oscilloscope, logical analyser and protocol analyser.

Microcontrollers and boards ARM Cortex M0/M4/M7 (XMC44XX, STM32F4, STM32H7, BlueNRG), AVR (STK500, Arduino etc.), MSP430 (TI LaunchPad), STM8 and Microchip dsPIC33EP.

Currently learning/improving: Docker.

CURRENT ASSIGNMENT

Infinera, Stockholm, Sweden
Firmware engineer **From 2022-08**
Embedded software development for Infinera's fiber optical solution. Working with an ARM Cortex M4 that acts as an interface circuit.
Tools/techniques used are; GCC toolchain, CMake, git, gdb, embedded C C++, Google Test and Mock, grpc, docker and proprietary tools.

E^2 FirmwareLabs, Stockholm, Sweden
Hardware engineer **From 2021-04**
Doing PCB deign and layout for a client's project with primarily analog components. Using JLC for prototype production. Maintain BOM and work on sourcing components. Investigate new product design ideas for ethernet connectivity.
Tools/techniques used is KiCad.

PROFESSIONAL EXPERIENCE

DigiSign, Stockholm, Sweden
Firmware engineer **2022-03 – 2022-08**
Helped the client porting a small proprietary realtime kernel from MIPS (different PICs) to ARM (STM32H7). The work is focused in low level programming close to the hardware; including interrupts, communication, scheduling, context– and task switching, timers, memory management, etc.
Tools/techniques used are; GCC toolchain, gdb, Eclipse/STMCube, Make, git, ARM assembler, embedded C and proprietary tools.

Peratech, Stockholm, Sweden
Firmware engineer **2021-11 – 2022-02**
Helped the client with troubleshooting an ADC scanning device running ZephyrOS. Worked on refactoring and merging for two codebases into one.
Tools/techniques used are; ZephyrOS, GCC toolchain on Linux, CMake, Make, git, embedded C.

Polarium, Stockholm, Sweden
Senior Embedded Systems Engineer **2021-06 – 2021-10**
Working with firmware for Polarium's Battery Management System (BMS). Investigate how a Hardware-In-the-Loop system can be built to automated test of firmware.
Tools/techniques used are; JIRA, git, Silicon Labs 8051 MCU, Subversion, IAR, embedded C.

DeLaval, Stockholm, Sweden
Senior Embedded Systems Engineer **2020-11 – 2021-06**
At DeLaval I developed firmware for the next generation of connected devices. Provisioning of IoT devices, MQTT communication between embedded device/PLC and AWS cloud.
Tools/techniques used are; JIRA, git, GCC toolchain (including Cmake/make) on Linux, AWS IoT Core and AWS infrastructure, embedded C, ARM Cortex microcontroller, FreeRTOS, SSL/TLS encrypted MQTT communication, PLC programming and Wireshark.

InMotion, Stockholm, Sweden
Senior Embedded Systems Engineer **2020-03 – 2020-11**
My main work was with firmware requirements, implementation, testing and verification. Main area was Functional Safety of inverters for a motor control system. Firmware must fulfill automotive standards (e.g., ISO 26262 requirements). The team worked according to Scrum.
Tools/techniques used; JIRA, Crucible, Jenkins, Subversion, IAR, embedded C, unit testing, gcov, Python and Robot Framework.

Scanreco, Stockholm, Sweden
Senior Embedded Systems Engineer **2019-04 – 2020-03**
Working with firmware for the next generation of Scanreco's professional remote controls. Primarily working with the Bluetooth connectivity for firmware upgrades (bootloaders) and remote configuration via the back-end system. he team worked according to Scrum.
Tools/techniques used are; GCC toolchain on Linux, Make, git, embedded C, Bluetooth Low Energy (ST 's BlueNRG-2 SoC; ARM Cortex microcontroller), unit testing (C Unit), IAR, STM8.

Realtime Embedded, Stockholm, Sweden
Firmware/hardware engineer **2017-03 – 2019-03**
Working with electronics and firmware design for RTE's clients. Primarily working on system design and firmware for hardware interaction, and also electronic development and board bring-up. The largest project (running for 18 months) involved power control of an inverter with CAN communication and bootloading (among others).

BioServo Technologies, Stockholm, Sweden
Firmware/hardware engineer **2014-02 – 2017-02**
Working on electronic and firmware design on BioServo's SEM glove and next generation of BioServo's products. Primarily working on electronic development, board bring-up, system design and firmware for hardware interaction. Responsible for software in a scientific project to evaluate BioServo's product. Also maintaining current production version with upgrades and production support.

ÅF Group, Stockholm, Sweden *Embedded Software Eng.* **2012-11 – 2014-02**
Working on firmware design for client's embedded systems. *Project 1:* embedded Linux on ARM for an autonomous mobile robot. *Project 2:* embedded Linux web server on a RaspberryPi, short investigation and demo mock-up. *Project 3:* PWM control using an MSP430, short investigation. *Project 4:* control of an electrochromic foil (AVR) and powerline communication (LonTalk), 9 months.

Karolinska Institute, *Research Engineer*, Stockholm, Sweden **2009-12 – 2012-11**
Research Engineer in Brain, Body & Self Laboratory (Ehrsson group), at the Department of Neuroscience. My main task was to develop custom electronics and software for research in neuroscience.

I worked on developing an MR compatible robotic anthropomorphic hand for neuroscience research on body perception, body ownership, agency, and prosthesis.

Örebro University, *Research Assistant*, Örebro, Sweden **2009-06 – 2009-12**
Work on modelling of human grasping strategies. Modelled grasping skills should be possible to transfer to dexterous robotic hand. This work is part of the HANDLE project, funded by EU:s FP7.

Örebro University, *Ph.D Student*, Örebro, Sweden **Nov, 2003 – June, 2009**
Research on Programming-by-Demonstration including learning systems, human-machine interfaces, human-like motions. In addition, I have been a teaching assistant in several courses. On parental leave in 2008-02–2008-05 and 2008-12–2009-01 (50%).

Örebro University, *Research engineer*, Örebro, Sweden **June, 2001 – Nov, 2003**
Maintenance with mobile robots and lightweight manipulators. Also, involved in the electronic design of an electronic tongue for water quality assessment, control system for manipulators, range finding sonar for manipulation.

Aerotech Telub, *Radio engineer*, Arboga, Sweden **Jan, 2000 – June, 2001**
Carried out several consulting projects associated with a short range radio for the take off team around the fighter aircraft SAAB JAS Gripen. I was involved in preliminary radio measurements for installation of a radio system in the metro of Barcelona.

Courses

Non academic courses

- Nov. 26–27, 2019 Machine safety
- Maj 16, 2019 How to Develop Better Firmware Faster by Jack Ganssle
- Apr. 23–24, 2013 Building the IoT with Thingsquare Mist and Contiki

Education

Örebro University, Örebro, Sweden

- Ph.D., Computer Science, *Programming by Demonstration of Robot Manipulators* 2009.
- M.Sc., Electrical and Electronic Engineering, December 2002.
- B.A., Electrical Engineering, September 1998.

Academic skills

During my Ph.D. my research field was within imitation learning, where a robot learns a task by observing a human. Learning should then continue to improve the performance by further self-observation or by providing more knowledge from the demonstrator (teacher). The main application is to simplify the programming process of an industrial manipulator (robot arm), a.k.a. "Programming-by-Demonstration".

Teaching **August 2004 - December 2009**
Class: Introduction to Robotics and Intelligent Systems, Master Course. Autumn 2009. An introductory course in robotics. Topics covered: Robotic history, actuators, manipulation, sensing and perception, localisation, navigation, mapping, state estimation, dead reckoning, Bayesian filters and multi robot applications.
Duties at various times leading weekly computer lab exercises:

- TDD121/PRG045 Programming in C, Winter 2006 and 2007.
- TDM136 Methods for Modelling, Simulation and Visualisation, Fall 2007.
- TDD112 Computer Graphics, Fall and Autumn 2004, Autumn 2005, Fall 2006, Fall 2007.