Alp Sayin

Cambridge, UK

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PhD Firmware Engineer| Multi-Disciplinary Expert in Comms, Embedded Systems & Tech Solutions

I like everything tech related, but especially system-design, comms, and coding, and I'm good at it. My skill set can be best described *"jack of all trades, master of none, still better than one".* I learn & adapt fast. Relevantly, I love sharing ideas & knowledge. I'm mainly enthusiastic about space, aviation & related technologies. Apart from my work, these days I'm passionate about cycling & skiing.

Education

PhD. Radar Signal Processing, Microwave Integrated Systems Laboratory, University of Birmingham, UK   10/2013 – 9/2017

MSc. Embedded Systems Design, KTH Royal Institute of Technology, Stockholm, SWEDEN   8/2010 - 5/2013

BSc. Honours Electronics Engineering, Bilkent University, Ankara, TURKEY   8/2006 - 6/2010

Middle East Technical University Development Foundation Private High School, Ankara, TURKEY   8/2003 - 6/2006

Work Experience

MTS (Staff) Firmware Engineer, AMD AECG Group *(former Xilinx)*, Cambridge, UK   5/2022 – **Present**

Studying new IPs via documentation or via RTL; designing and implementing HW abstraction and then driver layers; bridging host driver APIs with the FW. Test and verification of pre-silicon RTL for bug hunting & fixing and/or reporting HW bugs. Documentation of findings as verified hardware and firmware behaviour. Further efforts in supporting my team by software modelling the HW; setting up automated test infrastructures; designing the roadmap for larger blocks of FW, communicating necessary steps with management and sometimes allocating tasks to other engineers. Making architectural change proposals and implementing as time allows; and finally mentoring juniors, seniors and interns. I'm also one of the go-to persons when an issue needs urgent attention ("firefighting").

Embedded Software Developer, Dekunu Technologies, NSW, Australia – REMOTE from Ankara, TURKEY   11/2020 – 4/2022

Design, development and coding of Dekunu ONE smart altimeter's baremetal firmware on an ARM based modern microcontroller. Assessment of issues reported by users and bug reporting. Continuous testing and improvement of codebase. Documentation of existing and new components of the codebase. Working remotely from Ankara, Turkey.

Part-Time Instructor, Bilkent University, Ankara, TURKEY   6/2019 – 01/2022

Acting Module Coordinator/Designer and Instructor for *CS431 Embedded Systems.* Instructor for *CS223 Digital Design*. Also taught *Ceng232 Logic Design* at Middle East Technical University during Spring 2020 term.

Technical Lead, Novit.AI, Ankara, TURKEY/London, UK   2/2019 – 9/2020

Development of machine learning systems, processing data from spaceborne SAR and multispectral instruments, continuous integration and deployment, embedded development, novel mesh networking methodologies, system design, project planning and management with direct report, management of a software dev team of 3, client engagement.

Research Fellow, Microwave Integrated Systems Laboratory (MISL), Birmingham, UK   9/2016-12/2018

Development of radar systems, hardware design & implementation, signal processing algorithm development, modelling & simulation, planning & conducting trials, data processing, documentation & presentation of results to stakeholders, project planning & managing, and managing students

Projects

AMD/Xilinx Network Accelerator Cards (AMD/Xilinx SmartNICs)   5/2022 – **Present**

Management controller firmware engineering of network accelerator cards which handle offloading of physical or virtual network interfaces off from a host CPU. I got involved with HW verification on Siemens Veloce, QEMU and a homebrew SW model; bug/signal tracing & reporting. I've developed FW drivers on RiscV, MicroBlaze and ARM with Zephyr for new&existing cards. Host-facing (kernel) driver API implementation based on a homebrew RPC (remote-procedure-call) infrastructure built on UART and PCI. I've ported FW written on top of FreeRTOS to Zephyr. And particularly I've ported Zephyr OS to MicroBlaze. I've refactored our CMake build system to be similar to Zephyr's, set up Jenkins CI/CD using bash & python scripts all around. Briefs of the previous generations: smartnic, low-latency, X2

Zephyr RTOS Microblaze Port (Pull Request #53576 at Zephyr)   6/2022 – **Present**

A WIP 32-bit Microblaze port for Zephyr RTOS. Currently, all tests pass with AMD/Xilinx's proprietary compiler toolchain. Current effort is focused on upstreaming compiler toolchain fixes to Zephyr's public toolchain.

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Dekunu ONE – Smart Altimeter for Skydivers (core features)   11/2020 – 05/2022

A smart altimeter that logs altitude and GPS position and syncs to cloud while showing real-time altitude to its user. Working remotely with a team from UTC+3, +7 & +12 time zones. The main work is inspecting bug reports, C coding for hotfixes, bugfixes and new features into the Dekunu ONE device. I also develop device test firmware and necessary python PC scripts for testing automation and debug/emulation purposes. I also work closely with the operation managers to solve users' problems which may not require coding which also helps build a knowledge base for both users and operation managers.

Projects Continued

SHLEP – Ship Location Extrapolator Project (Skybase)   3/2019 – 2/2020

I was the lead on this project deciding our technical direction with respect to business motives. I decided on our radar & optical satellite computer-vision algorithms, training data sources, machine learning models and our optimisation approaches. I first created and coded our post-processing algorithms for combining SAR images. Then I've successfully designed and coded data fusion algorithms to automate labelling of images of oil tankers. I've also created a geospatial labelling software specialised for labelling large satellite images which we planned to open source. I've then designed and lead our team to implement our ML pipeline to detect, localise and classify oil tankers in both SAR and optical images with >95% accuracy. Goal is a B2B product that can detect & classify oil tankers in key areas with maximum 4-day intervals.

Edge AI Comms Unit – Multi-spectrum Comms Module for Edge AI Unit   2/2019 - 5/2019

I landed on the final stage of this project that utilised an ESP32 board with its micropython, LoRa and Wifi capabilities to deliver data from client's Edge AI unit to an MQTT server via a dual-layer mesh network. The unit is an rPi with a LoPy4 custom hat; rPi handled comms with AI unit and acted as cold storage while LoPy4 handled the multi-channel comms stack. I fixed the bugs and corrected the design faults in the project while directly engaging with the client and managing their requirements. I delivered the project to its finalised deployment ready state. I also optimised the latency-per-hop by 50% while implementing a per-hop reliable transport protocol. We implemented the entirety of the solution using Python.

Technical Experience (in no particular order)

Remote Sensing: MIMO Radar, Phased Array, Digital Beamforming, SAR, MTI, Doppler, Passive Bistatic, Airborne and Spaceborne, Sonar, Ultrasonic Sensing, Signal Processing, RF front-end, Automotive, Surveillance, Defence

Embedded Systems: Embedded software, Multi-core programming, FPGA programming, Low-level communications (RS232, I2C, Ethernet etc.), Wireless Sensor Networks, Network Applications, Client/Server programming, IoT (Internet of Things), STM32Cube, CMSIS, Zephyr, FreeRTOS, ugfx, ESP32, ublox, micropython, uC/OS, TinyOS, Contiki-OS, PCB design

Other: System Design, Algorithm Development, Heuristics, Machine Learning, Software Optimisation, Software Development, Project Planning and Management, Knowledge Transfer, Risk Assessment, Time Management

Languages: C, CMake, Python, MATLAB, Java/Groovy, VHDL, SystemVerilog, Bash, Assembly, HTML, CSS, Javascript

Environments: MATLAB, NI LabView, Keil, Git, Linux, Eclipse, Quartus, Xilinx ISE, Modelsim, Gpl-Eda, Netbeans, Proteus

Teaching Experience

Supervisor for Concurrent & Distrubuted Systems & CompNet, Robinson College, Cambridge University	10/2022 – 4/2023
Module Coordinator and Instructor for CS431 Embedded Systems, Bilkent University	6/2019 – 1/2022
Instructor for Ceng232 Logic Design, Middle East Technical University	1/2020 - 7/2020
Instructor for CS223 Digital Design, Bilkent University	9/2019 – 6/2021

Other

Jumped out of a perfectly good Casa CN-235 and an Antonov AN-2	2019, 2023
Finished Bosphorus Cross-Continental Swimming Race in top 10 percentile in Istanbul, Turkey	2016, 2019, 2020
Finished and probably came last in BUCS Duathlon and BUCS Olympic Triathlon	2016, 2017
Committee Member and Advisor for University of Birmingham Skydiving Society	10/2016 – 1/2019
Trained with the University of Birmingham Triathlon Team & Swimming Team	9/2016 – 9/2018
58th/700 at *ieeeXtreme* worldwide 24-hour programming contest	10/2009
Languages: Turkish (Native), English (Bilingual)	