EFOSA IBIZUGBE

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Profile

Software Engineer with expertise in **Wireless Systems, Embedded Software and Digital Signal Processing**. Having **12 years** hands-on experience across the technology industry including the Medical, Embedded devices, Wireless and Satellite Communications fields. Core skills include:

* **C, C++, Python and Assembly** Language
* **Algorithm development, Simulation & Modelling using MATLAB**
* **DSP Experience with** **ARM Cortex-M3/M4**, **TI TMS320C67x DSP**, **Icera ‘software-defined’ DXP, NI USRP DSP**
* **Embedded Software development with** **RTOS (embOS, NanoK)**, **Embedded Linux** and **Bare-metal** environments.
* **Excellent technical understanding of Physical Layer (PL1) for Wireless** ( LTE/WiFi/WCDMA/GSM)
* **Expert in Classical and Statistical DSP** - FIR/IIR Filter, FFT, OFDM, MMSE/Zero-Forcing Equalizer, MIMO implementation, including Receive and Transmit Diversity, Beamforming, Space-time coding, Spatial multiplexing, Maximal Ratio Combining, Equal gain combining, Power Spectrum estimation, etc
* **RFIC Firmware development**, programming of the RFIC Transmit and Receive chains, RFIC calibration
* **Wireless System level design** (link budgets, transceiver design, frequency planning, intermodulation, sensitivity, gain compression, etc)
* **Debugging firmware issues** down to hardware level, probing with Emulators, Spectrum Analyser and Oscilloscope
* **Software tools including: Eclipse, IAR, GDB/DDD, Linux Shell scripting (bash), GIT, Perforce, Jenkins, Octave, SlickEdit, Jira, GNURadio, etc**.

WORK EXPERIENCE

Current: **Consultant- DSP & Embedded Software,** Expro North Sea Ltd

My core duties are the design and implementation of Embedded Software for Expro’s range of Innovative Remote Sensing Devices used in Well Flow Management. These devices enable us measure, control and improve flow within high-value oil and gas wells.

Achievements include:

* Embedded C++ development (MISRA compliant) on STM32 Microcontrollers with ARM Cortex M4
* Physical Layer development for our custom Wireless protocol
* Design, Simulation and Validation of Signal Processing Algorithms in MATLAB – Matched Filtering, Chirp Spread Spectrum, FFTs, Demodulation, Synchronization, etc.
* Translating Signal Processing blocks from MATLAB to C++ for the target DSP, System-level design and reviews
* Agile development framework, with development based on Atlsassian tools – Jira, Confluence, Bitbucket and Bamboo for Continuous Integration

2018- 2019 **Consultant- DSP & Embedded Software,** Viavi Communications (formerly Cobham-Aeroflex)

I worked within the Agile based Teams to develop the Physical Layer (baseband) for the TM500 products, specifically to support the new **5G Wireless Standard (NR 3GPP)**. The TM500 is an advanced UE (Phone) simulator, that has become the defacto standard for testing Cellular BaseStations, with support for multiple radio access technologies including- 3GPP GSM, WCDMA, LTE, LTE-A FDD and TDD, and 5G.

Achievements include:

* Detailed Design & Implementation of the Physical Layer for 5G NR standard in C/C++ from 3GPP 38.211 PHY Specs.
* Coding of the Downlink Baseband routines – Cyclic Prefix removal, FFT Module, Channel Estimation and Equalization, RE Demapping, Demodulation, Descrambling, Polar Decoding, LDPC Decoding, De-interleaving, etc.
* Coding of Downlink Synchronization Module – decoding the PSS, SSS and PBCH within the 5ms SSB Burst Set Window
* Unit test, Component Test and Integration testing – including Creation of New Test Cases and maintenance of Existing Test Cases
* Support and maintenance of existing code
* Debugging of software issues.

2017- 2018 **Consultant- DSP & Embedded Software,** Satellite Applications Catapult

I was responsible for the design and implementation of software defined radio (SDR) platforms that form the ground segment for nanosatellites launched into space. This ground segment is responsible for communication with the satellites in orbit - receiving and sending payload as well as the operations control – decoding telemetry and issuing telecommands.

Achievements include:

* Setting up the GNURadio framework in Linux, writing signal processing blocks in C++ and Python, designing flowgraphs in GRC for the modem.
* Designing the Receive path for control data (Telemetry), based on space datalink protocol (CCSDS131.0-B-2) – GMSK demodulation, Viterbi Decoding, Reed-Solomon decoding, Descrambling, ASM synchronization.
* Designing the Transmit path for control data (Telecommand) based on the AX.25 standard- TC frame encapsulation, Scrambling, NRZI encoding, Gaussian Filtering, etc
* Designing the Receive path for the Payload in the S-band- RS encoding, Convolutional encoding, Scrambling, OQPSK Modulation, RRC pulse shaping.
* Improving robustness and reliability on the Tx/Rx path by compensating against Timing and Frequency jitters, Correction of channel distortion by Equalization, Compensation for doppler frequency changes due to motion of satellites in orbit.
* Writing Unit tests in Python to track errors introduced due to new feature development as well as checking regression in the existing code base.
* Simulation of signal processing algorithms in MATLAB, including design of Filters and optimization of blocks.
* Creating and maintaining a GITHUB repository for the signal processing blocks (GNURadio Out-of-Tree Modules), including test modules.
* Debugging of software issues such as low BER, poor sensitivity, DC offset, etc.

2016- 2017 **Principal Consultant- Algorithm & DSP,** **CLOUDTAG plc**

My responsibilities were to research, develop and implement the intelligent algorithms to power the ‘Onitor Track’ device- (www.onitor.com). This is a wearable health and fitness product that measures the heart rate, steps taken, distance walked, calories burned, user activity and other useful health statistics.

Achievements include:

* Designing a new ‘step counting’ algorithm. This work involved developing the concept, simulating the functionality in MATLAB, and writing the implementation on the ARM Cortex-M device using ‘C’.
* Developing a unique ‘Activity tracking mechanism’ that relies on the feedback of device orientation, frequency content of accelerometer data and motion data.
* Enhancing the accuracy of the Heart Rate measurement during periods of intense activity, by implementing an Adaptive ‘LMS’ Filter that excludes the interfering motion produced by the user’s activity.
* Developing a method that identifies when the device is worn in the wrong orientation, and applying a correction to the accelerometer data to ensure the statistics remain consistent.
* Actively researching new algorithms and methods with potential to improve the current ECG, Steps and Activity Detection module performance. Optimizing the existing code to reduce memory usage, increase processor efficiency and enhance battery life. Making good use of the ARM DSP CMSIS Library to promote re-use of efficient code.
* Debugging of software linked performance issues such as inaccurate step count, no ECG, inaccurate activity detection, etc.
* Designing a Calibration routine for the Accelerometer, to ensure that performance is guaranteed across multiple devices and reduce the product-to-product variations.
* Providing technical advice and guidance on current and future software direction

2010- 2015 **DSP Software Engineer**, **NVIDIA DEVELOPMENT (pre-acquisition: ICERA)**

My work was to design, debug and implement physical layer algorithms in C and Assembly for our ‘Software Defined’ modem (i450/i500/Tegra4i), supporting the latest wireless protocols. I also worked in RF Embedded Software (Driver) development for the RFIC, to fulfill the GCF specifications for reference/customer modem platforms.

Achievements include:

* Software coding of WCDMA/LTE Front-end Rx processing routines – Filtering, Sample rate conversion, Descrambling, Diversity combining, Rake Receiver, Equalization, as well as Tx routines – Baseband Modulation and Symbol mapping, Pulse shaping, Spreading, Scrambling, Channel coding, etc
* Writing of the core baseband algorithms in Assembly for the DSP processor (FIR/IIR Filter, FFT, Polyphase Filter, Rake MRC, MMSE/Zero-Forcing Equalizer) . This is necessary to increase throughput on the datapath.
* Development of modules in ‘C’ for the physical layer procedures – Cell Search, Cell Synchronization, Channel Estimation, PHY Channel procedures (e.g RACH), Cell Measurements. My work also involves verifying these modules against simulated models for bit-level accuracy.
* Debugging module and system level issues that arise during software implementation as well as field testing of the modem in fading and non-fading channels. Some examples include failure to detect a cell, low throughput issues, failure of the physical channels, dropped calls, high BER. I also continually work on optimising the assembly code to reduce stalls and save MIPS.
* RF Driver development in ‘C’ for GSM/EDGE/WCDMA, programming of transmit and receiver chains in signalling & non-signalling modes (factory test). Implementation of calibration routines for the transceiver.
* Supporting the RF Engineers in fixing software-linked performance issues on the RFIC, such as poor Rx sensitivity, ACLR faliures, 2G PvT faliures, high BER, low throughput, low Tx power, high DC offset, etc.
* Implementing new features in the Radio software, enhancements to the events scheduler, and background task, enforcing strict layering between platform drivers, Rf driver and upper layer, adding support for new front-end modules such as converged PAs, antenna switch, setting up GPIO’s & FEMs for new platforms, etc.

2007-2009 **Wireless Engineer**, **HUAWEI TECHNOLOGIES**

My work included deployment and installation of Huawei’s 1x CDMA/EvDO BSS Network Solutions for Cellular Mobile Operators. Software and Hardware Commissioning of the Base Station Subsystem, including integration of the BSS with the Core Networks (Voice & Data). Level-3 BSS support for Client Networks under Managed-Service arrangement.

Achievements include:

* Software programming of the BSC, BTS and PDSN using MML scripts
* Setting up of Linux build environment and version control
* Development of user-space applications and kernel modules for the embedded Linux software
* Debugging of software linked performance issues such as link failures, low throughput, etc.
* Writing of Linux Shell scripts to automate tasks such as device flashing, setting product type and ID, etc
* Setup the Um interface for the BTS, Abis interface between BTS and BSC, A1p/A2p interface between BSC and MSC, and Pi interface for the PDSN
* Performed Testing and Acceptance of new BTS cell sites
* Generated and Analyzed Traffic & Performance Statistics for network improvement

EDUCATION

2009-2010 UNIVERSITY OF LEEDS, UK.

M.SC BROADBAND WIRELESS AND OPTICAL COMMUNICATION

Distinction (Sept 2010)

Modules Studied: WiMax & Broadband Networks, Cellular Mobile Communication Systems, Wireless Communication System Design, Fundamentals of Communication Theory, Digital Signal Processing, DSP Hardware Implementation, Photonics & Communication Technology, Optical Communication Network, Pilot Study, Dissertation- Software Defined Radio (SDR).

1999-2004 UNIVERSITY OF BENIN, NIGERIA.

B.ENG ELECTRICAL/ELECTRONIC ENGINEERING

2nd Class Upper Division (2.1)

1991-1997 GTSS, NIGERIA.

Senior Secondary School Certificate (9A’s O-Levels)

Five ‘A1’ (including Maths & English), two ‘A2’ & two ‘A3’

**State-Level Award for Best Result**.

DISSERTATION

* Software Defined Radio (SDR)/ Cognitive Radio

University of Leeds, MSc Project 2010.

Simulation of Multimode SDR receiver with traditional RF front-end processing completely implemented in software using Digital Signal Processing. RF mixing is performed using Digital Downconversion/Cordic Algorithm and Multirate Filtering is implemented using Sample Rate Conversion. A multimode digital front-end SDR is implemented and simulated using MATLAB to process three air interface standards: WCDMA, CDMA2000 and GSM. A study of adaptive algorithms to enable the SDR achieve dynamic spectrum sharing, spectrum on demand and adaptive spectrum management was also undertaken.

INTERESTs

Volunteering:

I am very much involved in conservation and afforestation efforts such as planting trees, designating green zones and promoting awareness for the cause. During a year long National Youth Service Programme, I spent some time as a member of the tree planting society and was recognized with an award for my contributions.

I also help in mentoring students in my local church. By listening to their challenges on their studies and offering them advice and encouragement from my own experience of school life. For me it is a precious opportunity to influence young people to work hard and achieve their goals.

Activities:

Enjoy playing football, video games and having a day out with my lovely family.

REFERENCES

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