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MATTHIAS THÖMEL

Skills

for Customers

Version en-1.19

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date: 2021-09-06

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1. Quality Assurance

Document	
Title	Skill for Customers
ID	
Related Documents	
Author / Department	M. Thömel
File Position	D:\user\MATTHIAS\Jobsuche_2021\docs\en\Skills Matthias Thoemel en-v1.19.doc

History	Reason for change	Name / Department	Date
Version en-1.7	Added TL for VW Project	M. Thömel	2009-12-01
Version en-1.8	Added Bosch	M. Thömel	2012-01-27
Version en-1.9	Added CUDA, Abroad, Mediaplayer and libraries	M. Thömel	2013-01-23
Version en-1.10	Added Höft und Wessel AG	M. Thömel	2014-01-13
Version en-1.12	Android	M.Thömel	16-06-2016
Version en-1.13	Added Linux kernel	M.Thömel	19-12-2016
Version en-1.14	Added Linux file observer and TensorFlow	M.Thömel	06-06-2017
Version en-1.15	Added ESP32, Android, EFM32	M.Thömel	02-10-2019
Version en-1.16	Added AILO project	M.Thömel	30-12-2019
Version en-1.19	Added DPRE/ESP32	M.Thömel	06-09-2021

*o p e n***Contents**

1. Quality Assurance	2
2. Technical Data Processing	4
3. Android.....	7
4. Programming.....	8
5. Interfaces and Networking.....	10
6. Hardware and Computer Systems	11
7. 4 GL Programming Languages.....	12
8. Special Libraries.....	13
9. Programming Languages	14
10. Abroad	15
11. Other Topics	16

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2. Technical Data Processing

- Data broker for MQTT and MODBUS
- Temperature measurement data acquisition via OneWire (own driver)
- Create a user interface with WebToolkit
- Digital signal processing using OpenCV and own FIR filters
- Machine learning using NVIDIA CUDA on GPU (RTX2070)
- Implementation and testing of the USB driver for EFM32 SOC
- Connection of LDMA to USART interfaces for EFM32 SOC to bridge interrupt latencies
- Fast embedded measurement data storage and aggregation with SQLite3-SQL on Android
- Update Over the Air for embedded IoT module
- Azure cloud connectivity for IoT module
- WLAN data routing module for IoT in consumer devices
- AES encryption
- Linux File Change Observer with inotify (own implementation)
- Linux kernel driver development for DMA and function tracing
- Projection on Android Java API to Android Wear
- P2P encryption with RSA 1024 bit
- Bluetooth communication on Android Java API
- Protocol layer for a custom protocol used by public traffic control systems for the communication to the vehicles
- UDP scrambling engine to simulate the behaviour of UDP over air interface
- Massive parallel image processing on Nvidia GPUs (filtering and pattern recognition)
- Development of a very fast SQLite3 abstraction layer for a media player application
- Embedded Mediaplayer Core design and implementation
- Design of a media database for SQLite inclusive prototyping of SQLite SQL queries to analyse its performance, embedded Linux
- Development of a function tracing tool for embedded Linux used as preload library
- Development of a memory tracing tool for embedded Linux used as preload library

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- Introduction of the Eclipse-CDT debugging environment running on X86 Linux (uBuntu) for remote debugging of embedded Linux (ARM architecture)
- Porting of C/C++ software components from t-kernel to X86 Linux and ARM embedded Linux (Monta Vista) with GNU EABI (C/C++), inclusive build system changes to enable cross compiling with GNU EABI toolchain
- In-Target Profiling Tool for C55 DSP/BIOS
- Inter processor communication with zero copy capability between ARM and C55 DSP
- Very fast Memory Management System for the internal and external Memory (C55 / DSP/BIOS)
- DMA Management for DSP C55 DMA Controller
- Design and realisation of several Modem Standards (Siemens and normal FSK)
- Own Speech analysis and synthesis for an encrypted phone. FFT, iFFT and FIR used
- Usage and control of several standard modems for a embedded multi messaging system (Voice, Fax, Mail, SMS)
- Own video CODEC for realtime systems to transmit colour pictures via ISDN cable (2 FPS!)
- Synchronization of up to 7 multimedia computers to display 3D games around an audience via UDP broadcast and an own protocol layer above
- Switched packed data transfer (PPDC) to mobile phones for Japanese users to bring them the internet on their mobile. Protocols: HDLC, IP, TCP, Unit (Ericsson), LAPDM (Ericsson)
- Network analyzer (Sniffer) for the protocols: TCP, IP, HTTP, FTP, SMTP, NNTP, POP3, NetBIOS using the NDIS interface of the Windows 98 network layer
- Unix low level system programs for a network connection between HP-UX and RTE-A (HP1000) to realize the bootp daemon for RTE-A
- Development of the public project: "Der Wellenreiter". This project was published in ELRAD. The project realized a common development platform for the DSP 56001 with several interface circuits.
- Common Digital Signal Processing in realtime
- Fast realtime analogue to digital conversion and vice versa
- Programming of several microcontrollers
- Realtime measurement data acquisition and documentation
- Analysis systems for development and research in automotive environment

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- System for the planning of material usage and material tracking for a big steel company in Germany
- Statistical quality assurance (“X/R-Regelkarte”)
- Networking between several different systems
- Fast graphical interfaces
- Graphical analysis of measurement data

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3. Android

- JAVA on AndroidX
- GPU Supported graphics rendering of data plots
- Extremely fast sqlite connection (for several million records per second)
- ProGuard
- Multilingual
- Portrait and landscape support
- WebViews / JavaScript connection to JAVA
- USB host interface
- GPS connection
- Graddle Programming (Multiple flavors for the app)
- dynamic views (generated at runtime)
- Foreground service (for measurements in the background)
- Unit testing / demo mode of the app
- Obfuscation of part of the database (action against reverse engineering)

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4. Programming

- HTML5 and JavaScript for interactive machine website
- C ++ 14 for WebToolkit for user interface in the browser
- Machine learning with CUDA 10.2
- Android JAVA on AndroidX
- Graddle (Android Build)
- Python web server for GoogleTest test cases
- Embedded software on freeRTOS and ESP-IDF
- Design of a convolutional neural net (AI) with TensorFlow
- Thread control and scheduling framework for CUDA 5.0
- Own State Machine Framework for generated state machines out of ArgoUML
- Memory- and function tracing tools for embedded Linux (C/C++)
- Surface for a live sound mixing system (C# / .NET) remote control
- Migration of LUA script language into an embedded target
- Extension of the Nucleus+ OS
- Implementation of an anti priority ceiling protocol
- Driver Management Block to start target dependant driver blocks
- Several optimizations for the C55 DSP software (RAMSET, Stackmove)
- Extension of DSP/BIOS with function for analysis and task controlling
- Application Management on DSB/BIOS basis
- Several devices and driver for VxWorks
- Design and realisation of an own DSP multitasking real operating system as basis for several DSP projects for the Motorola DSP 56826
- Shared system (multi processor) for the transmission of internet protocol packets to mobile phones
- Shared data broker system (Linux and HP-UX with load balancing. 60 MB data located in one binary tree, maximal answering time per session: 3 seconds)
- Integration of the data broker system via php (own function for php)
- Unix and Windows NT programming (programming language C) to develop a unique database application programming interface to integrate and bind several different applications to different database systems

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- Windows GUI programming in C and C++ on Windows 95, 98, NT, XP (several compiler)
- Design and Programming of a cross compiler between AutoLISP (AutoCAD) to C ADS Interface (AutoCAD) and a cross compiler between Dbase 4.0 and Clipper 5.0
- Software design and programming for Windows 3.11 with Borland C++/API
- Application programming for AutoCAD R12/R13 on the ADS interface
- Several User Interfaces for Windows 3.11, AutoCAD R12/R13, XWindow, Terminals, ...

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5. Interfaces and Networking

- ESP32: I2C, Analog-IO, Digital-IO, WIFI, Sockets, mbettls
- MIDI
- LDMA
- I²C, USART
- Bluetooth LE modem
- WebSocket, SSL, JSON, UPnP
- WIFI (WLAN) access point and station
- Linux kernel coherency memory interface for ARM v7
- Bluetooth (Android API)
- MOST bus for CAR multimedia networking systems
- MIDI for Windows (for a digital sound mixing system; system exclusive, controller-data)
- AIC23 AD/DA converter
- Serial interfaces inside DSP and VxWorks
- ISDN (Uk0)
- T1-Interface (US-Standard)
- analogue/digital- and digital/analogue chips and interfaces
- AES/EBU, S/P-DIF and other digital audio interfaces
- Parallel interfaces, serial interfaces, HP-IB, GP-IB, own digital interfaces (serial and parallel)
- LAN, ThinLAN, ThicLAN, X25
- Low level access programming on Ethernet 802.3 (LAN) in C (HP-UX) and Fortran

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6. Hardware and Computer Systems

- EFM32 from SiliconLabs (emlib, SDK)
- ESP32 from Espressif (freeRTOS, ESP-IDF)
- iMX6, ARM V7 (Linux/kernel)
- ARM processor (WinCE 4.2 operating system)
- Nvidia-GPU (GT-260) stream processors (CUDA 5.0)
- ARM Triton 3 Core System on Chip (customer chip) (t-kernel and embedded linux)
- Texas Instruments OSK5912, OSK5946 (Trinity-OSK)
- Texas Instruments OMAP5912 (C55 DSP), OMAP5946 (Trinity) (C55 DSP)
- Motorola DSP 56826
- Video frame grabber interface for PC104 Systems
- VME-Bus
- several Modems: Voice, Fax, GSM
- Power-PC (604, 860) (VxWorks, Ericsson-WPP)
- IBM compatible PC (MS-DOS, Windows 3.11/95/NT, 32-Bit-DOS-Extender, Linux)
- HP 9000 (HP-UX, HP-Technical BASIC)
- HP 1000 (RTE-A, RTE-6, RTE-L)
- HP 85 (HP-BASIC)
- Microcontroller: 8051, Z80, MC68000/8, DSP56001, MC68302
- Paragon (HP measurement data acquisition system)
- Cyber 76 and 128 (Control-Data)
- HP-Plotter, LaserJet, magnetic tape systems, CTD-Streamer, ...

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7. 4 GL Programming Languages

- ArgoUML plus own State Machine Framework
- TresosGUIDE with XML export and Crosscompiler to C language
- Rational Rose for realtime (PPC860)
- Innovator under HP-UX 9.5 (on HP-Workstations)

8. Special Libraries

- Linux:
 - libtag
 - libpl-parser-lib
 - libmtp
 - libcppunit
 - libdbus
 - libsqlite3
 - Devil (libIL, libILU, libLUT)
 - libduma
 - glib
 - pthread
 - zlib
- Windows:
 - Videoinput
 - CUDA 5.0
 - WT (WebToolkit)

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9. Programming Languages

- C ++ 14 (smart pointer) under Microsoft Visual Studio 2017
- GCC Crosscompiler Suite (many systems)
- JAVA on Android API
- Perl/Tk under Windows
- C/C++ for WinCE 4.2 for embedded devices
- C/C++ for CUDA Nvidia GPU stream processors (incl. NSight)
- C/C++ with GNU EABI inclusive gdb/gdbserver and Eclipse CDT
- Perl under Linux
- JAVA (JDK 1.6, J9, Eclipse)
- C# (.NET) for a GUI
- LUA (for Widgets of a Radio- and Navigation-System)
- TCONF (TI Configuration für DSP/BIOS Projekte)
- C (TI Code-Composer-Studio 2.21 und 3.20 mit XDS zum OMAP)
- GNU-C (Metrowerks Codewarrior for DSP 56826)
- GNU-C++ for VisiBroker applications (CORBA)
- TCL/TK (with own DLL under WIN32)
- GNU-C (VxWorks), SunWS-C-Compiler
- C, C++ (MSVS++6.0, Linux, SGI, ...), ECOC (for MC68008), SCZ80 (for Z80), MRI-C (for MC68302)
- CDM(CATIA) database API
- Dbase4 and SQL (database on MS-DOS, Unix, NT)
- FORTRAN 7X of HP
- Image (database on HP 1000)
- Fortran 5 of Control-Data
- Several BASIC dialects
- several Assembler
- HP-GL (Graphics-Language of HP)

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- Technical team lead for Indian and Chinese team (4 months)
- Two sample presentations at customer in the US (3 weeks)
- Team support and education for Indian colleagues (2 years)
- Software Design documentation in English (10 years)
- The supplier meetings with Japanese supplier (three days)
- Supplier meeting in Belgium (one day)
- Training for measurement acquiring software in the US (2 weeks)
- Development and support for a measurement acquiring software in England (one week)

11. Other Topics

- Architecture and design of a machine control software for industrial ventilation systems
- Creation of a product page for the AI project AILO: <http://ailo.show>
- Migration of device software from obsolete microcontroller to EFM32, including low level drivers and low power handling
- Software architecture and design of a WIFI router module for fastest response times and highest reliability (for IoT devices)
- Development of a software design process for a medium-sized company based on SVN, perl / tk for tooling
- Technical Lead for international (Chinese and Indian members) team (4 months)
- Development workshops for C/C++, build system, download system, remote debugging; 40 developers, 5 meetings; to ramp up the project
- Presentation of sample devices at Detroit/US
- Leadership for several taskforces
- Performance analysis and bottleneck removal for embedded Linux and t-kernel software components
- C/C++ code reviews
- Design of a software development process and error tracking process for a project with 50 developers
- Design of a software interface coordination process for an automobile concern
- Teamleader for a software development team of 15 developers
- Customer meetings to clarify requirements and project planning
- Project planning for a sub project
- Team leadership for a complete team of 6 members (all external colleagues)
- Complete Systemdesign for the C55 driven by DSP/BIOS with needed extensions
- Setup of a multi target and multi project build environment from scratch on ClearCase basis
- Own research and development and realisation up to start of production
- Project leader and team leader
- Giving lectures
- Author for a professional journal

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- Documentation for several systems
- Writing of many reference manuals
- Onsite support
- Giving trainings for customers and employees
- System administration (UNIX)