# Gaurangkumar Khodifad

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#### **Career Summary**

A professional with 8.5 years of experience in embedded software/firmware designing and development. Experience working with end-to-end embedded product design and development which covers Microcontroller firmware development, Linux application development, Linux BSP porting and customization, Linux driver development, Custom Board Bring Up.

# **Skills Set**

Operating Systems	Windows, Linux, Embedded Linux, FreeRTOS, ThreadX,
	Baremetal
Programming Languages	C, C++, Python
Tools	GCC, GDB, Valgrind, SVN, GIT, IAR, Eclipse, Keil, Postman, MQTTLens, Yocto, VectorCAST, Wireshark, JIRA, Visual Studio 2019, Code Composer Studio (CCS), Bitbucket, Doxygen, MCUXPresso, Atmel Studio, MPLAB, QCOM MDE, ModusToolBox, VS Code, Redfish, Postman
Hardware Platforms	HPE iLO5, iLO6, NXP i.MX6UL, i.MX8M/Mini/Nano, i. MXRT1050/60, JN5169/79, KW41Z/21Z, KW24D, NFC PN7362, Cypress CX3, Raspberry Pi, ESP32, nRF52, Jetson Xavier, Jetson Nano, Qualcomm BLE SoC, ATTINY204, NXP LPC804, ATTINY3217

# **Education Details**

Qualifications	Year	Board/University	Institute	CPI/%
B.Tech (ECE)	2015	Dharmsinh Desai University (Deemed Uni)	DDIT, Nadiad (Guj)	7.80
HSC	2011	Gujarat Higher Secondary Education Board	S.P. Educational Institute Bhavnagar	81.40%
SSC	2009	Gujarat Secondary Education Board	J. P. Parekh High School, Mahuva	75.23%

# **Experience Details**

**Hewlett Packard Enterprise (HPE)** As a Firmware Specialist from February 2024 to till date.

**Infineon Technologies Semiconductor India Pvt. Ltd.** As a Staff Application Engineer from August 2021 to January 2024.

**Engibrains Technologies.** As an Embedded Software Technical Lead from February 2019 to August 2021.

**Volansys Technologies Pvt. Ltd.** As an Embedded Software engineer from Dec 2014 till Jan 2019.

# **Projects Details**

#### **Develop new APIs for server management system**

This project is developing new APIs for server management system and improve existing APIs for bug fixes and enhancement.

My Contribution	Understand server management system
	Understand new APIs requirement
	<ul> <li>Develop new APIs in server management system's firmware</li> </ul>
	<ul> <li>Debug issues with existing server management firmware APIs</li> </ul>
	Enhance existing server management firmware APIs
Tools	MULTI, GCC, VS Code,
Platform	Integrated Lights-Out (iLO), INTEGRITY RTOS, GreenHills

#### New combo chip bring up and code example support

This project is to prepare BSP to support new combo chip for RTOS as well as Linux host. This project also includes code example development/porting of BT/BLE code example.

My Contribution	<ul> <li>Understand new combo chip architecture</li> <li>Prepare BSP to support new combo chip with RTOS and Linux Host</li> <li>Develop/port Code examples to demonstrate BT/BLE features</li> <li>Prepare documentation for combo chip getting started and highlight features</li> </ul>
Tools	ModusToolBox, GCC, VS Code
Platform	RTOS platform, Embedded Linux Platform

# **BT/BLE** application porting from RTOS to Linux

This project is to port existing RTOS applications to ARM64 based Linux platform for new WiFi BT combo devices. This will include learning of internal application development process, coding standard process and to comply with all the internal processes.

My Contribution	<ul> <li>First BT/BLE application porting to Linux for the reference of all coming applications</li> <li>Prepare Linux application development guideline</li> <li>Prepare complete user guide for BT/BLE application usage on Linux platform</li> <li>Support team members in application development for technical guidance</li> </ul>
Tools	ModusToolBox, GCC, VS Code
Platform	RTOS platform, Linux Platform

# WiFi BT Combo device bring up with different Linux host platforms

This project is to bring up in house WiFi BT combo devices with different host platforms for the Bluetooth and BLE applications.

My Contribution	<ul> <li>Bring up WiFi BT combo devices with different host platforms (ARM64 Linux Platforms)</li> <li>Quick validation of firmware flashing functionality</li> <li>Documentation</li> <li>Internal initiative support</li> </ul>
Tools	Yocto
Platform	ARM64 Linux Host Platforms

# Bluetooth 5.1 based Neckband and Earbud

This project is to design and develop firmware for Bluetooth 5.1 based Neckband and Earbud using Qualcomm BLE SoCs. I am responsible to support customer from Proto level to the mass production level for all the firmware related development requirements. It includes support of automated script development for production level to program and test multiple devices at the same time.

My Contribution	<ul> <li>To prepare control requirement document for Button/LED/ Touch interface</li> <li>Develop driver for I2C based touch sensor</li> <li>Firmware design and development as per the requirement</li> <li>Charging parameter configuration to achieve fast charging and long playback time</li> <li>Firmware optimization to achieve long battery life</li> <li>Proto board unit testing</li> <li>Production level automation script development</li> <li>User guide/Build guide documentations</li> <li>Firmware version control management on Git and Project progress tracking on JIRA</li> </ul>
Tools	Logic Analyzer, DSO, DMM, Qualcomm IDE & SDK
Platform	Qualcomm BLE SoCs, Windows 10

# **18 MP Camera driver & control firmware development along with PC based camera capture and control application over UVC**

This project is to develop 18 MP camera driver and control firmware to capture 4K raw image with 10 FPS rate. Cypress CX3 based host process interact with camera over I2C and data stream will be on Mipi interface. Once the data is available on Mipi, it needs to transfer to PC based application over USB using UVC protocol.

My Contribution	<ul> <li>Camera driver development to capture 18 MP Raw images a 10 FPS.</li> <li>Custom hardware bring up</li> <li>Host application design and development</li> <li>Unit testing</li> <li>Documentation</li> </ul>
Tools	Windows Media Foundation, Visual Studio 2019, EZ USB Suite, J-Link, DSO
Platform	Cypress CX3, Onsemi AR1820, ThreadX, Windows 10

# Amazon Voice service (AVS) based IoT Platform

This solution is targeted for small footprint, low cost, form factor ready AVS (Amazon voice service) based platform. The objective of the platform is to enable the customer so that they can integrates voice enable solution into their product with lesser time to market. On connectivity front it provides Ethernet, Wi-Fi, ZigBee/Thread and BLE interface.

My Contribution	<ul> <li>Custom Board bring up</li> <li>Peripherals test firmware for Speaker, MICs, SDRAM, 802.15.4 Radio KW41Z, LEDs, Switches, Ethernet, Wi-Fi, UART interface</li> <li>KW41Z BLE firmware for Wi-Fi provisioning</li> <li>Out of box application firmware development</li> <li>Bug fixing and customer support</li> </ul>
Tools	IAR, NXP MCUXpresso IDE, SEGGER Jlink
Platform	I.MXRT1050, I. MXRT1060, KW21Z/KW41Z, FreeRTOS, Windows 10

# Industrial anomaly detection solution platform

This solution is targeted for small footprint, low cost, form factor ready IIOT (Industrial IOT) applications. It contains many sensors needed in many industrial applications to detect anomaly e.g. temperature, vibration, humidity, proximity, etc.

My Contribution	<ul> <li>Custom Board bring up</li> <li>Peripherals bring up test firmware for SDRAM, KW41Z, LEDs, Switches, Ethernet, Wi-Fi, Multiple sensors, UART</li> <li>Porting of vibration anomaly detection on this platform</li> </ul>
Tools	IAR, NXP MCUXpresso IDE, SEGGER Jlink
Platform	I.MXRT1050, I. MXRT1060, KW21Z/KW41Z, FreeRTOS, Windows 10

# Multiradio IoT Gateway platform

This platform consists of multiple RF (Wi-Fi, BLE, Zigbee, Thread, and NFC) radio in single CE/FCC certified box. It is targeted as ready to use proven reference design for the customers who want to develop their own gateway which may use one or more type of connectivity. There is end to end out of box demo application developed to cover the use cases start from gateway commissioning to end node OTA.

My Contribution	Out of box application development
	Custom Board bring up
	Mass OTA application development for the Zigbee and Thread     based and node
	<ul> <li>Gateway and end node commissioning via BLE and NFC</li> </ul>
	<ul> <li>Porting of multiple cloud agent e.g. amazon green grass, IBM Watson, clearblade</li> </ul>
	Black box testing and bug fixing
	CE/FCC certification related SW support
	Customer support
	• Porting of BSP and application on new Linux kernel version.

Tools	IAR, Eclipse, Postman, MQTTLens, Yocto, SEGGER Jlink, Wireshark, CPPChecker, PCLint, Doxygen, MCUXPresso
Platform	i.MX6UL/ULL, JN5169/79, KW41Z/21Z, NFC PN710, Murata Wi-Fi/BLE, Ubuntu, Yocto, Windows 10, FreeRTOS

# Object Entry/Exit monitoring using BLE: -

This project is to monitoring object's entry and exit using BLE. This project has three component, BLE Beacon Tag attached to object, BLE Observer and Wi-Fi/3G Gateway. BLE Observer will collect BLE beacons received from object and identify Entry/Exit by use of Angle of Arrival concept and sends data to Wi-Fi/3G Gateway and then Gateway can push data to cloud.

My Contribution	<ul> <li>Design and development of BLE Observer</li> <li>Design and development of Wi-Fi/3G Gateway</li> <li>Beacon configuration for Object BLE Beacon tag</li> <li>Python host system to collect object Entry/Exit data</li> </ul>
Tools	Code Composer Studio, Python TKinter

# NFC based SDK Development for upcoming wireless charging standard

This project is to develop custom NFC based protocol SDK on NXP PN7362 hardware. There is some strict timing requirement for communication that we need to take care for NFC data transfer. We need to achieve data transfer along with Wireless charging.

My Contribution	Explore and understand requirement
-	Design firmware with its detailed design document
	SDK development
	Application Firmware development
	Unit testing
	Documentation
Tools	NXP MCUXpresso IDE, SEGGER Jlink, DSO
Platform	NXP PN7362, FreeRTOS, NXP NFCRdLib

# Amazon Voice Service porting to custom hardware: -

This project is to port Amazon Voice Service to custom designed hardware which is based on iMX8M.

My Contribution	<ul> <li>Identify hardware pin connection difference by studying schematics</li> <li>Validate custom hardware</li> <li>Port AVS meta layer to new hardware BSP</li> <li>Test and Validate AVS functionality</li> </ul>
Tools	Yocto, Amazon Voice Service
Platform	iMX8M Mini, Ubuntu

# Driver development of custom camera module based on MT9M114: -

This project is to develop driver of custom camera module based on MT9M114 with NXP iMX8M Mini EVK.

My Contribution	<ul> <li>Driver porting of MT9M114 on iMX8M Mini BSP</li> <li>Driver unit testing and validation</li> <li>Linux application to validate camera functionality</li> <li>Linux application to control on board I2C sensors</li> <li>Documentation (Build &amp; User Guide)</li> </ul>
Tools	Yocto, GSTreamer, Linux i2ctool
Platform	MT9M114, NXP i.MX8M Mini, Ubuntu

# VectorCAST Unit testing: -

This project is about the Unit testing of the entire firmware of Medical domain project. VectorCAST is a commercial software unit testing tool produced by Vector Software for the Unit testing. VectorCAST is a GUI tool for performing unit testing, indicating dead code in the source code, Integration testing of the project and coverage reporting of the source files. We need to write test cases logic in C language in order to test the firmware.

My Contribution	<ul> <li>Understanding of QT</li> <li>Understanding of software architecture for Integration testing and Blackbox testing</li> <li>Whitebox testing</li> <li>Code Coverage testing</li> <li>Preparing report of test results</li> </ul>
Tools	VectorCAST, Keil, Qt