

Venkata **Raghunath** Kumar Rachabattuni

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SUMMARY

- Seasoned engineering professional with B.Tech+ M.Tech from IIT Madras, with a strong experience in building & managing multi-disciplinary technology teams specializing in MBD, electric powertrain, concept-to-proto and system-level design, with a good understanding of scalability
 - Technology leader with an extensive experience in building & guiding highly skilled engineering teams
 - Has hands-on experience in Motor control software, Electromagnetics, Battery management system, Embedded systems, Bootloaders, Data acquisition, File systems, Bare metal coding and Anti-Lock braking
 - Experienced in internal & external stakeholder management, working with consultants, manufacturers and suppliers from multiple geographic sites, for sourcing the technology to augment the existing knowledge
 - Has working understanding of Intellectual Property Rights related matters, especially patents
 - Obsessed about good engineering with a proven history to adapt quickly and thrive in a new and complex situation while delivering results
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EMPLOYMENT

Principal Software Engineer	MathWorks, India	Nov 2021 – Ongoing
Makers of MATLAB & Simulink, the leading mathematical computing software, also with solutions for embedded domain Initiatives	PMSM, SynRM and ACIM control tuning maps based on user FEA/dyno data	
Role	Technical strategist for product feature planning & development to support MBD workflows	
Lead Engineer	TVS Motor Company, India	Sept 2015 – Nov 2021
India's leading motorcycle and three-wheeler manufacturer and recipient of Deming Prize for manufacturing quality Initiatives	Created <i>Design Automation and Optimization</i> software for electric traction motor designs and implemented a design framework based on open-source tools (https://rlib.redarm.in)	
Key Projects	Hub-mounted BLDC motor development, Engine mounted ISG motor development	
Role	Lead a team of 6 for end-to-end traction motor design management for electric vehicles	
Senior Software Engineer	MathWorks, India	Jun 2014 – Sept 2015
Initiatives	Designed & prototyped a portable, enhanced two-stage bootloader for ARM Cortex-M and TI C2000 series microcontrollers, which is still shipped till date	
Role	Auto-generation of processor-specific embedded code from Simulink models	
Lead Engineer	TVS Motor Company, India	Aug 2007 – Jun 2014
Initiatives	Designed and implemented a data acquisition system with storage on USB, SD card	
Key Projects	Li-ion battery management system, Anti-lock braking system, Fuel cell controller	
Role	Lead a team of 3 to conceptualize, design, develop and manage technology projects	
Student Project Intern	Honeywell, India	May 2006 – May 2007
An R&D division within Honeywell International, Inc., dedicated to product research		
Role	Participated in design and validation of power inverter design for aerospace application	

PATENTS & PUBLICATIONS

- 11 GRANTED PATENTS
- 4 International Conference Presentations
- IEEE On-demand Webinar on advanced non-linear motor's optimal control

10+ patents pending grant and 40+ patents yet to be published

EDUCATION

IIT Madras, India	August 2002 – May 2007
Dual Degree (Bachelor of Technology + Master of Technology)	
Electrical Engineering & Power Electronics	

SKILL SET

Programming	MBD & auto-code generation, Embedded C, MATLAB, Scilab, Python
Microcontrollers	ARM Cortex-M(ST), TI C2000, Renesas R8C RX, Freescale S12 S08, Microchip PIC
Project related	DFMEA, QFD

SELECT PROJECTS

Look-Up Table (LUT) based Non-Linear Motor Control [MathWorks]

Led a team to develop the LUT based workflow for PMSM, SynRM and ACIM control including MTPA, FW and MTPV. Implemented using the actual form of voltage limit constraint curves.

Keywords: MBD, Motor Control, Constraint Curves, Non-linear control, LUTs

Electric Machines [TVSM]

Led a team for development of traction motors including spec finalization, identifying constraints, conducting FMEAs, modeling, simulations, prototyping, testing, and planning control methodologies. Proofs-of-Concept have been demonstrated to the management to get funds for further stages.

Keywords: Multiphysics, Electromagnetics, Project management, motors, manufacturing, prototyping

Two Stage Boot-loader [MathWorks]

Implemented with a generic architecture to make it portable for several microcontroller families.

Prototyped the technical concept, and integrated with the existing product infrastructure to make it commercially viable. This is included in R2016a and higher versions of Simulink support packages.

Keywords: C, firmware, two stage bootloader, ARMCC, GCC, STMCubeF4, Makefile, ARM Cortex-M

Battery Management System [TVSM]

Led a team that designed BMS to reduce dependency on Li-chemistry & cell rating. Implemented SOC estimation algorithms.

Developed the SW to control (dis)charging and balancing based on cell & load conditions. Evaluated on vehicles and tested for all failure modes. Demonstrated at AUTOEXPO-2014 in India.

Implemented AUTOSAR influenced software architecture that reduced the time during uC change.

Keywords: AUTOSAR, QFD, DFMEA, C, firmware, device drivers, bootloader, SPI, I2C, CAN, UART

Data Acquisition System [TVSM]

Implemented a low cost, modular and portable data acquisition system using UART, CAN, I2C and SPI interfaces to sensors and GUI. The primary board included SD card and USB host interfaces for data storage. Implemented FAT32 file system to store the data.

Keywords: Embedded C, firmware, USB host stack, CAN, UART, SPI, I2C, FAT32 stack, OrCAD PCB

Anti-lock Braking System [TVSM]

Concept-to-product development. Developed plant models & algorithms and implemented in embedded platform. Developed control strategy for an optimized brake feel during the ABS operation. Interacted with multiple teams & consultants to develop and take part in commercializing the product which is integrated into a mass-produced vehicle – TVS APACHE RTR 180 ABS.

Keywords: QFD, DFMEA, Embedded C, CAN, UART, VB .net, bootloader, system simulations

ASSOCIATIONS

Licensed Amateur (Ham) Radio operator in India since 2012

Life member of Magnetism Society of India

Life member of Advanced Computing and Communications Society, India