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**Objective**

To pursue highly challenging career where I can contribute to the Digital Transformation there by simultaneously acquire new technical skills, contribute constructively and with the fullest utilization of my problem solving experience to match for organization’s growth and strength.

**Area of Expertise**

Design Body Control Module (BCM), Drivetrain - Automated Manual Transmission (AMT), DC Motor Controller, Auto Clutch, Immobilizer, BLE.

**Profile Summary**

* 19+ Years of Experience in Embedded System Design and Development

[10 years of Experience in Automotive Product Design]

* Hardware Circuit Design and Interfacing BCM for HCV, LCV, Multiplexer (Master, Slave), 2 Wheeler.
* Hardware Circuit Design and Interfacing of AMT on HCV vehicle, Hydraulic Tractor vehicle
* Hardware Circuit Design of Motor Controller for Brushed DC Motor.
* Hardware Circuit Design for Starter Motor that eliminates multiple Cranks during Engine ON.
* Hardware Circuit Design for Auto Clutch
* Hardware Circuit Design on Immobilizer, Remote Keyless Entry (RKE) for 2 Wheeler.
* Prepare Techno-commercial proposal to meet the Target Cost provide best options / Solutions.
* Requirement Capturing and Interfacing Analysis, Analyze Functional Safety requirement.
* Mitigation, Analysis on the DFMEA, FTA
* Project Management, Estimation, Planning. Resource.

**Experience Summary**

* Working as Deputy Manager(NPD) in PRICOL LIMITED , Coimbatore from Aug. 2014 to Till date
* Worked as Design Manager in EATON – MTL Limited, Chennai from Apr. 2011 to May 2014
* Worked as Project Lead in L&T Limited, Mysore from Apr. 2010 to Mar. 2011
* Worked as Senior Engineer in Tata – CMC Limited, Hyderabad from Apr. 2006 to Mar. 2010
* Worked as Engineer in Aquest Systems, Chennai from Jul. 2004 to Mar. 2006
* Worked as R&D Engineer in Toshiba – MS Elevators Sdn. Bhd., Malaysia from Apr. 2000 to Mar. 2004

**Education and Certification**

* Bachelor Degree in Industrial Electronic, College of Engineering Osmanabad.
* Diploma in Embedded System Design from Accel Technologies Ltd. Chennai.

**Tools**

Schematic: Altium, Protel

Simulation: PSpice, Multisim

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| Project | **Body Control Unit (BCU) for HCV, Electric Bus** |
| Description | BCU is developed for 24V System that drives Body Electrical Loads for an HCV segment or for Electric vehicle and is built on ISO26262 Safety Architecture.  The MCU is 16bit RL78-F15 that have built in Safety features. Inputs are configured as either Active High or Active Low. BCU have High Side Driver BTT6010-1EKA, BTT6020-1EKA, BTT6030-2EKA, BTT6200-1ENA that drive either resistive Load (exterior and interior Lamps, LEDs, Heater) or Inductive Loads (Solenoids, Motor). Each of the Output have Diagnostic feature Load Current monitoring; during fault the respective Output is Turned OFF. For critical outputs safety concepts are implemented. BCU driving Lamp Loads specific logic are built for eliminating Lamp inrush current, also when operating the Lamp above rated voltage specific logic are built to increase Lamp life. BCU have Low Side Driver BSP75 to drive relays. BCU have Dual CAN communicating with ECU and another with Body Slave units. The BCU can either be configured as Master or Slave. Master receives inputs from switches and drive front electrical loads. Based on the system 2 or 3 slave modules communicate over CAN with the Master. BCU also have an LIN Communication configured as either Master or Slave. The BCU have Limp Home feature, in the event of MCU reset or failure few of the electrical Loads are driven without MCU intermission thereby still providing protection feature. BCU provide Protection and Diagnostic for each of the Electrical Loads.  BCU drive Motor Loads Wiper motor, Door Solenoid, Washer pump, Power window motor, Windshield defog. |
| Roles & Responsibilities | * Complete Product development to deployment on vehicle * Capture detailed Input - Output Electrical specification interface requirements. * Derive Technical Safety Requirement (TSR), Technical Safety Concept (TSC), assign Safety Goals (SG) and generate ASIL level, implement Diagnostic features. * Develop Architecture, prepare proposal to meet target with 2 or 3 options. * Design, select Components, simulate Thermal analysis, Cost optimize * Design Hardware Circuit, EBOM, Component placement, PCB Layout, Gerber. * Conduct DFMEA, FTA. * Perform Board bring up, Integration Testing, Firmware support. * Review Test Plan & Test Case, Freeze DVP requirement * Plan for test bench setup Electrical Load Jig for Firmware Test, HIL Lab test jig, * Perform and record all reliability testing, Endurance test; debug failures. * Guide and Motivate the Team during the entire process. |

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| Project | **Starter Solenoid Controller** |
| Description | Starter Solenoid Controller developed to eliminate multiple cranking events occurring on the vehicle after Engine ON. Engine RPM is monitored through WL Terminal. Starter Solenoid Controller have High Side Driver BTS7002-1EPP to drive the Starter Solenoid. When the Engine RPM is above the Ideal Speed then the High Side Driver is Turned OFF. Also during cold start multiple crank is eliminated by monitoring the number of switch input events, thereby providing brief time after successive input events. Starter Solenoid Current is monitored thereby providing Protection and Diagnostic feature against various faults. |
| Roles & Resp. | * Complete Product development to deployment on vehicle. |

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| Project | **Body Control Module (BCM) 2 wheeler** |
| Description | BCM is developed for 2-wheeler that drive electrical Loads (Lamps, Radiator Fan, Horn, Starter Solenoid).  BCM have high side (HSS) driver MC07XS6517 to drive both Lamp Loads and LED loads, it is interfaced to MCU with SPI or with input switches. BCM also have HSS BTS7008-2EPA to drive Inductive Loads. The MCU is a 16bit RL78-F13.The BCM have Limp Home feature, during MCU reset or hang, then critical Loads are still driven with protection features. LH and RH Switches are driven through protected 5V High Side Driver BTS7200-2EPA. BCM have a Gyro device (LIS6DSL) interfaced to MCU that determine the tilt on the Vehicle. BCM Turn OFF the Engine during vehicle skid. BCM have Base station device (PCJ7991) that communicate with Transponder PCF7938 through coil Antenna, performing authentication during Ignition ON. BCM have an 433 MHz RF Receiver providing RKE feature like find my vehicle feature, Guide-me to the vehicle. BCM have Low side driver BSP76 to drive LEDs. BCM have CAN Bus for communicating with other ECU and for Diagnostic. |
| Roles & Responsibilities | * Complete Product development to deployment on vehicle * Interact with Customer, perform POC on their Vehicle, built confidence |

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| Project | **Motor Controller for Tractor** |
| Description | Motor Controller developed for Tractor move the Implement UP / Down, drive PTO Solenoid, drive 4-wheel Solenoid, Horn, Tell-tale and Lamp Loads.  Motor Controller have an Half-bridge driver BTN8982 for rotating the motor forward or backward. Motor Current are monitored through H-bridge driver (IS pin), thereby providing short to Ground Protection, short to battery protection, Motor disconnect, thereby building various safety implementation. Selected MCU from RL78-D1A that have options of with/o CAN. It have additional Half-bridge driver BTN8962 for driving PTO Solenoid and 4-wheel drive Solenoid. All the outputs of Motor Controller have Protection and Diagnostic feature. Motor Controller have High Side Driver BTS7008-2EPA, BTS7020-2EPA to drive the High Beam and Low Beam Lamps, Flasher Lamps, Horn. Various blink codes are generated to determine the Fault states for Motor, Solenoid, Lamps. Switch Fault state is identified by controller. |
| Roles & Responsibilities | * Complete Product development to deployment on vehicle. |

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| Project | **Auto Clutch system for Tractor** |
| Description | Conventional system has mechanical activation (Clutch pedal) for Clutch activation. Auto Clutch system consists of a Clutch Controller unit and Clutch Actuator. This eliminates the conventional Clutch Pedal replace with Throttle pedal sensor that receives the Pedal position. The controller activates solenoid that allows hydraulic oil flow into the piston and thereby activating the clutch and Gear shifting done manually. The controller receives Clutch position through rotary sensor.  The Power Clutch Controller have MCU MB96F007. High side driver BTS7080-2EPP drives the Solenoid. Solenoid is driven by PWM output through High side driver and MCU ADC pin monitor the Solenoid current. Throttle Sensor and Rotary hall sensor are interfaced to MCU ADC pin. |
| Roles & Responsibilities | * Complete Product development to deployment on vehicle. |
| Project | **Automated Manual Transmission (AMT) on Pneumatic Vehicle** |
| Description | AMT is developed for HCV is based on electro-pneumatic solenoid. The system comprises of Keypad Module, Power Module, Display Module, Gear Position array Sensors, Clutch Sensor, Telescopic piston cylinders for Gear and Clutch activation, Solenoids. LIN Bus device (TJA1029) provides communication between these Modules. Keypad Module receives various mode of operation by Dome Switch activation. Following are the Modes of operation Reverse, Park, Neutral, Drive, Manual, Gear Increment, Gear Decrement. LEDs reflect the status of the switch activation. Keypad Module receive Accelerator Pedal Sensor input and provide APS output to ECU. The selected MCU have an DAC output that provide respective output to ECU. Keypad Module have CAN Bus device (TJA1042) interface for receiving Engine RPM. Keypad Module MCU RL78-F14 is interfaced to an Gyro device LIS6DSL through SPI that provide information on vehicle going on Uphill or Downhill. Power Module have Low Side Driver TLE8108 interface to MCU RL78-F13 with SPI communication, that provide protected output to drive 8 nos. of pneumatic Solenoids for Gear X-Y movement. These Solenoids provide air flow to move the piston of a Cylinder thereby various Gear positions are controlled. Clutch Solenoid (3 nos.) and Park Solenoid (1 no.) are driven through High Side Driver BTT6200-4ESA that provides protected output. Power Module receives the status of Gear Position through Hall sensors DRV5023. Clutch Position sensor (HAL3736) provides PWM output on the Clutch Position. Clutch position sensor PCB is assembled on the pneumatic cylinder. Power Module receives Air pressure low input that provide indication on the display module. Display Module has an LCD display providing status on the Gear position, Mode of operation. The Display Module is an MCU MB96F007 that have inbuilt LCD controller driving the Segment and Com pins of LCD.  Various Diagnostic are implemented (Detection of Solenoid shorted to Ground, Shorted to Battery, Open / Disconnect, Battery Voltage for under-voltage, overvoltage, Gear Positions, Protected output to sensors). Various safety concepts are built at system level. Low power consumption after Ignition OFF is achieved by disconnecting supply to LCD Module, Power Module and with Vehicle CAN going into sleep mode the keypad nodule MCU goes in sleep mode. |
| Roles & Responsibilities | * Capture the requirement, Input – Output Interface detail (system & vehicle level). * Prepare Project Proposal, Estimation, Component cost, Resource and Time plan. * Derive Technical Safety Requirement (TSR), Technical Safety Concept (TSC), assign Safety Goals (SG) and generate ASIL level. * Prepare Hazard Analysis and Risk Assessment, define DVP. * Develop Hardware Circuit for each of the Module, conduct reviews. * Optimize the design, Component selection, analysis power supply requirement. * Interact with Mechanical Team on Enclosure, PCB restriction drawing. * Capture LCD requirement, provide input to styling team, assign the port pins. * Review component placement, PCB routing. * Prepare Wiring Harness between the module, interact with Supplier. * Participate in Test bench Jig setup, HIL Lab test setup and requirement. * Participate in Board bring up, resolve the issues, support on Integration testing. * Conduct Endurance Testing at Board Level, Vehicle level capture result & analyze. * Integration on Vehicle, compare the vehicle performance against expectation. * Interact with Customer, provide status update, review Time plan. |

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| Project | **Automated Manual Transmission (AMT) on Tractor** |
| Description | AMT is developed with electro-hydraulic solenoid. The system comprises of Keypad Module, Power Module, E-pedal, Rotary Sensor, Manifold for Gear and Clutch activation. LIN Bus device (TJA1029) provides communication between these Modules. Keypad Module have Dome Switches that provide user input on various mode of operation. MCU for keypad module is RL78-F14 that has DAC output. Keypad Module receive Accelerator Pedal Sensor input and provide APS output to ECU. Engine RPM is received on the CAN Bus device (TJA1042). Keypad Module have LCD display providing various Gear Position information, Fault codes, tell-tale indication that receives information from power module over LIN Bus. MCU for Power Module is RL78-F13.Power Module have High Side Driver BTS7008-2EPA that drive hydraulic Solenoids 3/2 valve for various Gear position. During Solenoid activation hydraulic oil pushes the shaft that is coupled to transmission Gears. Each of the Gear Positions are validated by Hall sensor DRV5023 assembled along with the power module. The Power Module have High Side Driver BTS7080-2EPA that provide constant current to drive the clutch solenoid 3/3 valve. Clutch position feedback is received by device HAL3736 sensor assembled on PCB. Power module provides protected output to each of the solenoid and sensors, thereby monitoring each of the load currents. Transmission output shaft speed sensor is monitored by power module. Power module have oil pressure sensor to monitor the oil pressure. Various Functional Safety concepts are monitored and provided.  During Drive Mode Clutch activation, Gear activation are controlled electronically based on the Engine RPM. During Manual Mode based on either Up Shift or Down Shift input from Keypad and E-pedal input, Gear position are respectively incremented or decremented. |
| Roles & Responsibilities | * Complete Product development to deployment on vehicle * Perform DFMEA at Component Level, System-Vehicle Level. * Prepare System Architect, Design and review Hardware circuit, EBOM, PCB Layout. |