CHETHAN RAMAKRISHNA REDDY (PREFFERED NAME – CHETHAN)
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OBJECTIVE - To contribute my skills in an automotive engineering research and product development environment and have a relation of mutual passion and benefit.

EDUCATION

Degree	University	School/College	Specialization	Year	Percentage/Grade
SSLC (Secondary School Leaving Certificate)	Karnataka Secondary Education Examination Board, Government of Karnataka, India	Shree Cauvery High School, Bangalore, Karnataka, India		2005	87.84%
2nd year Pre-University College	Department of Pre-University Education, Government of Karnataka, India	St. Joseph's Pre-University College, Bangalore, Karnataka, India	PCME (Physics, Chemistry, Mathematics, Electronics)	2007	78.33%
Bachelor of Engineering (BE) (Link)	Visvesvaraya Technological University, Belgaum, Karnataka, India	New Horizon College of Engineering, Bangalore, Karnataka, India	Mechanical Engineering	2007-2011	73.18%
Master of Technology (MTech) (Link)	National Institute of Technology Karnataka (NITK), Surathkal, India	National Institute of Technology Karnataka (NITK), Surathkal, India	Mechatronics Engineering	2011-2013	8.37 cgpa on a scale of 10
Doctoral Research (Ph.D.)	Michigan Technological University (MTU), USA	Michigan Technological University (MTU), USA	Mechanical Engineering – Engineering Mechanics (ME-EM)	2016-Present	3.85 cgpa on a scale of 4 (So far)

ACADEMIC DETAILS

Ph.D. | **MTU**

1. ***Fall 2016 (Aug 2016 – Dec 2016) – Key courses[1]:***
   - ***Introduction to Propulsion Systems for Hybrid Electric Vehicles*** - Hybrid electric vehicle analysis will be developed and applied to examine the operation, integration, and design of powertrain components. Model based simulation and design is applied to determine vehicle performance measures in comparison to vehicle technical specifications. Power flows, losses, energy usage, and drive quality are examined over drive-cycles via application of these tools. **GPA 4/4**

[1] MTU Course Description

- ***Internal Combustion Engines II*** - Advanced topics in internal combustion engines with emphasis on CI operation, modeling of engines, modeling of combustion processes, tribology, second law applications, and other topics of current interest. **GPA 3.5/4**
  Project: *Effect of external supercharging in a CI diesel engine with swirl combustion chamber* – A validation of experimental result in simulation (Tool – GT-Suite).

- ***Principles of Energy Conversion*** - Introduces background, terminology, and fundamentals of energy conversion and storage. Discusses current and emerging technologies for production of thermal, mechanical, and electrical energy. In-depth analysis of major thermodynamic power cycles. Topics include fossil and nuclear fuels, thermodynamic power cycles, solar energy, wind energy, and energy storage. **GPA 4/4**
  Project: *Efficacy of PV Solar Energy in Houghton, MI* – A study on technical and economic feasibility (break even time).

2. ***Spring 2017 (Jan 2017 – April 2017) – Key courses[2]:***
   - ***Advanced Propulsion Systems for Hybrid Electric Vehicles*** - Hybrid electric vehicles (HEV) will be studied and simulated using advanced powertrain component analysis and modeling. An in-depth analysis and study of power flows, losses and energy usage are examined for isolated powertrain components and HEV configurations. Simulation tools will be developed and applied to specify powertrain and vehicle components and to develop control and calibration for a constrained optimization to vehicle technical specifications.

   - ***Engineering Research Communications*** - Guides students through the process of publishing research in technical journals and presenting research at conferences and other venues, with a focus on practical application of rhetorical concepts. Students will prepare papers and presentations related to their own research.

   - ***Distributed Embedded Controls*** - This course will develop an understanding for the design and application of embedded control systems. Topics to be covered include: embedded system architecture, model-based embedded system design, real-time control, communication protocols, signal processing, and human machine interface. Embedded applications in advanced hybrid electric vehicles will also be introduced.

MTech | **NITK**

1. ***Mini Project: Rotary encoder using an 8051 micro-controller***
   - Aim of the project was to reduce the cost of available Rotary encoders
   - An incremental rotary encoder was designed and built using a stepper motor
   - Every step by the stepper motor gave a pulse, which was amplified and fed into the micro controller
   - The micro controller was programmed to show the angle turned by the stepper motor by an LED and an LCD display

[2] MTU Course Description

2. ***Practical Training at Robert Bosch Engineering & Business Solutions Private Limited, India (RBEI)***
    - Built a Stepper Motor interface model (MATLAB/Simulink environment) as an Idle Air Control Actuator for a Fuel Injected Gasoline I.C. Engine
    - Modeled and simulated a complete Air Intake system (including cylinder breathing dynamics) considering a Gasoline 2-cylinder Engine – in MATLAB/Simulink environment.

    Report Link

3. ***MTech project/thesis at Robert Bosch Engineering & Business Solutions Limited, India (RBEI) on Development of Automotive Thermoelectric Generator (ATEG)***
    - Aim of the project was to recover waste heat energy from exhaust of an Internal Combustion (IC) engine driven Automobile and convert a part of it to electricity (useful form of energy) by the thermoelectric or Seebeck effect.
    - Project involved a detailed simulation model built in MATLAB/Simulink environment and an overview on the control strategy to realize ATEG. Model validation was done by giving the model inputs from the engine test bench data (measurements).
    - Future activities involve demonstration of Waste Heat Recovery by thermoelectric generator on a test vehicle.

    Thesis link

BE | **New Horizon College of Engineering**
Final semester project:

1. ***Design and Fabrication of Boundary Layer Turbine as a Potential Automotive engine (Compressed Air as Fuel):***
    - Based on invention by Nikola Tesla in early 20th century
    - The project involved design and analysis of a rotary boundary layer turbine to drive an automobile
    - This was a low torque engine which could rotate at speeds towards the fluid inlet velocity
    - Compressed air was used (upwards of 10 bar) and the engine output was tested at each input fluid pressure
    - The problem of low torque was tackled by inletting compressed air at a high velocity so that the shaft output speed was high (rpm), the engine shaft was then geared down at the wheels to maintain sufficiently high torque
    - Storage of compressed air fuel required a very large tank to obtain a reasonable range
    - The solution proposed was to have an on-board compressor which kicked in at a threshold rpm (when the engine has enough power to drive the compressor and the automobile), thus increasing the range for smaller storage tanks.

    Thesis link

WORK EXPERIENCE

Organization	**Duration**	**Role**
Robert Bosch Engineering and Business Solutions Limited (RBEI), Bangalore, Karnataka, India	4 June 2012 to 29 March 2013 – approx. 10 months	Project Intern (Certificate)
Robert Bosch Engineering and Business Solutions Limited, Bangalore, Karnataka, India	19 August 2013 to 30 September 2015	Engineer– Modeling and System Simulation
Robert Bosch Engineering and Business Solutions Limited, Bangalore, Karnataka, India	1 October 2015 to 5 August 2016	Senior Engineer– Modeling and System Simulation (Relieving Letter) (Service Certificate)

WORK DETAILS

1. Internship – Carried out my internship activities (two months), my master's project work and other tasks to assist my team and the organization overall.
2. Employee
    1. **HIL plant model development** - A Hardware in Loop setup (HIL) contains a control model (to be tested in its target hardware) and a plant model. My role was in calibrating the plant model (in this case an Automobile) and also developing missing models, if any. MATLAB/Simulink was used calibrate, built, validate and generate code of the models.

    2. **Model based testing** - The aim of this project is to develop control model in a simulation environment (MATLAB/Simulink) and then generate code out of it. We do testing and validation (of the control logic), by Model in Loop testing (MIL - integrating the control model with plant model and testing by feeding the model with standard test cases) and Software in Loop testing (SIL - generating code out of the control model and integrating it with the same plant model and feed the co-simulation model with standard test inputs), in the development phase itself thus saving time and resources. I was responsible for all the technical implementation for this pilot project.

    3. **Model based design & calibration** – There are two aims with this project, they are
        i. Built highly accurate plant models and use it to pre calibrate the Maps/Tables in an Electronic Control Unit (ECU)
        ii. Built highly accurate plant models and use it to make design decisions (for egs: how big a component is required? How best to connect it? etc.)

        The obvious outcome of this project is lesser dependency on Test Bench, faster time to market; leading to cost savings. The project is carried out in GT-Suite and MATLAB/Simulink.

    4. **Virtual hardware** - The aim of this project is to be able to model/simulate the whole embedded system in a PC environment. That includes a very accurate microcontroller model (purchased for microcontroller manufacturers), ASIC models (usually the electrical drivers), control model (software inside the microcontroller) and plant model (to give various sensor and receive actuator signals from the control model). The use case of this pilot project will benefit the organization in time, money and resources. My role was to completely develop and validate the plant model. This included calibrating the model to the particular use case, develop missing models and validate the same with integrating with the rest of the system. MATLAB/Simulink was used to develop, calibrate and generate code out of the model.

    5. **Active Noise Cancellation and Enhancement** - The aim is to develop a product for automobiles (two wheelers, passenger cars, off road vehicles etc.) capable of cancelling or enhancing sound at the exhaust of the vehicle. This is achieved actively. So, the idea is to cancel sound if the vehicle exhaust is too loud or enhance it to make a passenger car sound like a F1 car (for egs). I was responsible fully on the technical implementation of the project (from vehicle noise measurement, mechanical setup of sensor and actuator to electronic control unit development). I was successfully able to develop two demonstrators on test vehicle (a two-wheeler). One with a pure static analog hardwired solution for active noise cancellation and an adaptive software solution for cancellation/enhancement both (a switch to opt either of the two). The software tools I used for this project are MATLAB/Simulink and DSPACE MicroAutoBox 2 (rapid prototyping electronic control unit (ECU)).

    6. **Bosch Boost Recuperation System (BRS) Simulation** – BRS is an advance system for mild hybrid and CO_2 reduction by Bosch, one step ahead of conventional start/stop systems. It provides start/stop, coasting, brake recovery and also boosting using a controller and an electrical

machine (acts as a motor and also generator) coupled to the Engine. BRS is typically a 48 Volt system (i.e. consisting of a 48 Volt electrical machine) in developed markets like the Europe and America but for emerging markets such as India a 12 Volt BRS (i.e. consisting of a 12 Volt electrical machine) is more appropriate, mainly due to cost and smaller Engines. So, my task was to develop both the control (mainly because control strategies for European and Indian market will be markedly different) and plant model to analyze the advantages of a 12 Volt BRS and 48 Volt BRS for Indian market and the different vehicle segments of the Indian market. One more important task in this project was to validate the pros and cons of using a Supercapacitor/Ultracapacitor/Hybrid-Supercapacitor as an alternate ESS (Energy Storage System) to the Li-Ion Battery for Indian Market. This work was done partly in GT-Suite and partly in MATLAB/Simulink.

7. **Automobile Waste Heat Recovery using thermoelectric generators** – This is mainly a self-initiation project. In addition to the work I had done during my internship at Bosch, I have further built competency, interacted with a few thermoelectric generator manufacturers, studied use cases in the Automotive domain, and demonstrated a use case on a two-wheeler.

TECHNICAL SKILLS

1. Modeling/Simulation/Data Analysis in MATLAB/Simulink environment
2. Basic knowledge of Modeling & Simulation in Automobile system simulation tools – GT-SUITE
3. Automobile system understanding (Basic to Intermediate level)
4. Automobile exhaust system acoustics understanding (Basic to Intermediate level)
5. Automotive Embedded Software Development Cycle – Usage of Automated tool chain, eg. ETAS, DSPACE tool chain
6. Basics in Hardware in loop (HiL) testing (Automobile environment)

CERTIFICATION COURSES

1. **Completed a practical and hands on course in Automobile Servicing and Maintenance in G.D. Naidu Charities, Coimbatore (Certificate)**
   Highlights:
   1. Was a 3-week course on Automobile servicing and Maintenance
   2. We were given all the typical Automobile parts (Engine, Clutch, Gear Box, Differential, Suspension, Steering, etc.).
   3. These were stripped to most basic level and we learnt to service (clean) and re-assemble them
   4. Was a very informative course, helped to understand all the parts of a typical Automobile, understand its realisation physically (after what I had learnt in theory in college) and appreciate their performance

2. **Completed a familiarization course in H.A.L. Aircraft division (Certificate)**
   Highlights:
   1. Was a month long Training/Familiarization course in the H.A.L. Aircraft division plant in Bangalore, India
   2. Each day we were assigned a department/shop to get to know and familiarize ourselves with what they are doing, which component of which Aircraft they are producing, number of employees etc
   3. In the final week, we were assigned to Aircraft service bay and final assembly plants, where I got a chance to sit inside and explore Sukhoi, LCA (Light Combat Aircraft), Surya Kiran, Hawk (the then training and combat Aircrafts used by the Indian Air Force)

ACHIEVEMENTS

1. Demonstrated ANCE (Active Noise Cancellation and Enhancement) project on a two wheeler and was appreciated by many top level management/technical leads of our organization including the president of our organization (RBEI). Our project ANCE was covered by various media organisations (Link 1, Link 2, Link 3, Link 4, Link 5)
2. Took an active part in College fests at both Pre-University and Undergraduate level
3. Was the school captain in Class X

LANGUAGES KNOWN

1. English – Business fluent English (Read, write & speak). Cleared TOEFL iBT (May 2015) with a score of 103/120 (Link)
2. Indian Languages known – Telugu (mother tongue), Kannada, Hindi
3. German (Basic Conversation skills) – 1A qualified (Link)

PUBLICATION

Chethan R Reddy, Shrikantha S Rao, Vijay Desai, Karthikeyan Ramachadran – "Modeling of an Automotive ThermoElectric Generator (ATEG)." Volume 2 Issue 5 May 2013 in International Journal of Science and Research (IJSR). → (http://www.ijsr.net/archive/v2i5/IJSRON2013977.pdf)

INTERNATIONAL EXPERIENCE

Had been to Germany for a 2-week business visit to a sister company of our organization to learn/discuss about ANCE (Active Noise Cancellation and Enhancement) project.

PERSONAL DETAILS

Date of Birth: 14 December 1989
Sex: Male
Marital Status: Single
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US VISA Class: F1
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