Chethan Ramakrishna Reddy

https://chethanrreddy.github.io, ✉ chethan.reddy@gmail.com, ☎ +1.906.275.9969 ♂ Pronoun - He, ☆ Date of birth - 14 Dec 1989,
† Citizenship - India, → US Work Authorization - O1-A (Authorized to work for Current Employer - Need sponsorship to work for Other Employer.)

EDUCATION

MICHIGAN TECHNOLOGICAL UNIVERSITY

PhD in Mechanical Engineering
Co-advised by Dr Mahdi Shahbakhti and Dr Rush D. Robinett III
Research focus - Model Predictive Control of Energy Systems for Heat and Power Applications
Mar 2022 | Houghton, MI
CGPA: 3.77/4.00

NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA

MTech (MS equivalent) in Mechatronics Engineering
May 2013 | Surathkal, India
CGPA: 8.37 / 10, US equivalent CGPA: 4.00 / 4.00

EXPERIENCE

ENGINEER | Ford Motor Company
Jan 2022 – Present | USA

- xEV model based calibration optimization.
- Powertrain energy management focus.

RESEARCH ASSISTANT | Michigan Technological University
May 2017 – Jan 2022 | Houghton, MI

- Research on Model Predictive Control of (i) Building HVAC System with Solar Energy Integration, and (ii) Internal Combustion Engine with Waste Heat Recovery at the Energy Mechatronics Laboratory.

INTERN | Halla Mechatronics
Jan 2019 – May 2019 | Bay City, MI

- Closed-Loop (Plant and Control) Model Development, Validation and Simulation of Electronic Controllers in Motor Controls Group.

SENIOR ENGINEER/ENGINEER | Robert Bosch India
Sep 2015 - Aug 2016/Aug 2013 – Sep 2015 | Bangalore, India

- Modeling & Simulation Expert in the System Engineering Group (Responsible for Hybrid and Battery Electric Vehicle).
- Plant model development, control model development, integration of models, and system simulation in modeling and simulation group.

INTERN | Robert Bosch India
Jun 2012 – Mar 2013 | Bangalore, India

- Plant Modeling Support and Simulation Based Research on Automotive Waste Heat Recovery using Thermo-Electric Generators (My Masters Thesis).

SELECTED PUBLICATIONS

- C. R. Reddy , V. Bonforchi Vinhaes, J. D. Naber, R. D. Robinett III, M. Shahbakhti, "Exergy based model predictive control of an integrated dual fuel engine and a waste heat recovery system" , in *Control Engineering Practice*, 2023.
- C. R. Reddy , V. Bonfochi Vinhaes, J. D. Naber, R. D. Robinett III, M. Shahbakhti, "Model predictive control of a dual fuel engine integrated with waste heat recovery used for electric power in buildings" , in *Optimal Control Applications and Methods*, 2022.
- C. R. Reddy , M. Shahbakhti, R. D. Robinett, and M. Razmara, "Exergy-wise predictive control framework for optimal performance of MicroCSP systems for HVAC applications in buildings" , in *Energy Conversion and Management*, Volume 210, 2020.
- M. Toub, C. R. Reddy , M. Razmara, M. Shahbakhti, R. D. Robinett, G. Aniba, "Model-based predictive control for optimal MicroCSP operation integrated with building HVAC systems" , in *Energy Conversion and Management*, Volume 199, 2019.

SKILLS

- Modeling, Simulation, Data Analysis, and Code Generation in Matlab/Simulink.
- Energy systems, energy storage systems (thermal energy storage, battery energy storage) modeling, control & simulation.
- Modeling of thermal, mechanical, hydraulic, pneumatic, electronic and electric sub-systems.
- 0D, 1D, 3D, and Multi-Physics Modeling Techniques.
- System Simulation in GT-Suite, AVL, AMESim, CarSim. And Co-Simulation with Matlab/Simulink.
- Numerical Optimization Techniques / CPU usage Optimization Techniques of system / simulation model.
- Model Predictive Control. Optimal Controller Design. Optimization Techniques. Linear and Non-Linear Control Theory.
- Model, Software, and Hardware in Loop (MiL, SiL and HiL) Model Development and Testing. Tool chains - ETAS, DSPACE, and MotoHawk.
- Mechanical CAD. Tools - Solidedge, and Solidworks.

PROJECTS

ACADEMIC

PhD Course Projects

- Fuel Consumption Reduction Technologies and Hybrid Vehicle Design
- Control System Development for a Hybrid Vehicle ECU (MotoHawk)
- Effect of External Supercharging in a CI Diesel Engine with Swirl Combustion Chamber (Simulation study)
- Efficacy of PV Solar Energy in Houghton, MI
- Decentralized Model Predictive Control for Thermal Control of buildings
- Optimal Control of Wave Energy Converters

Masters Thesis

- (Model-Based) Development of Automotive Thermo-Electric Generator (ATEG)

Bachelors Thesis

- Design and Fabrication of Boundary Layer Turbine as a Potential Automotive Engine (Compressed Air as Fuel)

INDUSTRIAL

- Model-based Design, Testing, and Calibration.
- Modeling and Simulation of Electrically Assisted Power Steering System.
- Mechanical Design, Fabrication, and Controller Prototyping of Automotive Exhaust Active Noise Cancellation and Enhancement System.
- Bosch Boost Recuperation (Mild Hybrid Vehicle) System Simulation.

SELECT PROJECT IMPACTS

- Optimized the digital twin developed/used by our group at Ford to improve the simulation speed by more than 35%.
- Developed Model Predictive Control Framework which saves greater than 30% of energy in a building HVAC system when integrated concentrated solar power plant during PhD.
- Developed Model Predictive Control Framework which saves 4% of fuel in a internal combustion engine with exhaust heat recovery during PhD.
- Investigated cost-benefit analysis of hybrid electric vehicles vs. internal combustion engine vehicles for Indian OEM costumers of Bosch in the initial phase of hybrid adoption in India.