SAKET ADHAU

Master of Technology - Instrumentation and Control
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EDUCATION

Master of Technology, Instrumentation and Control ***Aug'17–June'19***

- College of Engineering Pune, India
  - CGPA: 7.89
  - Thesis Title: *Learning Based Model Predictive Control*
  - Supervisor: Prof. Dayaram Sonawane

Bachelor of Engineering, Instrumentation and Control ***Aug'13–June'17***

- University of Pune, India & Government College of Engineering and Research, Avasari, Pune.
  - Mention: First Class with Distinction | Percentage: 69.67%
  - Project Title: *System Identification and PID Control of PMDC Motor using* MATLAB *and LabView*
  - Supervisor: Dr. Milind Bongulwar

PUBLICATIONS

Articles in international conferences
2019

- **Adhau S.**, Patil S., Ingole D., and Sonawane D., "Implementation and Analysis of Nonlinear Model Predictive Controller on Embedded Systems for Real-Time Applications", *accepted for publication in Proceedings of the* 17^{th} *European Control Conference (ECC'*19*)*, IFAC and IEEE, Naples, Italy, 2019.

2018

- **Adhau S.**, Phalke K., Nalawade A., Ingole D., Patil S., Sonawane D., "Implementation and Analysis of Offset-Free Explicit Model Predictive Controller on FPGA", *in the Proceedings of* 5^{th} *Indian Control Conference*, IEEE, Delhi, India, 2018.
- **Adhau S.**, Dani S., Ingole D., and Sonawane D., "Embedded Model Predictive Control on Low-Cost Low-End Microcontroller for Motor Speed Control", *in the Proceedings of International Conference for Convergence in Technology (I2CT)*, IEEE, Mangalore, India, 2018.

RESEARCH INTERESTS

Non-Linear Model predictive control
Optimization
Embedded systems
Machine learning for MPC

INTERNSHIP EXPERIENCE

Bosch Chassis Systems India Pvt. Limited, Chakan, Pune. ***June'15 - July'15***

- Studied advanced braking system like Anti-lock brake systems (ABS) and electronic stability program (ESP).
- Studied various kinds of braking systems viz. Mascular-energy braking , power assisted braking system, parking brake system for passenger cars.
- Studied the working of brake boosters, Tandem master cylinder, design of braking system, brake pedal and braking components.
- Worked with the TeF department towards maintenance and predictive safety standards.
- Carried out analysis of Mean Time To Repair (MTTR) and Mean Time Between Repair (MTBR) on the assembly lines (NOAH, Line 51, TMC line).

PROJECTS

- **Real time implementation of Non-Linear MPC on ARM and FPGA**
  - Non-linear MPC was successfully implemented on ARM using GRAMPC toolbox.
  - Along with, Acado toolkit was also used to implement NMPC on ARM as well as Pynq FPGA board.
  - Detailed analysis of results were carried out from embedded implementation aspects.
- **Real time implementation of Linear and Explicit MPC on ARM and FPGA**
  - Linear Model Predictive Controller was implemented on ARM microcontroller using MATLAB and Simulink.
  - The designed MPC was tested on DC motor using HIL and for real time using simulink coder.
  - Explicit MPC was also implemented using MPT toolbox and Matlab based toolbox for DC motor speed and position control on ARM.
  - Both Linear and Explicit MPC were also implemented on zedboard **FPGA** and detailed memory and time analysis was carried out.
- **Auto tuning of PID Controller using optimization**
  - Auto tuning of PID controller was done using optimization algorithm SQP.
  - The complete simulation was built in MATLAB and the system gave optimized values of K_p, K_i and K_d parameters using run time optimization.
- **Parameter Estimation and Position control of PMDC motor**
  - PMDC motor model was experimentally validated and corrected using parameter estimation.
  - SQP algorithm was implemented in MATLAB for estimation using optimization.
  - The validated model was tested and PID controller for position and speed control was successfully implemented on ARM microcontroller.
- **System Identification and PID Control**
  - System identification for an unknown DC motor was done using System Identification toolbox of MATLAB.

- The system was passed through various linear and non-linear signals for accurate system model.
- The identified state-space model was PID tuned using Zeigler Nicholas and Cohen-Coon methods for speed control of the motor.
- PID controller was implemented on 8-bit microcontroller using plain C code, MATLAB based embedded coder and in LabVIEW using toolbox for VISA protocol.

POSITIONS OF RESPONSIBILITY

- **Co–ordinator for 3^{rd} Winter School.** ***Dec'18***
  - Served as convener and co–ordinator of 3^{rd} **Winter School on Optimization and Optimal Control – A Data–based Approach** at Embedded Systems Lab, COEP.
  - Responsible for organization and management of more than 50 candidates.
- **Teaching Assistant.** ***July'18–Dec'18***
  - Served as TA for **Microcontroller Techniques and Its Applications** for undergraduate students.
  - Responsible for conducting practicals and tutorials for a class of 60 students.
- **Teaching Assistant.** ***Dec'17***
  - Served as TA for **Embedded System Design** which was a special course conducted embedded systems lab, COEP.
  - Responsible for conducting practicals and tutorials for a class of 20 students.
- **Graduate Class Representative** ***Aug'17–June'19***
  - Served as Class Representative (CR) for masters student, Biomedical engineering 2019 batch.
  - Responsible for various activities, organization and management of students.
- **Students Placement Cell – Coordinator** ***Aug'16–June'17***
  - Co–ordinator at Training and Placement cell in college for undergraduate students.
  - Organizing various training and placements programs for a class of 60 students.
- **Technical Event Head – Micromania** ***Sep'16***
  - Event head for annual Technical fest of the college.
  - Responsible for conduct of various events and workshops under the technical event.

AWARDS AND FUNDING

- Project accepted for oral presentation in **MATLAB Expo'19.** ***May'19***
- Student support program for Indian Control Conference – IIT Delhi. ***Jan'19***
- Xilinx University Program for researchers – Pynq development board and software. ***Sep'18***

SKILLS & INTERESTS

- **General**
  - Non-linear Optimization, model-based control, non-linear dynamic system modeling.
- **Programming languages**
  - C, C++, HTML, Python.
- **Tools**
  - MATLAB/Simulink, LaTeX, TikZ, Inkscape, Microsoft office suite.
- **Development**
  - Atmel Studio, Vivado, MPLAB X, HDL coder, LabView, Arduino IDE, Linux.
- **Toolboxes**
  - Protoip, MPT toolbox, ACADO Toolkit, CasADi, FORCES, GRAMPC.
- **Version control tools**
  - GitHub, GitLab, Bitbucket.

TRAINING

- 3 days workshop on Tiva C and MSP430 based Embedded System Design. ***March'19***
- Winter School on Optimization and Optimal Control - A Data-based Approach. ***Dec'18***
- One month Certificate course on embedded systems design. ***Dec'17***
- Certificate course on Ethical hacking, COEP, India ***Sep'16***
- MATLAB & Simulink for engineers, one month training at COEP. ***Dec'15***

PERSONAL DETAILS

- Full Name: Saket Sunil Adhau
- Citizenship: Indian
- Date of Birth: 29 May 1995

REFEREES

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