

Curriculum Vitae

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Education

- **Indian Institute of Technology Bombay, Mumbai, India**
 - Bachelor of Technology with Honors and Master of Technology in Mechanical Engineering
 - Specialization: Computer Aided Design and Automation
 - GPA – 8.79/10, Expected date of completion – June 2013
 - Ranked 5th in the batch of 50 students
- **Dayanand Anglo Vedic Public School, Kota, India**
 - Major in Science, Affiliated to Central Board of Secondary Education
 - Aggregate – 87.4%, Completed – March 2008
- **Delhi Public School, Guwahati, India**
 - Affiliated to Central Board of Secondary Education
 - Aggregate – 90.4%, Completed – March 2006

Awards and Achievements

- Recipient of **Undergraduate Research Award 01** in 2011 for excellence in research
- Received **Academic Proficiency AP** grade in the courses **Vibro-Acoustics** and **Automatic Control Engineering** for outstanding performance in class
- Qualified the **National Talent Search Examination (NTSE)** in 2006 and awarded annual scholarship till graduation for the same
- Awarded **Certificate of Merit** by CBSE for being among the top 0.1% in Mathematics in 2006

Areas of Interest

- Vehicle Dynamics
- Control Theory, Model Predictive Control, Nonlinear Control
- System Identification using Time Series Models, Neural Networks
- Flexible Multibody Dynamics

List of Publications

- S.Talukdar, D. Purdy, V. Sastry, M.Awan, A. Tremlett, *Preview based Vehicle Steering Control using Neural Networks*, SAE World Congress and Exhibition - 2013, Detroit, USA
- S.Talukdar, A.Mazumdar, A.Ujjwal, M.Mohanan, Dr.K.Kalita, *Mathematical Modeling in Vehicle Ride Dynamics*, SAE World Congress and Exhibition - 2012, Detroit, USA
- A.Mazumdar, S.Talukdar, Dr.K.Kalita, *Comparative Analysis of an Elastic 2 Degree of Freedom Vehicle Ride Model with a Rigid 2 Degree of Freedom Model*, SAE World Congress and Exhibition - 2012, Detroit, USA
- S.Talukdar, S.S.Kulkarni, *A Comparative Analysis of a Rigid Bicycle Model with an Elastic Bicycle Model for Small Trucks*, SAE World Congress and Exhibition - 2011, Detroit, USA
- S.Talukdar, M.Awan, Dr.A.Hameed, *Implementation of Low Cost Inertial Measurement Unit (IMU) Integrated with a Global Positioning System (GPS) Receiver- A Study*, SAE World Congress and Exhibition - 2011, Detroit, USA

Internships

Preview based Vehicle Steering Control

Guide: Prof. D. J. Purdy, Cranfield University, United Kingdom

May '12 – July '12

- Implemented autonomous vehicle steering controllers using **Classical Control Theory** and **Neural Networks** which were validated against real track data
- Evaluated the various controllers and specified optimum performance speed range for each
- These controllers will be used by the Vehicle Systems Group, Cranfield University to represent the human driver in simulations

Mathematical Modeling of Vehicle Ride Dynamics

Guide: Prof. Karuna Kalita

May '11 – July '11

- Investigated the existing vehicle **ride models** including tires and dampers in detail
- **Remodeled** vehicle ride dynamics considering **chassis flexibility** which was validated using **Finite Element Method** and experiments
- This proposed analytical model lays the foundations of flexible vehicle ride models

Vehicle State Estimation using a Inertial Measurement Unit integrated with a GPS

Guide: Prof. A. Hameed, Cranfield University, United Kingdom

May '10 – July '10

- Devised a **sensor system** by interfacing inertial sensors and GPS with the data acquisition system
- Designed a software program which provides estimates of unmeasured vehicle states using **Kalman Filter** and validated it with real time experiments
- This system is used to implement **skid steering** controller on a steer-by-wire vehicle

Key Academic Projects

Integrated Chassis Control for Vehicle Safety

Guide: Prof. S. S. Kulkarni and Prof. S. C. Patwardhan

Dual Degree Project

July '12 – Present

- Analyzed the **interaction** between the different vehicle safety technologies
- Currently designing a controller to improve vehicle safety using **Model Predictive Control**
- Future goal is to propose a single controller for the various subsystems

Vehicle Handling Dynamics and Control : A Review

Guide: Prof. S. S. Kulkarni

Seminar

Jan 2012 – April 2012

- Reviewed vehicle handling active technologies and their implications on vehicle safety
- Simulated the controllers in Simulink and established the need for Integrated Chassis Control

Adaptive Control of a Robotic Manipulator

Course: Adaptive Control Theory

Course Project

January '12 – April 2012

- Implemented **Adaptive Control** for control of a robotic manipulator with unknown inertia
- Analytically demonstrated closed loop **stability**

System Identification and Control of a Vehicle with Four Wheel Steering

Course: Advanced Process Control

Course Project

January '12 – April '12

- Remodeled vehicle handling dynamics using **Black-box models**
- Designed and compared the performance of different **State Estimation** algorithms for estimation of unmeasured vehicle states
- Solved the tracking problem using Linear Quadratic Control and Model Predictive Control

Modeling and Simulation of Vehicle Handling Dynamics

Guide: Prof. S. S. Kulkarni

Undergraduate Research Project

August '09 – September '10

- Investigated the **rigid bicycle model** for vehicle handling dynamics
- **Remodeled** vehicle handling dynamics considering **chassis flexibility** and validated it using **Finite Element Method**
- Analysed the response of both the models and established the reasons of differences between them

Teaching Experience

- **Teaching Assistant** for the course – **Microprocessors and Automatic Control**
 - Lectured on building blocks of primitive microprocessors
 - Involved in designing tutorial and exam papers for a batch of 130 students
 - Organised doubt clearing sessions and graded answer scripts/tutorials
- **Teaching Assistant** for the course – **Nonlinear Systems Analysis and Control**

Relevant Courses

- **Control Systems**
 - Process Control, Automatic Control Engineering, Advanced Process Control, Applied Mechatronics
 - Multivariable Control Systems, Control of Nonlinear Dynamical Systems, Adaptive Control
 - Differential Geometric Methods in Control, State Estimation, Linear Filtering
- **Dynamics and Modeling**
 - Kinematics and Dynamics of Machinery, Space Flight Dynamics, Large Scale Systems, Vibro-Acoustics
 - Analytical and Geometric Dynamics, Modeling and Identification of Dynamical Systems

Technical Skills

CAD packages : ANSYS, SolidWorks, Eagle (PCB Layout), Labview, MSC Adams
Modeling & Analysis : MATLAB/Simulink, Mathematica
Microcontrollers : Atmel AVR – ATmega 8/16/32/640, Freescale XEP100
Programming : C/C++

Technical Activities

- Reviewer for **Asia Pacific Automotive Conference 2013** organised by SAE Thailand
- Completed a certificate course on **Intellectual Property Rights** organised by School of Management, IIT Bombay in 2012
- Participated in the **2nd Winter School on Control and Dynamical Systems – 2012** organised by System and Control Engineering, IIT Bombay
- Presented two papers in the **SAE World Congress and Exhibition 2011** in Detroit, USA
- Conducted **MATLAB Workshop** in the Department of Civil Engineering, IIT Bombay in 2011
- Secured **4th** position in **Robocon – National Robotic Contest 2010** held in Pune, India
- Participated in **Full Throttle** – a scaled down IC engine car racing event in Techfest 2010
- Participated in **Nexus** – India's **1st** solar robotics contest organised as a part of Techfest 2009
- Awarded **Hostel Technical Colour** in 2010 for commendable inputs in hostel technical events
- Designed a **Laboratory Robot** which was amongst the top 20 finalists in the **National Level CBSE-Intel Science Exhibition 2004**
- Invited to present the **Laboratory Robot** in the **Intel Science Talent Discovery Fair 2004** and the **12th National Children's Science Congress 2004**

Extra-Curricular Activities

- Secured **1st** position in **MechView**, a film making contest organised as a part **Radiance 2011**
- Awarded **Certificate of Merit** for swimming 12 hours in Swimathon 2009