

## Mr. Nishant Parikh, M.Tech [CV](#)

### Lecturer

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Mr. Parikh has worked on Dynamic Modeling and Control of a Nuclear Steam Generator. Poor control of the steam generator water level in the secondary circuit of a nuclear power plant can lead to frequent reactor shutdowns. Such shutdowns are caused by violation of safety limits on the water level and are common at low operating power where the plant exhibits strong non-minimum phase characteristics and flow measurements are unreliable. Therefore, there is a need to systematically investigate the problem of controlling water level in the steam generator in order to prevent such costly reactor shutdowns. Classical PID controllers are not able to handle multivariable interactions and constraints carefully. In this work, we proposed to use Linear Quadratic Gaussian (LQG) control scheme to achieve efficient servo and regulatory control of steam generator. The emphasis is given on developing process simulator for carrying out simulation studies. The Benchmark Astrom (2000) model for a nuclear steam generator has been simulated using MATLAB. Analysis of the simulation studies reveals that proposed feedback plus feedforward LQG scheme is able to track desired setpoint trajectory satisfactorily and quickly reject moderately large changes in steam demand at various operating point.

Mr. Parikh has implemented various control algorithms such as 2DOF Pole Placement Control, Discrete PID Controllers, LQG Controllers, Model Predictive Controllers on benchmark laboratory based systems such as Coupled-tank System, Inverted Pendulum, Hybrid Tank, Gantry Crane, Two-tank System, Heat-exchanger process control etc.

Currently he is working on powerful algorithm, 'Adaptive Optimal Control Techniques', which seems very promising for time varying systems. Optimization consumes time, so that it may not be suited for fast (electronic) systems but FPGA are now well established and provides very less computation time. Mr. Parikh is trying to explore Compact RIO module of LABVIEW to develop FPGA based optimal controller for time varying systems. He is also working on Modeling of systems especially via system identification and time series modeling techniques for prediction of system's behavior and on developing LABVIEW based SCADA system for the petrochemical processes.

**Specialization**      Systems & Control, IIT Mumbai

**Research Interest** Adaptive Control, Mathematical Modeling, Optimization, System Identification, Multivariable Chemical Process Control, Nuclear Steam Generator Control, Intelligent Sensors, Advance Instrumentation, SCADA Based Systems, Digital Control, Robust Control, Embedded Control

## Research Publications

National Conference / Workshop

1. N. N. Parikh, Vishnuvardhana, A. T. Markana, "Adaptive control of a coupled tank system", NVSC, IEEE (Gujarat Section), April 19-20, 2008 at ADIT Eng. College, Vidyanagar, Gujarat, India.
2. N. N. Parikh, A. T. Markana, Harshil Raval, "Microcontroller based digital PI controller", NVSC, IEEE (Gujarat Section), April 19-20, 2008 at ADIT Eng. College, Vidyanagar, Gujarat, India.
3. N. N. Parikh, A. T. Markana, Vishnuvardhana, "Adaptive PI controller based on direct synthesis", REMES, IEEE (Gujarat Section), September 12-13, 2008 at Changa Eng. College, Anand, Gujarat, India.
4. A. T. Markana, N. N. Parikh, Ankit Shah, "Polynomial based design for generalized predictive control", REMES, IEEE (Gujarat Section), September 12-13, 2008 at Changa Eng. College, Anand, Gujarat, India.