Dhruv Ishan Bhardwaj

Electrical Engineer

Contact Info

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Skills

Technical Areas

- Circuit Simulation
- Power Electronics
- Controls
- Reinforcement Learning
- Machine Learning
- Data Analysis
- Meta Heuristics
- FEM simulations-EM

Programming Language

- Python
  ★★★★★

- Julia
  ★★★★

- C
  ★★

Inter Personal

- Time Management
- Punctual
- Communication

Languages

- English
- Hindi
- Punjabi

Hobbies

- Athletics
- History
- Digital Art
- Trekking
- Studio Ghibli Films

Education

Indian Institute of Technology Bombay'17-21
-Electrical Engineering B.Tech Honours   8.86/10.0

Scholastic Achievements

All India Rank **125** out of 200,000 candidates JEE Advanced   -2017
Top **1%** in National Standard Physics Examination Chandigarh 2016-17

RnD Internship-Sedemac Mechatronics

Hysteresis Modelling April-May 2020	• Simulated Jiles-Atherton **B-H hysteresis** in python and loss calculations • Verification of losses with empirical formulae-**Steinmetz Equations** for sinusoid and higher harmonic excitations
Reliability-BMS June-2020	• Illustrated failure rates of various **KooM** architectures of safety systems • Illustrated effect of **Diagnostic Coverage** on false & undetected cases • Simulated a simplified Battery Management System with failure rates • Using stochastic simulations, calculated **PMHF**
PMSM Stator fault July-2020	• Built healthy and faulty PMSM stator winding **circuit model** in python • Built fast real time **fault diagnosis** and simulated for **dynamic load** • Under noisy measurements calculated **diagnostic coverage**, **false detection** and **undetected fault rates** • Built healthy and faulty PMSM stator winding **circuit model** in python

Projects

(A) Non linear inductor for hysteresis
- Modelling B-H curve hysteresis as **non linear inducto**r element using inverse JA model
- Simulation of basic circuits with **explicit** and **implicit methods** in **Julia** and **OpenModelica**
- Meta Heuristic Methods for **para-identification** of model

(B) ML algorithms
- Solving Grid World Problem, learning **optimal path** from random walk using **KL control**
- Simulation of **Optimal control** for a DC motor modelled as **MDP** using KL control
- Para-identification of discrete and continuous output **HMM** with **K-means** and **EM algorithm**
- Feedback control modelled as chemical reaction network and simulated with **Gillepse algo**

(C) Tandem Solar Cell Optimisation
- Efficiency and FF calculation of InGaN-Si cell using **physics based model** in python
- **PSO** to optimise tunable parameters to obtain maximum efficiency for standard spectrum
- Studied about effect of concentrators and manufacturing challenges with InGaN-Si cell

(D) State Estimation
- **Kalman Filter**, EKF, UKF and PF for **estimation** of unmeasured states of Induction Motor
- **Particle Filter** for estimation of position of robot in a room under non Gaussian noise

(E) Sensor Fault Diagnose
- **Simulated faults** in sensors of induction Motor and built **diagnostic strategy** manually
- Simulated faults in sensors of ATC and trained an **SVM** to diagnose faults
- Using **stochastic simulations**, quantified the performances of above strategies

(F) FEM-WPT system
- Wrote **Finite Element** Method Code for Wireless Power Transfer System in python
- Calculated change in losses by modifying the geometry of Shield Rings in WPT

(G) Other Projects
- Design of hybrid **ESS** for isolated solar powered home using Battery and Supercapacitor
- BMS, UKF for Li-ion battery **SoC estimation**, CC charging and discharging circuits
- Operational Amplifier Design in **NGSPICE** for using MOSFETS only

Extra Curricular
- Managing a team and overlooking creation of embellishments for a MOOC
- Organising Symbiont quiz and Crime Scene Investigation competition @IITB
- Coordinator in Techfest'17 (technical fest) and AAVHAAN' 18 (sports fest)
- Digital Art published in Kaladarshan (Art Exhibition festival)
- IITB half marathon-2019 (21Km) with position of 33 out of 468
- NSS-Green Campus Volunteer and Abhuyday Lake cleaning campaign
- 15 day Course at Jawahar Institute of Mountaineering and Winter Sports