Akshay Deodhar | Curriculum Vitae

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Academic Background

- **College of Engineering, Pune** — **Pune, India**
  Computer Engineering (Hons), CGPA: 9.68 — *2017–Present*
- **Fergusson College** — **Pune, India**
  Science, HSC 92.4% — *2015–2017*
- **BVB's Paranjape Vidya Mandir** — **Pune, India**
  Schooling, SSC 95.2% — *2005–2015*

Coursework

- **Completed**
  - **Computer Science and Engineering:** Data Structures and Algorithms, Principles of Programming Languages, Digital Logic Design, Microprocessor Techniques, Theory of Computation
  - **Mathematics:** Discrete Structures and Graph Theory, Linear Algebra, Univariate Calculus, Differential Equations, Multivariate Calculus
- **Ongoing:** Computer Organization, Database Management Systems, Computer Networks, Advanced Data Structures, Probability and Statistics for Computing, Software Engineering, Artificial Intelligence
- **Spring Semester:** Operating Systems, Data Science, Algorithms and Complexity, Advanced Microprocessor Techniques, Software Engineering (part 2 of same course)

Research Experience

- **COEP Satellite Team** — **Pune**
  Attitude Determination and Control Subsystem — *November 2017–Present*
  - The team is an undergraduate research group which works on design and development of a nanosatellite with the scientific objective of demonstrating orbit maneuvering using solar sails. This is it's second satellite mission, after successful launch and communication with the passively stabilised picosatellite **Swayam** launched by ISRO in 2016.
  - I contribute to the team as a programmer for developing simulations, and writing code for orientation calculation and control algorithms. Work involves orbital mechanics, linear algebra, and numerical methods.
  - Research work involved creating a simulation to decide and validate optimum solar sail orientations for orbit raising for a low earth orbit.
  - Additionally, I interview students interested in joining, and mentor freshmen or sophomores who have just joined the team.

Publications

- **Attitude control using 3 axis magnetorquers and pitch axis reaction wheel for solar sailing satellite COEPSAT-2**
  69th International Astronautical Congress (IAC), Bremen, Germany
  Co-author
- **Analysis of solar sailing as a means of orbit maneuvering for nanosatellites in low earth orbit**
  70th International Astronautical Congress (IAC), Washington DC, USA
  Co-author, Presenter

  Presented in IAC 2019 in Washington DC

Skills

- **Programming:**
  - Proficient : C, Python
  - Familiar: Scheme, x86 Assembly, Bash, C++, m4
- **Tools:** Git, gdb, Linux utilities, LaTeX, Gnuplot, Make, Vim, Markdown, GMAT
- **Web Development:** HTML, CSS, Bootstrap, Flask, MySQL
- Technical documentation, orbital mechanics, numerical methods, mathematical proofs
- **Languages:** English, Marathi, Hindi

Projects

- **Trillian**
  A command-line chess game with a minmax AI and alpha-beta pruning *Fall 2018*
  Data Structures and Algorithms Project
  - Command line chess game in C with a minmax AI. Bot makes a decent move in 0.5 seconds, beats novices, solves puzzles.
  - Uses an efficient data structure that I designed which allows fast move calculation and generation.
  - 3000+ lines of modular code and a readable main game loop.
  - Savegames compatible with the standard Forsyth Edwards format.
- **RankRecommend**
  A rooted-pagerank based link recommendation system, with a specific application to github follow recommendation *Spring 2019*
  Principles of Programming Languages Project
  - Scrapes github using Requests and BeautifulSoup to build a follow graph in NetworkX
  - Ranks users in the neighbourhood based on the rooted pagerank eigenvector. This is the metric used for recommendation
  - Python based Flask app accepts github username or a generic graph and a node as input, generates follow recommendations / link recommendation
  - Front end uses Bootstrap, with dynamic webpage generation using Jinja
- **Orbit trajectory simulator for a solar sailing satellite**
  A continuous-thrust orbit propagator for analysis of solar sail orienations *March 2018–July 2019*
  COEP Satellite Team
  - Developed a Python module which interacts with NASA's General Mission Analysis Tool.
  - Simulation uses GMAT's propagator in conjugation with the module, which calculates optimal sail orienations, and the corresponding solar thrust.
  - Carried out verification of the simulation using analytical methods and available literature.
  - Used simulation to create an optimised set of solar sail orientations. This analysis formed the basis for the paper "Analysis of solar sailing as a means of orbit maneuvering, which has been selected for the 70th International Astronautical Conference, Washington DC.

  Code for course projects available at github.com/bri9k, simulation code not public.

Achievements

- Have a perfect grade in *all* Computer Science courses I have completed
- Selected for ACM India's compiler construction summer school
- Secured rank 106 in Maharashtra State Common Entrance Test among 300 thousand candidates
- Secured All India Rank under 10177 in IIT JEE Mains among over 1.3 million candidates
- Secured All India Rank under 6926 in IIT JEE Advanced among 220 thousand candidates
- Maharashtra State High School Scholarship

Extra-curricular activities

- **Blog**
  bri9k.github.io, About food, books, and standard nerd stuff *April 2018–Present*
- **Chess Team**
  School, Fergusson, CoEP., Represented institutions in inter-college events –
- **Writer, English Section**
  Abhiyanta Magazine, CoEP *September 2017–Present*
- **Event Head, *Retracer* (competitive coding event)**
  Mindspark, CoEP's technical festival *May 2019–Present*

Interests

A major goal is to understand computer systems right from the ISA, Operating Systems to Application programs. I find functional programming and compilers fascinating, along with theoretical areas like formal models of computation, algorithms and graph theory. I have worked with orbital mechanics and rigid body dynamics simulations. Am an open source enthusiast.

Hobbies

Love reading fantasy, science fiction, and farce. Enthusiastic about trekking. Listen to (and attempt to play on harmonium) all kinds of music. Write a bit of limerick. Currently learning sculling.