Ranveer Aggarwal

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About

- Pursuing **B. Tech with Honors** in Computer Science and Engineering at IIT Bombay
- **Interests:** Computer Graphics, Computer and Network Security, Web Development
- **GPA:** 7.25/10.00 (after 5 semesters)

Work Experience

- **Season of KDE Intern**, PlanetKDE *Winter 2014*

Mentor: Jonathan Riddell

  - Redesigned and redeveloped PlanetKDE, KDEs blog aggregator built on rawdog
  - Built a mobile friendly, KDE design scheme compliant, flat interface with social media plugins, working closely with KDEs design team and the dev community

Key Academic Projects

- **Lightcuts** *Spring 2015*
  - Implemented the research paper 'Lightcuts' [SIGGRAPH 2005] in a team of two for the Advanced Computer Graphics course project. The paper describes a scalable framework for computing realistic illumination
  - Developed it as a plugin for *pbrt-v2*, an open source renderer based on the book 'Physically Based Rendering'
- **Rendering with Photorealistic Renderman** *Spring 2015*
  - Wrote shaders and rendered raytraced scenes using Pixar's rendering software PRMan
  - The resultant scene elements produced effects like color bleeding, caustics, area lights and soft shadows
- **Transformer Rendering and Animation** *Autumn 2014*
  - Modeled, textured and animated (forward kinematics) a transformer robot from scratch with OpenGL
  - Developed an interactive environment for the keyboard controlled bot with inter-object collisions
  - Used motion captured data in the form of BVH inputs to animate the transformer (reverse kinematics)
- **Chess with Artificial Intelligence** *Spring 2013*
  - Developed a chess game in PLT Scheme using in-built GUI Toolkit in DrRacket
  - Implemented the Minimax Algorithm with Alpha-Beta Pruning for the AI with a tree depth of 3
- **Incremental Development of a Compiler** *Spring 2015*
  - Designed a compiler incrementally with different stages for tokenizing, parsing, AST-generation, semantic analysis and finally, machine code generation using FlexC++ and BisonC++
- **E-Learning Academy (MOOC Platform)** *Summer 2014*
  - Developed plugins and fixed bugs for the existing web-platform built in Django
  - Analysed user behaviour through data-logging and optimised the existing codebase
  - Based on the flipped-classroom model, the platform promotes student-centred learning, collaboration and improves content accessibility
- **2D Simulation of an Orrery** *Spring 2014*
  - Simulated a mechanical model of Solar System using gears instead of gravity
  - Used Box2D, an open source physics engine for interaction between mechanical components

Side Projects

- **Kapi - A Classroom Note Taker** *Spring 2014*
  - Designed an app that, along with normal text, typesets maths in LATEX format
  - Worked in a team of 4 to develop a program that recursively breaks down the LaTeX chunks into smaller components and parses them at the token level
  - The application won the 1^{st} place at Microsoft Code.Fun.Do, 2014 and is currently live on the Windows App Store

Seminars

• **Bidirectional Lightcuts** *Spring 2015*
Advanced Computer Graphics course *Guide*: Prof Parag Chaudhuri
If real-world scenes are to be modelled, we need a fast, noise free rendering algorithm that handles all kinds of materials like glossy materials, and phenomenon like subsurface scattering. General unbiased algorithms like Path Tracing produce a lot of noise whereas specialised noise free algorithms like Instant Radiosity are biased, meaning several important illumination features might be missing. The paper, an extension of a previous paper titled 'Lightcuts', implemented by the same author extends support to a wider variety of materials and phenomenon, while maintaining scalability and low noise. It uses clever weighing strategies to lower the bias in VPL-based algorithms and demonstrates scalable, efficient, and low noise rendering of scenes with highly complex materials including gloss, BSSRDFs, and anisotropic volumetric models. This was presented in a team of 2 for an advanced computer graphics course.

• **LAO*: A Heuristic Search Algorithm That Finds Solution with Loops** *Spring 2015*
Artificial Intelligence course *Guide*: Prof Pushpak Bhattacharya
Classic heuristic search algorithms can find solutions that take the form of a simple path (A*), a tree, or an acyclic graph (AO*). This paper describes a novel generalization of heuristic search, called LAO*, that can find solutions with loops. It is shown that LAO* can be used to solve Markov decision problems and that it shares the advantage heuristic search has over dynamic programming for other classes of problems. Given a start state, it finds an optimal solution without evaluating the entire state space. This paper was presented as a part of an Artificial Intelligence course.

Achievements

National
• Part of the team (of four) that stood third for two consecutive years at the national inter-collegiate hacking competitions, *Build the Shield 2015 and HackCon 2014* organised by Microsoft
• Bagged the first position in a team of four at both institute and national level at Code.Fun.Do 2014, a hackathon cum accelerator program by Microsoft India Development Center
• Attained an All India Rank of 104 (State Rank 2) among 3.75 lakh participants in National Level Science Talent Search Examination (NSTSE) 2012
• Secured All India Rank 1 in International Olympiad of Science (IOS) 2009
• Achieved an All India Rank of 53 in National Science Olympiad (NSO) 2008

Institute Level
• Stood first in autonomous line follower robotics competition for freshmen amongst 50+ teams
• Secured third position in RC Car building competition among over 100 teams
• Stood second in institute-level remote-controlled football-playing bot making competition

Technical Skills

• **Knowledgeable about** C/C++, OpenGL, Python, HTML, CSS, DrRacket
• **Basic familiarity with** Java, JavaScript, PHP, Renderman, VHDL, Bash, MIPS-Assembly

Campus Activities

• **Web and Coding Club, IIT Bombay** *May 2013 – April 2015*
  ◦ As a manager, led a two-tier team consisting of 9 co-ordinators to encourage programming as a hobby
  ◦ Mentored 15 freshmen teams under Institute Technical Summer Projects out of which 9 successfully completed their projects and 3 came up with prototypes
• **National Sports Organisation** *July 2012 – April 2013*
  ◦ Completed the year-long course by National Sports Organization in Squash

Hobbies and Interests

• Contributor to several KDE projects including Krita and PlanetKDE
• Developed an application, titled Rumor Roll! in php using Yahoo! Boss API and YQL that outputs rumours related to the given query at Yahoo! HackU 2013.
• Built a JavaScript based game Fission, on the lines of popular game, Chain Reaction
• Enthusiastic in swimming and water adventure sports