

# SAKSHAM DHULL

JUNIOR UNDERGRADUATE,  
COMPUTER SCIENCE AND ENGINEERING  
INDIAN INSTITUTE OF TECHNOLOGY, DELHI

EMAIL: [cs1170370@iitd.ac.in](mailto:cs1170370@iitd.ac.in)  
MOBILE: +91 9718227010  
WEBSITE: [dhull442.github.io](https://github.com/dhull442)

## ACADEMIC DETAILS

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DEGREE/EXAM	CGPA	INSTITUTION	YEAR
B.Tech, Computer Science	9.277/10	IIT DELHI	2017-2021(expected)
Class XII, CBSE Board	92.8%	New Happy Public School	2017
Class X, CBSE Board	10/10	Hansraj Model School	2015

## SCHOLASTIC ACHIEVEMENTS

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- Joint Entrance Examination (JEE) **Advanced** Rank: 66 (out of 1.6 lakh candidates).
- Joint Entrance Examination (JEE) **Main** Rank: 201 (out of 12 lakh candidates)
- **INTERNATIONAL OLYMPIADS, 2017** : Selected among top 30 students for **IPhO, IChO and IOAA** Orientation cum Selection Camp held by HBSCE, TIFR, Mumbai.
- **INTERNATIONAL OLYMPIADS, 2016** : Selected among top 30 students for **IOAA** Orientation cum Selection Camp held by HBSCE, TIFR, Mumbai.
- **Kishore Vaigyanik Protsahan Yojana (KVPY), 2015** : Awarded this scholarship by the Department of Science and Technology, Government of India after getting All India Rank 48 (out of 1.5 lakh candidates).
- **INTERNATIONAL OLYMPIADS, 2015** : Selected among top 30 students for **IAO** Orientation cum Selection Camp held by HBSCE, TIFR, Mumbai.
- **National Talent Search Exam, 2015** : Awarded Scholarship by Government of India for being in top 1000 students from all over India.

## PROJECTS

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### ROBUST HAND GESTURE RECOGNITION

*Prof. Chetan Arora, Computer Vision*

Nov, 2019

- Designed a CNN model with 2 convolutional layers and 3 fully connected layers.
- Trained models for plain background as well for generic background.
- Color based segmentation of generic bg images and contour lines addition to plain bg images was done as a preprocessing step

### AI BOT FOR CANNON GAME

*Prof. Mausam, Artificial Intelligence*

Nov, 2019

- Created a bot utilizing depth bound adversarial search along with alpha beta pruning for finding the best move.
- Designed an appropriate score function for comparing different states.
- Secured 3rd position in intra-branch knock-out tournament.

### MARKER BASED AUGEMENTED REALITY

*Prof. Chetan Arora, Computer Vision*

Oct, 2019

- Generated a script for calibrating the external matrixes for any given camera.
- Marker identification and orientation calculated using keypoint descriptor matching.
- Created a 2D AR car motion and a 3D AR ping pong game with accurate physics using markers as racquets.

### CLI CHAT PLATFORM

*Prof. Aaditeshwar Seth, Computer Networks*

Oct, 2019

- Created a command line messaging app mimicking TCP protocol using sockets in JAVA.
- Designed an encrypted mode using RSA scheme to encrypt-decrypt messages.
- Designed another encrypted mode using signatures for message integrity checking.

### PANORAMA USING IMAGE STITCHING

*Prof. Chetan Arora, Computer Vision*

Sep, 2019

- Created a script to take a group of images and stitch them into a panorama.
- Used a graph with edges as the matching distance between any two images for calculating a MST for best possible positioning.
- Used a recursive method to calculate homographies for images wrt root and stitched them.
- Applied alpha blending for removing intensity variation in images.

### INCREMENTAL BREADTH FIRST SEARCH

*Prof. Sandeep Sen, Summer Research Fellowship, IAS*

May, 2019 - Aug, 2019

- Improved the existing bounds for maintaining a BFS tree of an undirected graph in an On-line incremental setting.
- Proved an upper bound on the height of the BFS tree of a complete graph, deficient with  $kn$  edges and enhanced the bounds for these insertions.
- Working on enhancing the bounds in Random Graphs using a modified version of the developed algorithm.

### INTO THE DARKNESS, A UNITY-3D GAME

*Prof. Rijurekha Sen, Design Practices*

May, 2019

- Designed an arcade game to test spatial memory and sensitize people with difficulties faced by the visually impaired.
- Mouse-controlled stick is used to probe obstacles which briefly light up on contact and must be memorized in order to win
- Created real-life like movements and 3D sound effects along with navigational menus and progress save feature.

### LIGHT CONTROLLED OBJECT DETECTION

*Prof. Chetan Arora, Assistech Lab, IIT Delhi*

Dec, 2018 - May, 2019

- Collected a lumen calibrated dataset of 11K images of objects from COCO by programming a power supply with arduino.
- Proved the incompetence of current models under dark conditions and studied ways to improve that.
- Part of MAVI project to develop Mobility Assistance for the Visually Impaired by Assistech Lab, IIT Delhi.

### MULTI CYCLE ARM PROCESSOR WITH INTERRUPTS

*Prof. Anshul Kumar, Computer Architecture*

Mar, 2019 - May, 2019

- Implemented a multi-cycle 32-bit ARM Processor involving all Data Processing, Data Transfer as well as Branch instructions.
- Carried out exception handling routines in the Processor to handle hardware as well as software interrupts.
- Created a bus and shared memory space interface for using I/O devices with the Processor (Keypad and 7-seg display).

### CALL-by-VALUE & CALL-by-NAME INTERPRETERS

*Prof. Sanjiva Prasad, Programming Languages*

Feb, 2019 - May, 2019

- Created methods for lexing, parsing and type-checking of expression trees generated, for a custom functional language.
- Implemented function abstraction, function call, recursive functions and local scoped definitions in the functional language.
- Implemented a Krivine Machine for Call-by-Name and a SECD Machine for Call-by-Value semantics.

## DISTRIBUTED CLOUD COMPUTING ON LAN

Prof. Subhashis Banerjee

May, 2018 - Oct, 2018

- Conferred MHRD's Design Internship Summer Award after a 3-stage selection process by a committee of IITD professors
- Used the QEMU-KVM hypervisor to host, a preseeded ISO file to create, and libvirt toolkit to manage the VMs.
- Scripted a network protocol using TCP sockets, and designed a command-line interface to control the VMs.
- This project aimed to eventually leverage idle computers in the university by hosting powerful on-demand virtual machines and scripts to check the power consumption and accordingly trigger the migration process.

## RELEVANT COURSES

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- **ONGOING:**  
Operating Systems, Intro to Automata and Theory of Computation, Intro to Parallel and Distributed programming, Machine Learning, Optimization Methods and Applications
- **COMPLETED:**  
Principles of AI, Computer Networks, Computer Vision, Analysis and Design of Algorithms, Macro-Economics Discrete Mathematical Structures, Programming Languages, Data Structures and Algorithms, Probability Theory and Stochastic Processes, Digital Logic and System Design, Computer Architecture, Design Practices, Signals and Systems, Linear Algebra and Differential Equations, Calculus.

## TECHNICAL SKILLS

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<b>Programming Languages</b>	C, C++, C#, Python, Java, OCaml, VHDL, ARM, Bash, Javascript
<b>Softwares and FrameWorks</b>	KVM, OpenGL, OpenCV, Tensorflow, Unity-3D, ROS, nodeJS, Blender
<b>Embedded Hardware</b>	FPGA, Arduino, Nvidia Jetson, Kangaroo, Sabertooth

## POSITION OF RESPONSIBILITY

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- Technical Coordinator (backend) at Tryst, Technical Fest of IIT Delhi
- Astronomy Coordinator at Physics and Astronomy Club, in charge of all Astronomy related activities of IIT Delhi.
- Developer at DevClub, the web-development society of IIT Delhi

## EXTRA-CURRICULAR

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- Participated in Google's `foo.bar` challenge.
- Bagged 1st position in 100M Butterfly stroke and prizes in other events in InterHostel Aquatics, 2017
- Won 1st prize (in a team of three) in Riddle of the Sphinx (General Quiz), TRYST 2018, Techfest, IIT Delhi
- Volunteered with Samadhan Abhiyaan to conduct seminars and spread awareness against Child Sexual Abuse.