Sahil Dhull

Senior Undergraduate
Department of Computer Science and Engineering

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Academic Qualifications

Year	Degree/Certificate	Institute	CPI/%
2016 - Present	B.Tech in Computer Science and Engineering	Indian Institute of Technology, Kanpur	9.0/10
2016	Class XII (CBSE)	Abhinav Public School, New Delhi	97.4%
2014	Class X (CBSE)	DAV Public School, Kurukshetra	10/10

Achievements

– Obtained **Pre-Placement Offer** (PPO) from Adobe India Pvt. Ltd. after the internship
– Awarded **A* grade** for outstanding performance in the courses Formal Methods in Robotics and Topology
– Secured **All India Rank 230** in **JEE Advanced** 2016 among 150,000 shortlisted candidates
– Secured **All India Rank 27** in **JEE Mains** 2016 among 1.5 million candidates
– Qualified for **INPhO** and **INAO** conducted by Indian Association of Physics Teachers in 2016
– Awarded **KVPY 2014** fellowship, securing **AIR 46** conducted by IISc Bangalore
– Awarded **National Talent Search Scholarship 2012** by NCERT (National Council of Educational Research and Training)

Internship

Adobe Research | Bengaluru, India   *May'19 - Jul'19*
Research Intern | Supervisor: *Dr. Niyati Chhaya*
  – Problem Statement: Customizing web experiences using real-time user interaction data
  – Integrated the mechanisms to capture user information in real-time from web interactions using JS libraries
  – Hosted surveys on Amazon Mechanical Turk for data gathering using multiple websites and implemented 2 deep learning models
  – First model predicts the user profile based on the interaction; Second model leverages the profile to create a customized experience
  – Built a live PoC using JS and Flask, shows both the final output as well as the inner workings of the models used

Projects

Deep Learning Controller for Autonomous Driving   *Jan'20 - May'20*
Supervisor: Prof. Indranil Saha   Github
  – Created real-time motion planner that optimizes trajectory and generates automatic training data in Webots simulator
  – Simulated urban environment in the simulator, and implemented two different deep learning models
  – Conditioned and trained the Nvidia CNN end-to-end model that maps perceptual inputs (camera images) to control commands (steering angle) for executing high level navigation commands like turning left at intersection
  – A monolithic model is trained on all dataset, and modular type of model consists of separate models for each navigation element
  – Trained a Conv-LSTM model that takes image as input, and predicts steering angle and speed as the output

Emphasis Selection for Written Text in Visual Media   *Jan'20 - Apr'20*
Supervisor: Prof. Ashutosh Modi   Github
  – Implemented 2 deep learning based approaches in an end-to-end way where the input is the text and output is probability of each word to be emphasized
  – First approach has a BiLSTM/GRU layer on top of word and/or character embeddings, followed by attention and linear layers
  – Second approach uses Transformer models like BERT, RoBERTa, XLNet with fully connected layers on top, and their ensemble
  – Stood **3rd** in **SemEval 2020** - International Workshop on Semantic Evaluation, and wrote a **paper** which is in review

GO to MIPS Compiler   *Jan'19 - Apr'19*
Supervisor: Prof. Amey Karkare   Github
  – Implemented a compiler in python for a subset of programs in GO language, targeting MIPS; using PLY framework (python)
  – Processed input code in 4 stages: lexing, parsing and semantic checks, 3AC generation, and Assembly Code (MIPS) translation
  – Incorporated support for dynamic memory allocation, recursion, multi-dimension arrays, complex data types, multi-level pointers, multiple return types, functions with any number of parameters, and short variable declaration

Probabilistic Control Strategy Synthesis   *Jan'19 - Apr'19*
Supervisor: Prof. Indranil Saha   Chapter
  – Studied the problem of designing a control strategy for a robot to maximize the probability of satisfaction of certain specifications formulated as LTL or PCTL formulas
  – Surveyed the current state of the art algorithms for this problem in discrete as well as continuous-time dynamic environments and co-authored a book chapter on this topic

Building GemOS   *Aug'18 - Nov'18*
Supervisor: Prof. Debadatta Mishra
  – Extended various functionalities of GemOS operating system, like implementing 4 level page table radix tree, for a new context
  – Implemented system calls (like expand, shrink, write, clone, sleep) and exception handlers like Floating point and Page fault
  – Added signal handlers for SIGSEGV, SIGFPE, and SIGALRM and implemented scheduling using a round-robin scheme

– Implemented Object Store functionalities for a basic filesystem with and without caching, using FUSE APIs

Painter and Genre Classification *Aug'18 - Nov'18*
Supervisor: Prof. Piyush Rai `Report`
  – Used two approaches: Self-designed Convolutional Neural Network (CNN) based model and Feature extraction with Classification
  – First model consists of Convolution layers, ReLU activation, max pooling, dropout and batch normalization layers
  – Second model used VGG16 and ResNet50 for feature extraction and used logistic regression, SVM and KNN for classification
  – Gained a maximum test accuracy of 50% with the first and 75.2% with the second model

Teaching Experience

Teaching Assistant, Data Structures and Algorithms *Jan'20 - Present*
Under *Prof. Raghunath Tewari*
  – Developed a programming assignment including designing questions, making test-cases, hosting it on a platform and checking for plagiarism and assisted in checking of the papers and quiz copies of the students taking the course

Other Projects

English Premier League *Jan'19 - Apr'19*
Supervisor: Prof. Arnab Bhattacharya `Report`, `Github`
  – Implemented a database management system for a miniature scale model of EPL using LAMP stack with 20+ triggers

Deliver It App *Aug'18 - Nov'18*
Supervisor: Prof. Nisheeth Srivastava `Github`
  – Designed a community-based delivery app on IONIC Framework using Firebase Authentication Service for login, Firebase Real-time Database for backend and Leaflet Maps for geolocation services

Fusion of Inertial Sensing IoT Devices *May'18 - Jul'18*
Supervisor: Prof. Amey Karkare `Report`
  – Implemented a fusion algorithm on Dual Foot-mounted Inertial Sensors' data to reduce Systematic Heading Drift resulting in a more precise navigation system and plotted real time graphs showing raw and corrected trajectories to find drift errors

SAE IIT Kanpur | Team Member *Jan'17 - Feb'18*
Faculty Advisor: Prof. Shantanu De `Webpage`
  – Designed and fabricated a Formula race car (F-18) for Formula Bharat 2018, a national collegiate design challenge
  – Secured 9th position in Design Event, 6th in Business Plan and 15th position among 55 teams from all over India
  – As a part of Powertrain subsystem, designed the sprocket on Solidworks and simulated (and optimized) the design on ANSYS

Technical Skills

- `Programming`: C, C++, Python, Bash, SQL, Mips
  `Familiar`: MongoDB, Verilog, Javascript, PHP
- `Utilities/Frameworks`: Git, Vim, Docker, Flask, IONIC
- `Machine Learning`: PyTorch, Keras, Scikit-Learn
- `Robotics`: Promela, Spin, UPPAAL, NuSMV, Z3, LTLMoP
- `Mechanical`: ANSYS (Structural), AutoCAD Fusion, Solidworks

Relevant Coursework

Natural Language Processing	Machine Learning	Networks	Compiler Design
Operating System	Database Management	Computer-Aided Verification	Formal Methods in Robotics
Data Structure and Algorithms	Advanced Algorithms	Theory of Computation	Computer Organisation

Extra-Curricular Activities

Technical:
- Bagged 3rd position in a Robotics event (Robotricks) in Takneek16 (Inter-hostel Technical Competition):
  Built a robot to preform simple tasks like lifting blocks and detecting colored strips
- Participated in CBSE Regional Exhibition 2012 and North-Indian Science Fair 2012 at National Science Center, New Delhi
- Participation and podium position in numerous quizzes and exhibitions held at Kurukshetra Panorama and Science Center
- Secured 1st position in State level Essay Writing Competition by Govt. of Haryana in 2010

Sports:
- Played Lawn Tennis as Compulsory Physical Activity from July 2016 to April 2017
- Participation at State Level Swimming Competition in Haryana in 'Under 14 Boys' category

Cultural:
- Took part in Dance Competition in Galaxy (Inter-hostel Cultural Event) held in Jan 2017