AKSHAT SANGHVI

Research Student at IIIT Hyderabad

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SYNOPSIS

- Final year B.Tech student in Computer Science at the International Institute of Information Technology, Hyderabad (IIIT-H), pursuing an honours degree with a focus on research.
- Developing state-of-the-art lip-reading models utilizing deep learning techniques and Audio-Visual multimodal data, with a focus on developing assistive technology applications to improve communication access for ALS patients.
- Building algorithms for realistic physical manipulation and interaction within 3D environments, enhancing visual understanding capabilities of robots.
- Autonomous Vehicle Navigation: Finding critical vehicles for planning the path of self-driving cars, enabling safer and more efficient navigation.
- Enjoy playing chess and serving as a coordinator of our college chess club.

RESEARCH EXPERIENCE

Honours (Advised by Dr. Jawahar C.V and Dr. Vinay P. Namboodari)

CVIT (Center for Visual Information Technology) Lab

07/2023 - Present | IIIT-Hyderabad, Telangana

https://cvit.iiit.ac.in/

Computer Vision Lab for research in Image Processing, Vision, Graphics and ML

- **Personalized lip-reading for ALS patients**: Creating customized ML models for lip-reading, along with tailoring them to the unique needs of ALS (Amyotrophic Lateral Sclerosis) patients to help them communicate despite disabilities, and also overcoming the limitations of generalized approaches.
- **Visual Question Answering (VQA) Web App**: Designed and built web applications to showcase the answering capabilities of different VQA models in diverse domains (Medical, Road and Document VQA)

Independent Study (Advised by K. Madhava Krishna)

RRC (Robotics Research Center) Lab

10/2023 - Present | IIIT-Hyderabad, Telangana

https://robotics.iiit.ac.in/

- **Critical Object Estimation for self-driving cars**: Designing and implementing algorithms for real-time path planning in autonomous vehicles, optimizing for computational efficiency by prioritizing essential vehicle interactions, unlike traditional methods that are limited to analyzing a fixed number of closest vehicles.
- **3D Interactive Dynamics**: A system to analyze multi-view videos and track 3D objects (represented by 3D Gaussians) under natural forces. Using 3D tracking and physics models like the Material Point Method, it simulates object responses to user-defined virtual forces and predicts reactions to new forces, offering insights into the behavior of environments regardless of material properties.

PROJECTS

Image-Space Manipulation of Objects in Video

09/2023 - 11/2023

https://github.com/akshatsanghvi211103/DIP_Project

Digital Image Processing Course Project

Created 2D simulations of objects moving in response to virtual forces on an object in an image. Done by analysing a short video of tiny motions using of the object to infer its material properties (using modal analysis) by assuming a spring based physics model. Using this information to predict each pixel's reaction to the new user-defined forces.

ACHIEVEMENTS

College Merit List (2022)

Qualified KVPY for IISc with Rank 186 (2020)

JEE Mains 156, Advanced 2019 Rank (2020)

NTSE Stage 2 Qualified (2018)

RMO Qualified (2018)

Chess FIDE rating of 1730

EDUCATION

B.Tech. in Computer Science (CSE)

International Institute of Information Technology, Hyderabad

2021 - Present

- CGPA: 8.95 (till 6th Sem)

High School

Green Valley High School

2021

- PCM - 96% in 12th Class CBSE Board

SKILLS

Languages

Python | **C** | **C++** | **JavaScript** | **HTML/CSS** | **Bash** | **x86**

ML Frameworks

PyTorch | **TensorFlow** | **Numpy** | **Pandas**

Others

Open3D | **Git** | **Vim** | **SQL** | **React JS** | **Flask** | **Node JS**

PROJECTS

GMM Visualization

09/2023 - 11/2023

Statistical Methods in AI Course Project

Created a comprehensive tutorial on Gaussian Mixture Models, featuring visually engaging representations to enhance understanding of GMM with depth and clarity. Includes example visualizations in 1D, 2D, and 3D.

VLabs Web App

01/2023 - 04/2023

Design and Analysis of Software Systems Course Project

Created a Web App for Virtual Labs IIIT-H as a PWA (Progressive Web Application), to cache the web page of each lab. Used AWS DynamoDB as the database and deployed it to the Android Store with the help of the Trusted Web Activities framework. Also designed the main homepage of the app (VLabs is a problem solving lab that provides simulation learning for various disciplines in Science and Engineering).

Greddit

02/2023 - 04/2023

A Reddit clone Web App using the MERN stack. Chatting website like reddit, where users can add posts and comments, and get blocked or reported. Users have different roles of admin, viewer or editor.

xv6 Operating System Feature Addition

08/2022 - 11/2022

https://github.com/akshatsanghvi211103/Extending-MIT-s-xv6-OS

Operating Systems and Networking Course Assignment

Added new features to MITs open source implementation of xv6 operating system , like: System calls - 'trace', 'sigalarm'. Added scheduling algorithms like FCFS, LBS, PBS and MLFQ. Also implemented copy-on-write fork.

Building an Interactive Shell

09/2022 - 11/2022

https://github.com/akshatsanghvi211103/User-Defined-Interactive-C-Shell

Operating Systems and Networking Course Project

Created a shell from scratch with including the basic commands like 'ls', 'cd', and 'cat', and advanced bash functionalities like pipelining, signalling, foreground and background processes and I/O redirection, using only the C language

PID Control for Motor Angle

09/2022 - 11/2022

Project to control a motor adjusting both the motor power and direction to gradually reach a specific angle over time by utilizing PID constants, and configuring the hardware components to showcase the application of PID control.

SKILLS

Coursework

Computer Vision **Mobile Robotics**

Digital Image Processing **Linear Algebra**

Statistical Methods in AI

Data Structures and Algorithms

Operating Systems and Networks

Information Security

Quantum Information and Computation