

Manas Kale

B-1701, Dream Heights, Sector 19, Plot 28, Kharghar - 410210, Navi Mumbai, Maharashtra, India

☎ (+91) 7738676567 | ✉ manaskale@hotmail.com | 📱 manas96 | 🌐 ManasKale | manas96.github.io

Education

Bachelor of Engineering - Maharashtra Institute of Technology (Pune University)

Pune, India

COMPUTER SCIENCE AND ENGINEERING

2014 - May, 2018

- First class with distinction: 74.47% (final year)

12th - Ryan International School, Kharghar

Navi Mumbai, India

ISC BOARD

March 2014 exam

-Aggregate: 75% (Computer Science: 96/100)

10th - Ryan International School, Kharghar

Navi Mumbai, India

ICSC BOARD

March 2012 exam

-Aggregate: 83.71% (Computer Applications: 98/100)

Work experience

Data Scientist - Infinite Uptime

Aundh, Pune

PYTHON (APACHE KAFKA, SCIKIT-LEARN, HOLOVIEWS), C++ (EMBEDDED FFT LIBRARIES), JAVA (APACHE FLINK), FOURIER ANALYSIS, STREAMING

February 2019 - Present

ANALYTICS

- Significant productionized contributions to embedded edge computation device (**C++**), analytics algorithms (**Python**) and data processing backend (**Java**).
- Overhauled previous batch processing pipeline for edge device data. Architected and implemented an extensible real-time data processing pipeline (**Apache Flink - Java**), improving throughput by 200%, reducing infrastructure cost and lowering latency.
- Proactively created library for exploring and visualizing data in a Jupyter notebook (**Python - HoloViews**), improving data analytics workflow.
- Conceptualized and implemented automated thresholding by using **constraint solvers (Python - SciPy)**, saving tedious man-hours per customer.
- Volunteered and fixed critical stability issues for embedded device's WiFi (**ESP8266 chip, C++, MQTT protocol**) firmware.
- Implemented extensible **serialization data format** for transmitting edge device's FFT data (**C++**), reducing size of typical data packet by **3x**. Wrote server side deserialization library in **Python**.
- Improved edge device's FFT (**Fast Fourier Transform**) sampling block size from **512 to 4096**, improving frequency resolution **from 6Hz to 0.2Hz** while working under tight memory constraints. Wrote **extensive documentation (C++)** for the previously undocumented codebase.
- Contributed to writing an automated firmware flashing script (**bash**), saving thousands of man-hours.
- Improved embedded dev workflow by introducing new tools. Customized VSCode IDE for embedded team's **C++** development environment, formalized version control (**git**) and software release strategy.

Associate Software Engineer - NICE Interactive Solutions

Hinjewadi, Pune

JAVA (SPRING FRAMEWORK), JAVASCRIPT (ANGULARJS), AMAZON AWS, GIT, AGILE

July 2018 - January 2019

- Part of team responsible for **Tenant Management** microservice - a service which handles creation, maintenance, billing and license/subscription tracking of third party vendors on NICE's CXOne cloud platform.
- Implemented new features per business logic using **Spring** framework and **AngularJS** in an agile project management environment.

Intern - Tata Consultancy Services

Hinjewadi, Pune

IBM MAXIMO, PYTHON, WEBSOCKETS, REST API, JAVASCRIPT, HTML BOOTSTRAP

2 June - 28 July 2017

- Made a full stack webapp to monitor asset data in real time, detect anomalous data and issue warnings.
- Implemented server (**Python2**) to pull data from IBM Maximo's REST API and broadcast through **websockets**.
- Implemented webpage UI (**HTML bootstrap**) to track assets on a map and provide real time graphs for each sensor, issuing alerts in case of anomalous data.
- Project report** : manas96.github.io/internship_report/

Projects

Raytracer

C++ (OPENGL MATHEMATICS, OPENMP)

May, 2019 - Present

- Source code & screenshots** : github.com/manas96/Raytracer
- A backwards raytracer written for learning purposes.
- References used: **Ray Tracing in One Weekend** by Peter Shirley and **Physically Based Rendering, from Theory to Implementation** by Pharr, Jakob and Humphreys.
- Implemented **Monte Carlo Path Tracing** and optimized using **Bounding Volume Hierarchies** and **OpenMP** parallelization.
- Additional features: mesh loading from **.OBJ** files, real-time raytraced image visualization, depth of field, physically based materials.
- [Open Source Contribution]** Contributed to improving all three of **Peter Shirley's Ray Tracing in One Weekend** book series: <https://raytracing.github.io/books/RayTracingTheRestOfYourLife.html#acknowledgments>

Satellite tracking ground station for SatNOGS network

RASPBERRYPI, SOFTWARE-DEFINED RADIO

March, 2019

- Assembled & calibrated radio antenna and configured software defined radio (SatNOGS) on Raspberry Pi to track and collect data from **MOVE-II cubesat**.
- Sole maintainer of station **mumbai-gs** on the SatNOGS crowd-sourced satellite data collection network.

3D Game Engine using OpenGL

OPENGL, JAVA (LWJGL), GLSL SHADERS

June, 2017 - September 2018

- **Source code and screenshot(s):** github.com/manas96/3D-gameEngine-v2
- An **interactive** 3D rendering engine using **OpenGL** API (through LightWeight Java Game Library).
- Implemented features: • **Lighting (ambient, point)** • **OBJ geometry file loader** • **Fog blending** • **Entity system architecture** • **Collision detection** • **Particle system** • **Skybox** • **Raycasting** • **Normal mapped textures** • **Fresnel reflection shader**

Human Emotion Detection using Multimodal input (Bachelor's Thesis Project)

PYTHON (FLASK, SCIKIT-LEARN, OPENCV), MACHINE LEARNING (SVM, MULTINOMIAL NB, DNN), JAVASCRIPT (BOOTSTRAP, HIGHCHARTS.JS)

June, 2017 - June 2018

- A novel approach to determine user's emotion using a **weighted sum** of the following inputs: **facial features**, **spoken text** and **voice characteristics(tone)**.
- Used **IEMOCAP** dataset to train a **DNN** (Deep Neural Network) for tone module, **Cohn-Kanade** dataset for training a **SVM** (Support Vector Machine) for facial module and **IEMOCAP** to train a **multinomial NB** (Naive Bayes) classifier for spoken text module.
- Each module's **confidence score** along with its **weight** was used to calculate final emotion. Weights were adjusted dynamically based on quality of input and confidence score.
- Our (team of 4) algorithm was able to perform better using dynamically adjusted weights when compared to individual modules.
- Contributed to the facial module, weight adjustment algorithm, webpage UI and web server.
- **Detailed project report** : manas96.github.io/project_thesis.pdf

Open source contributions to MovingBlocks organization

JAVA (LIBGDX), GRADLE, GIT

March, 2018

- Fixed bugs for Terasology(a 3D voxel engine) and DestinationSol(a 2D space shooter).
- **Terasology link** : github.com/MovingBlocks/Terasology/pull/3275 • **DestinationSol link** : github.com/MovingBlocks/DestinationSol/pull/252

Research & Publications

Driver profiling using realistic racing games

C++ (SDL,OGRE3D), PYTHON (SCIKIT-LEARN, MATPLOTLIB), MACHINE LEARNING (SVM,KNN,NB)

March 2017 - April 2018

- Identified different (video game) drivers by logging keypress events and training various classifiers on this data.
- Edited source code of an open source 3D racing game, **StuntRally (C++)** to log keypresses. Cleaned, normalized and created a custom feature vector from this log data(**scikit-learn**). Trained **KNN**, **SVM** and **NB** classifiers on this data and found **SVM** performed best.
- **M. Kale and M. V. Bedekar, "Driver Profiling Using Realistic Racing Games", 2018 Second International Conference on Inventive Communication and Computational Technologies (ICICCT), Coimbatore, 2018, pp. 13-17. doi: 10.1109/ICICCT.2018.8473154**
- **Pdf link** : manas96.github.io/driver_profiling.pdf

Achievements

Certificate of Appreciation from Infinite Uptime

FOR PROACTIVE WORK ON FIXING CRITICAL EDGE DEVICE ISSUES & CREATING EXTENSIVE DOCUMENTATION

May 2019

1st Runner Up in SmartIndia Hackathon 2017

C++, OPENCV, NVIDIA CUDA, QT FRAMEWORK

April 2017

- Led a team of 5 in a national level non-stop 36 hours hackathon with 351 participating teams. Problem statement: **create real-time video stabilization software for use on Unmanned Aerial Vehicles**.
- Implemented a working prototype in 36 hours using **OpenCV (C++)** for video processing and optimized that with **NVIDIA CUDA** bindings for near real time video stabilization.
- Personally contributed to stabilization algorithm optimizations using **OpenCV's CUDA** bindings.

Extracurricular Activities

Led and organized teams in conducting DOTA2 tournaments

AAROHAN FESTIVAL(2016) - MITCOE & TEXPHYR FESTIVAL (2018) - MIT PUNE

March 2018 & January 2016

Advocated for and organized national level college e-sports tournaments for **DotA2**, a multiplayer online battle arena game I am passionate about.

Conducted hands-on practical session on data recovery, file carving for class students of MIT Pune

KALI LINUX, FOREMOST FILE CARVING TOOL

August 2016

Explained file carving process along with demonstration.

Skills & hobbies

Languages: C++, Python, Java

Graphics: OpenGL, OpenCV, OpenGL Mathematics (GLM), GLSL

Visualization: HoloViews, Bokeh, Matplotlib

Data science: Numpy, Scikit-learn, Pandas

Big data: Apache Flink, Apache Kafka, Redis

Web frameworks: Flask

Tools: Git, LaTeX, Doxygen

Hobbies: Wildlife & astro photography (manas96.github.io/photography/), trekking, cycling, reading (science fiction/high fantasy), video games