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
- Contributed to the whole platform - from embedded edge computation device (**C++**) to analytics algorithms (**Python**) and data processing backend (**Java**).
- Overhauled previous batch processing pipeline for edge device data. Architected and implemented an extensible data processing pipeline (**Apache Flink - Java**) using data-driven **session windows** for **device state classification**. Improved throughput by 200% and reducing infrastructure cost.
- Proactively created library for exploring and visualizing data in a Jupyter notebook (**Python - HoloViews**), improving data analytics workflow.
- Helped implement automated thresholding functionality by using constraint solvers (**Python**), resulting in reduced manual intervention required by support personnel.
- Helped develop a machine fault classifier capable of detecting different faults in industrial motors based on vibration data (**K Nearest Neighbours, scikit-learn**).
- Volunteered and fixed critical stability issues for embedded device's WiFi (**ESP8266 chip, C++, MQTT protocol**) firmware.
- Involved in effort to thoroughly understand previously undocumented C++ codebase. Wrote **extensive documentation** that is being used by the embedded team.
- Helped increase 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.
- Implemented custom **serialization data format** for transmitting edge device's FFT data(**C++**), reducing size of typical data packet by **3x**. Wrote server side decoding logic in **Python**.
- Contributed to writing an automated firmware flashing script (**bash**), improving device manufacturing workflow.
- Improved embedded dev workflow by introducing new tools. Customized VSCode IDE for embedded team's **C++** dev 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 tenants (third party vendors) on NICE's CXOne cloud platform.
- My tasks included developing new features and implementing business logic using both **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.
- The web server (**Python2**) pulled data from IBM Maximo's REST API which was broadcast through **websockets**.
- The webpage UI (**HTML bootstrap**) tracked each asset on a map and provided real time graphs for each sensor, issuing alerts in case of anomalous data.
- **Project report :** manas96.github.io/internship_report/

Projects

Raytracer
C++ (GLM, OPENMP) *May. 2019 - Present*
- **Source code & screenshots :** github.com/manas96/Raytracer
- A backwards raytracer written for learning purposes.
- Implemented **Monte Carlo Path Tracing** and optimized using **Bounding Volume Hierarchies** and **OpenMP** parallelization.
- Implemented mesh loading from **OBJ** files.
- **[Open Source Contribution]** Contributed to improving all three of **Peter Shirley's Raytracing** books. **Link to book acknowledgments:** https://raytracing.github.io/books/RayTracingTheRestOfYourLife.html#acknowledgments

Satellite tracking ground station for SatNOGS network
RASPBERRYPI, SOFTWARE-DEFINED RADIO *March. 2019*
- SatNOGS is a crowd-sourced satellite data collection network with stations all over the globe. To track and collect data from **MOVE-II cubesat** (move2space.de/MOVE-II/), I helped build (assembled radio antenna, installed SatNOGS software on Raspberry) station **mumbai-gs** (network.satnogs.org/stations/440/), the only one in India. I am currently the sole maintainer of this station.

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 include: • **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 (BE Project)

Python (Flask, Scikit-learn, OpenCV), Machine Learning (SVM, multinomial NB, DNN), JavaScript (Bootstrap, HighCharts.js)   *June. 2017 - June 2018*

- We implemented 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 it's **weight** was used to calculate final emotion. Weights were adjusted dynamically based on quality of input and confidence score.
- Our algorithm was able to perform better using dynamically adjusted weights when compared to individual modules.
- **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 minecraft inspired voxel engine) and DestinationSol(a 2D space shooter).
- **Fixed a UI issue for Terasology** : github.com/MovingBlocks/Terasology/pull/3275 • **Fixed a bug in DestinationSol where enemies spawned across game reloads** : 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*

- Attempted to 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 my 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.**
- We created a working prototype in 36 hours using C++ **OpenCV** for video processing and optimized that with **NVIDIA CUDA** bindings for near real time video stabilization.

Reached final round of IEEE CodeJam 2016

Conducted by MIT IEEE (Institute of Electrical and Electronics Engineers) student chapter   *November 2016*

Reached final round of Battlecode in MITCOE's Tesla 2015

Conducted by MIT College of Engineering students for their annual fest, Tesla   *November 2015*

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, C++, Python, Java, GLSL, JavaScript, Bash
Libraries/API's, Protocols: OpenGL, WebGL, OpenCV, GLM, CUDA, Three.js • Matplotlib, HoloViews, Bokeh • Numpy, Scikit-learn, Pandas • Flask, Redis • TCP, HTTP • **Operating System:** Linux
Software tools: Git, LaTeX, Unreal Engine 4 • Visual Studio, IntelliJ IDEA/Pycharm, Jupyter (Python)
Hobbies: Wildlife & astro photography (manas96.github.io/photography/), trekking, cycling, reading (science fiction/high fantasy), video games