HARIHARAN AYAPPANE

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EDUCATION

National Institute of Technology- Karnataka , Surathkal   July 2019 - Apr
Bachelor of Technology Electrical and Electronics Engineering 2023
Major in Electrical and Electronics Engineering CGPA: 8.91
Minor in Computer Science and Engineering, CGPA 9.00

EXPERIENCE

Texas Instruments India (TII), *Digital Design Engineer*, Bangalore, India   July 2023 - C
Working with the physical design team of the Processors group (Sitara MCU) to synthesize next gen processors for industrial and automotive applications
- Developed python scripts to extract and process excel data for IO timing analysis
- Developed Shell/TCL scripts to generate a constraints validation dashboard

Indian Institute of Science (IISc), *Research Assistant*, Bangalore, India   Jan. 2023 - Mar
Worked with Professor SK Nandy to to automate the process of running test cases on the Redefine Resource Manager (RRM).
- Designed customized hardware IP that loads an ELF file onto the Rocket Chip SoC using memory mapped registers and FIFOs.
- Synthesized the IP on Zynq UltraScale+ MPSoC, FPGA to run test cases onto the RRM core present in the Rocket Chip SoC.
- Set up the pipeline for running test cases on the SoC and ran benchmarks to evaluate the custom hardware's performance.

Texas Instruments India (TII), *Digital Design Intern*, Bangalore, India   May 2022 - July
Worked with the physical design team at Texas Instruments to improve metrics collection and management for PD flow.
- Configured pipeline for automating metrics collection and display for designs like radar_hsm and ecu_periph.
- Enabled designers to efficiently debug their flows by adding an HTML/Javascript-based UI dashboard using Stylus CUI.
- Incorporated addition of custom metrics to get further insight on chip designs.
- Finalized the project by developing a wrapper (in bash) to enable comparison between multiple flows.

Free Unified Rendering in Python (FURY), *Open Source Contributor*, Indiana University Bloomington, USA   Jan. 2021 - C
FURY is an open-source Python library with 100+ active users, available for scientific visualization. The library is available via PyPi or Anaconda package system.
- Developed actors to render dashed and dotted lines in 3D space. (Pull request)
- Designed and implemented a signed distance function (SDF) to render 3 types of Superquadrics. (Pull request)
- Devised an SDF for rendering a capsule actor with 2 parameters. (Pull request)

SandLogic, *Edge AI intern*, Bangalore, India   Oct. 2022 - Dec
Was given a task to assess the impact of machine learning and accelerated computing on the hardware industry.
- Drew parallels between hardware acceleration of graphics with machine learning
- Projected the potential growth of the ML acceleration technology over the next decade
- Presented an analysis on the same at the end of the internship.

PROJECTS

Solar Energy Forecasting using AI   Aug. 2022 - Apr
Developed an ensemble machine learning model RDLR (Random Forest, LSTM, Auto-LSTM, Ridge Regression) for short term solar energy forecasting.
- Ensembling was carried out using Ridge Regression (RR) to remove co-relation among the output of base models.
- The diversity of base models was assessed and overall model is evaluated across 0, 5, 15, 30 and 90 minute time horizons.
- The highest accuracy is for 0-minute (Coefficient of determination = 99.96%) and 5-min (Coefficient of determination = 30.90%) minute forecast followed by 15, 30 and 90 minute horizons.
- RDLR model outperforms all of it's base models and is ideal to make very short to short term forecasts in the span of (0-10 min).

Linear Methods for Image Deconvolution
- Applied linear methods to filter out noise from images using deconvolution techniques.
- Carried extensive comparison between Wiener and Median Filters
- Used PSNR and SSIM as metrics to evaluate the quality of deconvolution and optimization of parameters

Image Processing (BMP formats)
- Developed a Verilog (HDL) model to process images in bitmap format.
- Images (768 x 512 pixels) are converted from .bmp to hexadecimal format using MATLAB code and processed using FSMs in Verilog.
- Performs image processing tasks such as inversion, threshold manipulation, and brightness control in under 5-10 milliseconds.

Optimal Portfolio Allocation
- Engineered a Python-based model to generate an optimized portfolio of 10 NSE-listed companies.
- Utilized the Markowitz and Capital Asset Pricing Models to achieve a Sharpe ratio of 1.5 (much greater than 1).
- Using Monte Carlo Simulations, the value-at-risk (VaR) determination of 95% at 1.8% asset risk was carried out. (Project Link)

CLUBS AND SOCIETIES

Omdena, *Junior ML Engineer (Remote)*   July 2023 - C
- Currently working on LLM model deployment for using GCP and docker for a RAG based LLM.
- Worked model building, application building and deployment for plant disease classification under brazil local chapter
- Completed EDA (exploratory data analysis), model building, model tuning and final presentation for student success prediction under turkey Ankara local chapter

IRIS, NITK, *Systems Engineer*   July 2020 - Apr
IRIS is a homegrown ERP solution founded and managed by students, with over 7000+ active users.
- Orchestrated setting up applications such as Elasticsearch and Moodle for deployment in Kubernetes.
- Oversaw revamp of IRIS staging deployment server for development environment testing.
- Worked on setting up host-based access control (HBAC) using FreeIPA to enable privilege separation among developers.

The Institution of Engineers, NITK Chapter, *Head of Student Business Interest Group*   Aug. 2020 - Apr
- Coordinated games and events for over 200+ participants as a part of KOTH, the flagship event of even semesters.
- Organized Case-O-Mania, a case study competition for 25+ participants through IE's business student interest group, CAPITAL.
- Used data science tools such as Pandas, NumPy, and MatplotLib to produce a 30% annual return portfolio.