# Shahil Manoj Dhotre

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## ACADEMIC DETAILS

**North Carolina State University, Raleigh** **August 2022 - May 2024**

Master of Science in Electrical Engineering [3.9 GPA]

*Courses* - Neural Networks and Deep Learning, Automated Learning and Data Analysis, Digital Imaging System, Microprocessor Architecture, Computer Vision, Random and Stochastic Process

## EXPERIENCE

**ElasticRun (E-commerce Startup)** **January 2021 - July 2022**

**Engineer** **[Python, MySQL, Machine Learning]**

- Developed and tested the forecasting tool to predict sales with an accuracy of 70% - 80% at several levels and periodicity using Time Series Algorithms and Deep Learning
- Performed Hyperparameter tuning using the Bayesian algorithm for Forecasting Models to improve forecasting accuracy.
- Migrated and optimized the forecasting system from the existing Kubernetes server to the Azure platform for serverless training and reduced training time to 6hrs from 14hrs for approx. 120 warehouses all over India
- Created and visualized forecast reports according to the requirement using MySQL, MetaBase, and Matplotlib

**Toshiba Global Commerce Solution, Durham, NC, USA** **May 2023- August 2023**

**Hardware Engineer Intern** **[C, Embedded System, Bare Metal Coding]**

- Developed bare-metal firmware for SPI-enabled STM32 hardware to perform efficiently erase, write, and read operations between STM32 and Winbond flash memory (W25Q16JV)
- Migrated the existing codebase to harness the capabilities of an external flash memory module (W25Q32JV) by establishing a Quad SPI (QSPI) connection with the STM32 microcontroller, resulting in a 4x increase in system throughput
- Analyzed and visualized the data extracted from the weight pad to calibrate the pressure and weight value of the items on the self-checkout system

## SKILLS AND PROFICIENCY

- **Programming Languages:** C, C++, Python, MATLAB, MySQL
- **Software Skills:** PyTorch, TensorFlow, CNN, RNN, LSTM, LLM, Transformers, OpenCV, CUDA, HPC (Shared Memory)
- **Comp Architecture:** Memory Hierarchy, Virtual and Physical Map, Pipeline Hazards, Instruction Level Parallelization

## PROJECTS

**Cache and Memory Hierarchy Design** | NC State University **[C++, L1 and L2 Cache]**

- Designed a 2-level cache and memory hierarchy simulator with LRU replacement and Write Back Write Allocate policy
- Compared the performance, and area for different memory configurations of the simulator and studied the effects of varying arrangements on Miss Rate and Average Access time

**Branch Predictor Simulator** **[C++]**

- Implemented Bimodal, gshare & hybrid branch predictor simulator using a branch predictor & global branch history table(BHR)
- Conducted an in-depth analysis by fine-tuning design parameters, including prediction table, chooser table, and BHR size to evaluate the impact of these parameters on miss-prediction rates

**Speech Emotion Recognition** | NC State University **[Python, Audio Data, Librosa, ResNet18]**

- Developed a CNN model using TensorFlow and Librosa for audio feature extraction to classify emotions from the RAVDESS dataset, achieving a test accuracy of 53.40% after hyperparameter tuning.
- Enhanced accuracy by engineering an 11-million-parameter pre-trained Residual Neural Network (ResNet), achieving a remarkable 97% test data accuracy

**Crop Yield Prediction** | NC State University **[Python, Supervised ML, PyTorch]**

- Deployed a regression model such as Decision Tree, XGBoost, Shrinkage, KNN, and Artificial Neural Network to predict the yield of the crop in The United States of America
- Implemented regression models and based on analysis of multiple metrics, the Decision Tree performed well, 82% accuracy

**Movie Recommendation System |** NC State University **[Python, Keras, PySpark]**

- Designed a Recommendation System using the Alternative Least Square technique to perform research on collaborative filtering with latent component decomposition to propose users' most relevant movies from MovieLens 20M Dataset
- Employed PySpark (version 2.4.0) and computed the baseline model on an HPC cluster, a comparative study using different hyperparameter settings on the baseline model using the single machine on HPC

## PATENT and PAPER

- Ranked among the top three participants in Toshiba's Invention Challenge and actively pursuing a **patent** filing in the domain of Computer Vision
- Authored and published a research paper titled "CrawlBot: A Domain-Specific Pseudonymous Webcrawler" at the International Conference on Cybersecurity in the Emerging Digital Era