Varsha L. Thirumalai

San Jose, CA | 206 731 9102 | vthiru300@gmail.com
|https://vthiru300.github.io | https://www.linkedin.com/in/varsha-thiru-6a801b11b/

EDUCATION

San Jose State University **August 2022-Present**
Masters of Science in Electrical Engineering Expected Graduation: May 2024
Subjects Taken: Computer Architecture, Embedded SOC, Intelligent Autonomous Sys, Neural Networks GPA: 3.54/4

PES University **August 2015-May 2019**
Bachelor of Engineering in Electronics and Communications GPA: 3.02/4

SKILLS

- Programming Languages: Python, C, C++
- SOC Design Fundamentals, Xilinx FPGA, Vivado, Raspberry Pi, Sensor Integration
- Protocols: CAN, I2C, SPI, AXI, ANB
- Tools: Git, Jira, Confluence, Slash Framework, Agile, Lean, NumPy. Pandas, Matplotlib, Scikit-Learn

WORK EXPERIENCE

Wipro Technologies- Client: Ford Motors **Jan 2020–May 2022**
Software Engineer Bangalore, India

- Project Related Training-Automation: Integration Testing and Unit Testing on the Car Infotainment System, python scripting using OOPs concept.
- Accumulated hands-on experience with building test Automation Scripts for the Body Control Systems, focusing on motor control, sensing, and actuation in embedded environments. Developed firmware in C and validation tests in Python for components like windows, mirrors, wipers, seat control and latches. The Project allowed me to develop a deeper understanding of the automotive industry and gain insights on the broader disciplines in this domain.
- Experienced on Script development, Test cases Analysis, Making test plans, writing tests, bug fixing, API development using Python and C. Improved the test result efficiency by creating a system plan before Regression Testing by 65%.
- Performed in the lab to schedule test runs and perform Regression Testing.
- Wrote a script that would detect bugs during regression testing that would give an immediate notification in case of system failure or setup issues. Saved 2 days which decreased the false failure results by 50%.
- Accomplished cumulative achievement of KPI for every quarter and achieved 89% accuracy in the test results.
- Communicated with various teams like the Manual hardware team and development team for bug fixing and defect detection of the infotainment device which helped me get a big picture of the working of the product
- Developed lean and agile methodology skills which made me realize the importance of precise communication to meet client needs and ever-changing client and user expectations.
- Mentored and guided 3 new joiners in the team in initial work and process, and helped them ramp up in 1 months' time and briefly explained them the test-automation-pyramid.

PROJECTS

- **MIPS ISA dot product programming with "forward chaining and branch prediction"**
  • Developed python code that demonstrates forward chaining and branch prediction in MIPS architecture as well as implementations to find the dot product of two vectors depicting multiple stages of data transfer and storing and various ALU operations used in the process.
  • There was an improvement in the performance when forward chaining was implemented compared to it not being implemented by about 75%.
- **Tic-tac-toe on VGA Peripheral Interface Integration with Cortex M0**
  •Engineered a system that incorporated a Cortex-M0 processor, AHB-Lite bus, AHB VGA peripherals, and internal memory, all deployed on an Artix A7 FPGA board.
  • Utilized Keil Software to craft test programs in C, showcasing the tic-tac-toe mechanics. This effectively highlighted the seamless hardware-software interplay within the embedded system, with simulations and verifications carried out. Building upon this foundational program, I devised the logic for a two-player snake game and successfully executed it on the board.
- **Designed an IoT-driven vending machine for a lab equipment** -Vending machine using Arm Cortex M3, integrated cash transaction mechanism with GPS and RFID. Used DC motors instead of Stepper thereby reducing equipment costs by 30% and prevented wastage of components by 18% through precise dispensing mechanisms.

- **Indian Food Classification for Allergy and dietary information using MLP, CNN, RNN and Transfer Learning [Baseline Model Link]**
  •Developed a deep learning-based classification system for Indian cuisine, aiming to identify allergens and dietary information.
  •The models classified dishes according to dietary restrictions such as gluten-free and nut-free. Performance metrics such as accuracy and F1 score were used to evaluate the system, resulting in a robust classification tool that enhances dietary safety and awareness.
- **2D and 3D object detection using Yolov8, Yolov7 and Resnet-18 models on Kitti [Linkyolov8] [Linkyolov7] [Link]**
  •Led the project implementing state-of-the-art object detection models (YOLOv7 and YOLOv8) to enhance real-time video processing capabilities for an advanced AI-powered surveillance system.
  •Pioneered the integration of YOLOv8 for its breakthrough performance in speed and accuracy, customizing the architecture for domain-specific object classes.
  •Achieved a 20% improvement in object detection latency and a 15% increase in accuracy, directly contributing to a more robust and reliable monitoring system.
  •Tackled the challenge of 3D object detection using the ResNet-18 architecture on the Kitti Dataset.
  •By leveraging the power of convolutional neural networks, the ResNet-18 model was fine-tuned for the task of identifying and localizing objects in three-dimensional space from the dataset's diverse array of road scenes.
  •The project demonstrated the efficacy of deep learning for feature extraction in complex environments, providing critical insights for autonomous driving systems.
- **2D detection using Yolov3 on PYNQ Z2 FPGA[in progress]**
  •Developed scripts for evaluating and deploying LPYOLO, a low-precision YOLO variant designed for efficient face detection on FPGA platforms, as detailed in the associated paper.
  •Utilizes Brevitas, a PyTorch-based library, for quantization-aware training (QAT) of models, enhancing their performance and compatibility with low-precision hardware environments.
  •Models are prepared for FPGA deployment by converting them into the ONNX format, ensuring interoperability and ease of use across different platforms and tools.
  •Employs FINN, a cutting-edge framework from Xilinx Research Labs, for optimizing and executing deep neural network models on FPGAs, specifically demonstrated on a PYNQ-Z2 board for real-world applications.

PAPER

Deep Reinforcement Learning and Object-Tracking for SmallSat/UAV Coverage Path-Planning(MILCOM Conference, Status:Rejected) Jonathan Ponniah, Varsha Thirumalai, Milind Patil(San Jose State University) B. G. Lewis, A. K. Wang, T. Chang, M. Enoch, J. Pandya(Lockheed Martin)**[Paper Link] [Status Link]**

- Devised DRL-based algorithms resulting in near-optimal coverage completion times for UAV swarms, as evidenced by performance approaching a computationally feasible lower-bound over various grid sizes.
- Implemented a multi-agent coverage motion-planning policy that enabled efficient coordination of UAV swarms, with simulation results indicating coordination without explicit inter-agent communication.
- Utilized a novel down-sampling technique for global maps, achieving a notable reduction in training steps and communication bandwidth without compromising on completion-time performance.
- Conducted simulations across grids of increasing size, validating the hypothesis of locally-interactive structures in multi-agent problems and the viability of the proposed down-sampling techniques.
- Pioneered the integration of the Deep Affinity Network for object-tracking, achieving a 95% accuracy rate on test data for identifying earthquake-damaged structures, with further application to a variety of disaster scenarios.

ML competitions Participated

- **WiDs Datathon 2019-Oil Palm Detection-Won 8th Place all over and 1st place in Asia**: Predicted the presence of oil palm in the given Satellite Imagery Dataset. Used the used Resnet-18 model with FastAi library for classification. **[Link]**
- **WiDs Datathon 2023-Weather Forecast- Ranked 139 place all over:** Predicted Weather Forecast on time series dataset using Catboost and XGboost and Random Forest Algorithms on the time series dataset. Used the Ensemble model of the algorithms for enhanced accuracy **[Link]**