Nishant Kumar Bharali

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EDUCATION

Virginia Polytechnic Institute and State University, Blacksburg, VA — Anticipated Graduation (05/25)
Master of Science in Computer Engineering
Relevant Courses: *Machine Learning(CS5805), Computer Vision(ECE5554), Robotics and Automation(ECE5704)*

Vellore Institute of Technology, Vellore, TN, India — 2018 – 2022
Bachelor of Technology in Electronics and Communication Engineering, (CGPA: 3.33 / 4.00)
Relevant Courses: Robotics and Automation; VLSI;Image Processing; Signals and Systems; Controls System; Microcontroller and its Applications; Digital Logic Design; Electromagnetic Field Theory and Transmission Lines; Digital and Analog Electronic Circuits; Object-Oriented Programming; Applied Linear Algebra; Applied Calculus

WORK EXPERIENCE

Product Development Engineer | **Mahindra & Mahindra Limited** | Chennai, TN, India — August 2022 – July 2023
R&D Engineer - Electrical & Electronics - CAN BUS Analysis of Electronic Control Units [Automotive Product Development]

- **Projects:** Worked on the infotainment and cluster software architecture for ICE & BEV vehicles, providing bench-level as well as vehicle level environmental testing and production.
- Collaborated with cross-functional teams like ADAS, HMI and wiring harness to incorporate architecture changes.
- Authored technical documentation, design specifications, test plans, & streamline project development.
- Experienced in writing test cases from system requirements and applying **machine learning** supervised learning algorithms in customer use cases and data. (Datasets of different types of customers with their information to keep sales intact)
- Strong foundations in CAN, Diagnostics, Android and QNX architecture; Diagnostics tools like CANalyser, CANoe, Garuda 2.0.

Software Engineer Intern | **Oracle Cerner** | Bangalore, Karnataka, India — Jan 2022 – July 2022

- Collaborated with cross-functional teams to develop and deploy healthcare software solutions.
- Designed and implemented secure and scalable software components using Java (spring boot), Python, React, and JavaScript.
- Conducted code reviews, debugging, and testing, **reducing** software defects by **20%.**
- Employed machine learning to cluster suppliers using medical device datasets, saving the team 10 work hours per week.
- Assignment of beds and nurses to patients in different units done through web application with Spring Security in backend.
- **95%** average unit test coverage for the mainstream application using Mockito framework and Jest/enzyme framework.
- **DevOps:** CI/CD of the product upon Jenkins with pipeline staging scripts for automation, integration and deployment.
- Efficiently reduced size of MySQL database by **7%** with scripts; **improving** the product function by ~ **3%.**

VLSI Design Trainee (Internship) | **Maven Silicon** | Bangalore, Karnataka, India — May 2021 - July 2021

- Hybrid training upon the VLSI methodologies and understanding the functionality of system Verilog.
- Hands-on training upon basic Verilog concepts to model electronic systems in HDL and hierarchical design.
- Design and verification of digital circuits at the register-transfer level of abstraction.

Undergraduate Teaching Assistant (ECE2003) | Digital Logic Design | VIT Vellore, India — 2019-2021

- Worked as an undergraduate teaching assistant under Dr. Balakumar for the undergraduate course ECE2003 - Digital Logic Design.
- Carried out certain tasks of assisting sophomore-level students with laboratory sessions, grading assignments, examinations and laboratory results, maintaining and analyzing lab equipment, holding office-hours for freshers, and report to the faculty with logs of all the required information.

PROJECTS

Autonomous Navigation with Collision Avoidance using ROS | ROS - SLAM, GMapping, Odometry, Laser Scan, GazeboSim

- Designed an obstacle avoidance algorithm for which we used ROS GMapping in our 2 wheeled robot to generate a map using SLAM technique; Used the robot Laser Scan and Odometry data to generate this map.
- Performed high fidelity simulation on Gazebo to develop test algorithms and design; path planning was incorporated.

Idea Repository API | Spring boot, Redux Saga, Postman API, JSON, Git, Jenkins, MySQL, Oracle Database, React Framework

- An API for a full-stack web application to establish user security - authorization and authentication at the backend with Redux-based UI focus on frontend. Published as a technical paper - web application improved test user satisfaction ratings by 15%

- Emphasis on using redux-saga middleware instead of Thunk - faster web page response; improved scrolling efficiency by 10%
- GitHub: https://github.com/NishantBharali/projects

Digital Hearing Aid System using MATLAB | Simulation, MATLAB (GUI)
- Designed a digital hearing aid system using MATLAB using Digital Signal Processing. The implementation of this configurable DHA system includes noise reduction filter, frequency shaper function and amplitude compression function.
- The DHA design is designed to adapt for mild and moderate hearing loss patients since different gain can be set up to map different levels of hearing loss.
- The code written in MATLAB, loads the input wave signal and takes the sampling frequency and the number of bits of that signal. Then, AWGN (Additive white Gaussian noise) and random noise are added to the signal before they are processed by various MATLAB functions to get an output which is audible to the hearing impaired person.

Detection of Number Plate and Identification of Number using MATLAB | Platform Simulation, MATLAB, Simulink
- Our project focuses on developing an automated number plate recognition system, streamlining the process of plate detection and information storage. As vehicles enter a secure area, our system automatically captures and stores their number plates, replacing manual data collection for improved accuracy.
- The project operates on a supervised method, utilizing a reference database for comparison. It comprises three key components: reference creation, plate detection, and alphabet/digit identification.

Information Data Hiding using Steganography Techniques | OpenCV, Pillow, SciKit-Image, NumPy, Matplotlib
- Presented Comparative Image analysis between the two data hiding techniques are made on the reconstructed image to conclude which Steganography method achieves better results, Least Significant Bit (LSB) or Discrete Cosine Transform (DST)
- Automated the generation and evaluation of 35,000 images, achieving an 87% pose detection accuracy from the model

Adaptive Traffic Light System using 8051 Microcontroller |8051 Micrcontroller (AT89C51), LEDs, 7 Segment Display, IR Sensors, Proteus Simulation
- Designed an adaptive traffic light system, which allots different time frames based on the density of traffic to a certain lane.
- Under current circumstances, traffic lights are set in different directions with a fixed time delay, following a particular cycle which will be conveyed by the LEDs with the time delay in consideration.

SKILLS

Technical Skills: Python, Keras, SciKit-Image (sci-kit learn), Java, MATLAB, SQL, CAN, LIN, HTML, CSS, React, CI/CD, Linux bash, RESTful API, Redux-saga, Spring Framework, Jupyter, Microcontroller 8051, Simulink, SOLIDWORKS, Verilog
Framework and Tools: OpenCV, Matplotlib (Pillow), Vector CANalyzer, CANoe, Wireshark, Android and QNX architecture, Postman, Git Jenkins, Microservices, ROS, Visual Studio, Gazebo, MySQL
Other: Agile, Scrum, JIRA, Product & Project Management, Microsoft Office Suite, eLMS

ACHIEVEMENTS AND ORGANIZATIONS

- **SAE Autodrive Challenge** (Present) : Participating in the Vehicle Control and testing sub-team under working on Q23-24 cycle learning through training and workshops on topics like Machine Vision, ROS2 and MATLAB GUI's
- **Undergraduate Teaching Assistant** for the course Digital Logic Design (ECE2003), VIT Vellore (2019-2021)
- Secured Silver Rank in **IoT - Domain Specialist** conforming to National Skills Qualifications Framework Level 8, 2021
- Assistant Web Developer at **IEEE IAS**, VIT Vellore, 2020
- Core Committee Member, **IEEE - Circuits and Systems Society**, 2019-2020
- Core Committee Member, **IEEE Computer Society**, 2019-2022

PUBLICATION(S)

Full Stack Web Development of Redux-based Applications with Dynamic Microservices (Case Study - IDEA REPOSITORY), 2022-2023

- Successfully certified and published the technical research paper in a peer-reviewed journal with an acceptable impact factor where the synopsis of the paper was web development strategy to develop applications based on redux using redux-saga middleware instead of its native Thunk middleware for faster web page response and to improve scrolling efficiency by 10%.
- Use of the MySQL server and spring framework was incorporated for dynamic usage of the backend while the saga middleware at the frontend uses the data stored in redux store dynamically and asynchronously to facilitate faster and responsive web page.