ABHIJITH N BALAN

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Education

- **Indian Institute of Technology Madras** — Chennai, India
  Master of Technology in Automotive Engineering — *CGPA: 8.63* — *Aug. 2014 – Mar. 2019*
  Bachelor of Technology in Engineering Design

Experience

- **Jaguar Land Rover** — Bangalore, India
  Data Scientist — *July 2019 - Present*
  - **Head, AI/ML Research and Development**
    - Spearheaded the AI/ML Research and Development division at Jaguar Land Rover India, overseeing a diverse portfolio of projects, ensuring timely delivery and efficient use of resources.
    - Promote research in JLR by coordinating brainstorming events and AI/ML technical sessions. Coordinated with multiple global stakeholders to foster collaboration and to procure promising projects.
  - **LLM-based test-case generation from requirements**
    - Proposed and developed an LLM-based test-case generation tool using google T5 transformer model to automate the generation of test-cases in gherkin format from requirements.
    - Hosted the model on GCP for better data privacy and security and also performed domain adaptation using corpus made of supporting documents to adapt better to JLR automotive terminologies.
  - **Audio Decoupling using RPM Signals *(Patent filed)***
    - Modeled an algorithm that can decouple source signal from noise signal in a given audio file with the help of a base signal from the source.
    - Demonstrated the capabilities of the algorithm in Car cabin noise cancellation, Human speech removal, Engine sound enhancement and microphone record quality enhancement.
  - **Car Audio Diagnostics *(Patent filed)***
    - Implemented a Fourier transform based fault detection model using audio and rpm data from a car. Extended the solution to accommodate different fault signatures from vehicle.
    - Deployed the model in Google Cloud Platform using Docker and Kubernetes for container orchestration.
  - **Twitter Text Analytics**
    - Implemented short text Topic Modeling algorithms like BERTopic and Top2Vec to identify relevant tweets from customer related to vehicle complaints. Implemented Hierarchical Top2Vec increasing the NMI score from 0.53 to 0.57
    - Developed a live interactive dashboard using Dash and Plotly using flask framework and deployed the visualisations in cloud using GCP Cloudrun.
  - **Battery Fault Detection**
    - Implemented a LSTM-based autoencoder outlier detection model to detect faulty battery systems using battery DIDs. Trained the model to an accuracy of 96% and deployed the solution using GCP cloudrun with a live dashboard.
  - **Research Projects**
    - **Generalization of 3D Object Detection**: Proposed simulation based solution to lidar data generation from multiple devices. Generated ground truth data using Carla simulator and upgraded to Nvidia Drivesim simulator.
    - **Driver Deep Personalization**: Proposed and developed a driving character recognition with transformer based model. Patent application progressing on automatic drive select based on the same idea.
    - **Adversarial Attacks on Neural Networks**: Researched adversarial attack techniques applied on Artificial Neural Network with special emphasis on security of self driving systems.

- **Planys Technologies** — Chennai, India
  Software Developer Intern — *Dec 2017 - May 2018*
  - **Underwater Computer Vision** : Created Computer vision packages using OpenCV for Crack Detection (AlexNet), Underwater Image Enhancement, Live Image Stitching, Underwater object tracking and depth measurement using lasers.

- **Wipro Technologies** — Bangalore, India
  Robotics Software Developer Intern — *Jun 2017 - Jul 2017*
  - **Robot Simulation and Development** : Created a Humanoid Robot model in ROS, Rviz and Gazebo. Created a action copying robot ROS package using kinect sensor and demonstrated in both simulation and physical robot.

Patents and Publications

- **PATENT: Audio Decomposition and Analysis for Automobiles** Online
  Jaguar Land Rover *Jul. 2021*

  Audio Decoupling Algorithms using a base signal from the audio source. The Audio signals are processed and the signatures in phase with the base signal is extracted.

- **PATENT: Diagnostic system and method** Online
  Jaguar Land Rover *Jul. 2021*

  An Onboard diagnostics system using Audio and CAN messages from the car. The Signals are synchronized and processed to detect different fault signatures in the vehicles.

- **PUBLICATION: Multi-robot Decentralized Exploration using Weighted Random Selection** Online
  ICINCO 21 - 18th Internation Conference on Informatics in Control, Automation and Robotics *Jul. 2021*

  The paper introduced an efficient frontier allocation method based on weighted random selection for a decentralized multi-robot system.

Projects

- **Coordinated SLAM using SWARM robots**
  Master Thesis under Dr.Asokan T, IIT Madras *Mar 2018 - Mar 2019*
  - Created a multi-robot cooperative mapping algorithm for decentralized robot systems in ROS and devised a randomness based exploration strategy for cooperative map creation with minimal communication.

- **Graph Random Walk Algorithm**
  Global Digital Development Hackathon, Jaguar Land Rover *Jul 2021*
  - Implemented a Random Walk algorithm for graph traversal using Ant Colony Optimization and Page Rank algorithm.
  - Demonstrated the efficiency in generating random traversals in Car Infotainment system testing and placed first in hackathon conducted by Jaguar Land Rover.

Programming Skills

- **Languages**: Python, C, C++, HTML, CSS, Javasricpt
- **Technologies** Pytorch, Tensorflow, T5, GANs, Plotly, Dash, GCP, Transformers, Statistical Models, Docker, Kubernetes, Cyber Security, ,Computer Vision,Pandas, Numpy, Matplotlib ,Swarm Robotics,ROS, Gazebo, OpenCV, Arduino,

Other Skills

- **Recruitment**: Participated in talent acquisition process in Jaguar Land Rover for two years and took care of technical and analytical skills evaluation. Interviewed candidates for positions ranging from Graduate Trainee to Team Lead
- **Languages**: Fluent in English, Native in Malayalam, Intermediate in Tamil and Hindi. Trained in Japanese (Beginner)