

Saudi Arabia, where I was born and raised, is home to an exceptionally high rate of car accidents. With my interest in applied research to make an impact on people's lives, since 2019, I have focused on applying deep learning (DL) models for vehicular applications, like car damage appraisal and car tailgating detection. To expand my work and skillset to a wider range of applications, including perception in autonomous vehicle, I need to enhance my understanding of concepts like panoptic segmentation, uncertainty quantification, probabilistic DL layers, and geometric concepts of 3D space for depth estimation from stereo cameras. These are different from the perception concepts and the ordinary DL architectures being used for 2D applications, which I am already familiar with and have experience in using. To achieve my goals, I believe the Master of Science in Artificial Intelligence at King's College London is the most suitable program for me.

My path to AI was not inevitable or straightforward. My family wanted me to become a doctor. In 2014, I turned down a scholarship to study in the US awarded to academically talented Saudis. I then joined King Saud bin Abdulaziz University for Health Sciences (KSAU-HS) to pursue a career in medicine, which I was not passionate about. During my freshman year, my parents divorced. This affected my academic performance, and thus I left the medical school and opted for the discipline I enjoy the most – computers. I excelled in programming and did well in data-related courses, such as Data Structures and Data Warehouse. Through hard work and dedication, I was able to increase my GPA from 3.24 to 3.73 (out of 5) in three years. Fueled by this motivation, I ranked among the top 27 teams out of over 2,200 in the semi-finals of the MIT Enterprise Forum Saudi Chapter Startup competition, where I developed my graduation project for a system to reduce medication wastage by improving the distribution process across Saudi Arabia in 2017. The award provided me with an opportunity to co-found a tech startup, where I used K-Mean clustering to build an efficient ML model for identifying the best regions for grocery delivery in Riyadh city. This solution helped to reduce the cost of families' grocery items by almost 30%. Starting a company that utilizes AI was a challenge that pushed me out of my comfort zone. However, I found it to be a stimulating and rewarding experience, and I realized that I could make a positive impact on the tech industry.

To devote time to my passion for AI, I left my job as a developer at [STC](#), the largest telecom company in the Middle East, in order to devote more time to my passion for artificial intelligence (AI). I was awarded a three-month scholarship to attend a Data Science Bootcamp at the General Assembly (GA), a top-notch organization in education provision, funded by the Misk Foundation, an organization that promotes learning among promising youth in Saudi Arabia. During my time at GA, I worked with [Dr. Andrew Yip](#) to fine-tune a DL model¹ that predicts 3D bounding boxes. I also wrote an algorithm for car orientation detection and distance calculation, and successfully tested the solution on the KITTI dataset. My efforts earned me recognition as producing the best graduation project at GA, which paved the way for me to continue my research to improve the model against generalization issues with datasets in Saudi Arabia at the [ELM](#) company, a pioneer in big data in Saudi Arabia. At [ELM](#), I joined the research team as an ML engineer under the supervision of [Dr. Syed Adnan](#), the former team lead at the UK's Hitachi Autonomous Driving Lab.

¹ [Frustum PointNets for 3D Object Detection from RGB-D Data](#)

Following the success of improving the model using heavy augmentation techniques, like CycleGAN, I began a new project that utilized the YOLO-v5 model to automate the verification of e-transactions. To achieve this, I added a parametric layer to check for the existence of certain features and handle false positives. In order to minimize bias, I used synthetic data, and also quantized it for edge usage. This effort resulted in a reduction of the company's auditing team from 7 employees to just 1. I presented the findings of this project at the PyData conference². Furthermore, I expanded on this work by filing a patent at the USPTO in 2021 to more efficiently capture landmarks from different angles. We proposed separate models per different sets of placement angles under variable illumination conditions to make hidden landmarks, such as holograms, visible and hence available for the DL to validate their authenticity.

To continue my work in DL applications, since late 2021, I have been leading and working on a car damage estimation project through images, collecting and annotating more than 20k images from different countries to ensure diversity and generalization. I also designed a weighted multi-cross entropy loss to mimic concepts like overlap prevention from panoptic segmentation, an area I am eager to explore further by taking the Applied Deep Learning course. During this project, as well as my previous work, I observed that DL models tend to make incorrect predictions when the input images are perturbed by random noise. These findings are based on my experiments that were compiled into a research manuscript, at which I'm the first author, and published in the "Complexity"³ journal.

I believe the hands-on courses in this program will enhance my skills and knowledge to work on more advanced perception problems. For example, I want to enhance my understanding of deploying DL models on moving vehicles and gain hands-on experience with reinforcement learning by taking the Agents & Multi-Agent Systems course. Also, I want to build intuition about concepts related to scene understanding in non-stationary environments, which I believe the AI reasoning, and the Pattern recognition courses will help me to achieve it.

With more than five years of industrial experience and a scholarship funded by the government of Saudi Arabia to develop myself in this field, I am well-prepared to pursue the MSc in Artificial Intelligence at King's College London. The program will allow me to sharpen my skills and broaden my range of capabilities in the perception field, which in turn will prepare me to join my colleagues at [ELM](#)'s UK branch, a newly established branch dedicated to the development of autonomous vehicles, as a perception engineer.

² [Architecture selection & optimization for DL models](#)

³ [Automotive Parts Assessment: Applying Real-time Instance-Segmentation Models to Identify Vehicle Parts](#)