

A M.Sc. student in Information Technology with Mechatronics background, seeking a Ph.D. opportunity to work on Control Theory and Optimisation problems and willing to continue in academia and research.

Education

Master of Science in Infotech program, Embedded Systems specialisation

University of Stuttgart.

Grade: 1.3

Research Project topic: *"Implementation of a Data-driven State-feedback Controller for a Self-stabilising Bicycle"*. Grade: 1.3

Master's Thesis topic: *"Analysis and Modelling of Time-Varying Optimisation Algorithms as Dynamical Systems"*.

October 2023 — Ongoing

Bachelor Project and Thesis

Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen.

Topic: Lane-level Map Matching Algorithm for Model-scale Vehicles (read [here](#))

Grade: 1.0 (Equivalent to A, highest grade) (German scale GPA 1.0 - 5.0)

March — September 2022

Bachelor of Science in Engineering Materials and Sciences (EMS), Mechatronics major

The German University in Cairo, Cumulative GPA: 0.81 (A+ in German Standard GPA).

September 2018 — July 2023

Specialization Courses: Autonomous Systems, Classical, Modern and Optimal Control Engineering, Embedded Systems, Advanced Mechatronics Engineering and Hybrid Automata, Optimisation Techniques, Reinforcement Learning, Image Processing, Operating Systems, Bond Graphs Technique, Mechanics of Machinery, Data Engineering.

Experience

Teaching Instructor

Advanced Mathematics for INFOTECH exercise sessions for Masters students

October 2024 — March 2025

Universität Stuttgart

Research Assistant (Hiwi)

Cyber Physical Mobility Lab (CPM)

January 2024 — Present

RWTH Aachen

- Synthesised an OSM Lanelet2 map for a real-world scenario
- Transferred Real-World map to CPM Lab simulations
- Handled the RVIZ2 Simulations of the CPM Lab
- Developed a Dubins' path planner tool in RVIZ2
- Developed a Scenarios planner for the micro-cars

Research and Innovation member

GUCInnovators "Shell Eco Marathon" racing team

August 2022 — May 2023

The German University in Cairo

- Extracted map data points representing a racing track.
- Developed an algorithm that converts data points to the required format.
- Used an optimisation algorithm to obtain a Racing Line.

Research Intern

Control and Dynamical Systems Lab

August — September 2021

The German University in Cairo

- Developed a web server and a Socket programming channel besides a MAVLink UDP connection to communicate data between a raspberry pi and a PC.

Projects Member

GUCBrain, a machine learning AWG in the GUC.

January 2020 — December 2021

The German University in Cairo

- Did several machine learning tasks and attended tens of ML sessions.

Senior Hardware Committee member

IEEE GUC Student Branch

September 2018 — December 2021

The German University in Cairo

- Worked on Arduino, MATLAB, C and ROS tasks.
- Practiced Android Development.

Junior Teaching Assistant

German University in Cairo

February 2020 — January 2021

Cairo, Egypt

- Mentored students in the Introduction to Programming and OOP (CSEN 202) course Labs.
- Mentored students in the Data Structures and Algorithms (CSEN 301) course Labs.

Trainee

Robo-Tech EG

August, 2020

Alexandria, Egypt

- Trained on Robot arm designing, analysing, manufacturing and control.

Additional Experience

- **DEBI Robotics Competition.** Qualified to the round of 16 out of 200 participating teams.
- **ACM ICPC GUC Community member.** Took pupil's and Specialist's plans.
- **2020 ECPC qualifications contest.** Participated in the GUC qualifications.
- **Catalyst's Coding Contest, Google HashCode and Code Jam Participant.** 2019-2022
- **Nasa Space Apps competition participant.** 2020

Projects

- **Autonomous Car Localization, Planning, Control, and Communication** Modified an on-shelf scaled RC car (Ackermann Drive) by hacking its actuators, adding different sensors, mounting processors and implementing simulations and communications using ROS.
- **Target Tracking and Following for a Differential Vehicle** Implemented an image processing program that locates a differential vehicle position and using its heading, it controls the vehicle to follow Aruco marker targets.
- **Multi-UAV Task Assignment and Path Planning** Implemented multiple optimisation algorithms to solve the MUTAPP problem. Used algorithms include: Simulated Annealing, Genetic Algorithm, Ant Colony Optimisation, Whale Optimisation Algorithm, Dragon-fly Algorithm.
- **Robot Arm Implementation and Control** Fabricated and implemented a robot arm and applied trajectory planning and control using Matlab .
- **Real-Time System for UGVs for Warehouse Management** Modeled and simulated a differential UGV and controlled it using Stateflow and Hybrid Automata.
- **UK 2009 Accidents Dataset Analysis and Transformation (Data Engineering Course project)**
- **Hand-gesture controlled drone** Used image processing to control a hacked RC drone by detecting different hand gestures.
- **Coffee Bean Crusher 3 Piston Cylinder Pneumatic System.**
- **Analysis of a compound mechanism (4-bar and slider crank mechanism).**
- **Self Balancing Robot.** Implemented a self balancing two-wheeled vehicle using Arduino's ATmega328P microcontroller and MPU6050. Part of the Mechatronics Engineering / Embedded Systems course.
- **LZ Data Compression Using VHDL.** Implemented a data compression and decompression VHDL code using Lempel-Ziv algorithm as part of the Digital System Design Course.
- **HearthStone.** Developed a replica of the famous gameplay HearthStone and implemented its GUI where OOP concepts were used throughout the project. Computer Programming Lab (CSEN 401) course project.

Awards & Scholarships

- 2025** Sony Active Student Award for academic performance at University of Stuttgart.
- 2023** DAAD Scholarship for Masters studies at University of Stuttgart, INFOTECH program.
- 2023** Ranked 3rd on Mechatronics at the GUC. 9th semester.
- 2022** Full Scholarship, Bachelor's Thesis Abroad. Ranked 1st on Mechatronics at the GUC. Cumulative GPA over the first 6 semesters.
Ranked 6th on Mechatronics at the GUC. 7th semester.
- 2021** Ranked 4th on Mechatronics at the GUC. 6th semester.
- 2020** GUC excellence award. Ranked 2nd on Mechatronics at the GUC. 3rd semester.
- 2019** Ranked 5th on Engineering at the GUC. 1st and 2nd semesters.
- 2018** Partial Scholarship (70%) at The German University in Cairo. Ranked 98th on Egypt's Thanawya Amma (GCSE) Mathematical Section.

Languages and Technical Skills

- Python, C++, Java, C, VHDL.
- ROS1/2, OOP, AVR Microcontrollers, ML, Data Science, OpenCV, MAVLink.
- Linux, Raspberry Pi, MATLAB, SOLIDWORKS, AutoCAD, Ansys,
- Familiar with Carla, C#, Assembly, Docker, Proteus, SQL, Socket Programming, Flask, Django.

Interests

Autonomous Vehicles, Robotics and Control, University Teaching and Research

Courses

- Motion Planning for Self-Driving Cars (Coursera)
- Introduction to Self-Driving Cars (Coursera)
- Introduction to Data Science in Python (Coursera)
- Data Analysis Challenger Track (Udacity)