Adwait Naik

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Education

- **University of Glasgow** — Glasgow, Scotland, UK
  Master of Science - Robotics and Artificial Intelligence — *Sept 2021 - Sept 2022*
  Relevant Coursework: *Control System Analysis and Design(**ENG5022**), Digital Control(**ENG5022**), Navigation Systems(**ENG5062**), Computational Social Intelligence(**COMPSCI5095**), Machine Learning and Artificial Intelligence for Data Scientists(**COMPSCI5100**), Robotics Team Design Project(**ENG5325**), Robotics Foundations(**COMPSCI4076**, Honours), Conversational Interfaces(**COMPSCI5094**), Real Time Embedded Programming(**ENG5220**), Cyber Security Fundamentals(**COMPSCI5063**)*

- **University of Mumbai** — Mumbai, India
  Bachelor of Technology - Electronics Engineering — *June 2015 - June 2019*
  Relevant Coursework: *Circuit Theory, Control Systems, Computer Architecture, Computer Networking, Digital Logic and Design, Digital Image Processing, Data Structures and Algorithms, Embedded Systems, Robotics, VLSI, VHDL*

Technical Skills

- **Programming Languages**: C/C++(11/14), Go, MySQL, Python
- **Scripting Languages**: Unix Shell Programming
- **Machine Learning Frameworks/APIs**: Eigen, Keras, Matplotlib, Mayavi, Numpy, OpenCV, Pytorch, Scipy, Tensorflow
- **Robotics Frameworks/API**: Gazebo, ROS/ROS2
- **Version Control**: Github
- **Cloud Computing**: Docker, AWS (EC2), Peltarion cloud tools
- **Operating Systems**: Linux(Ubuntu), Mac OS, Raspberry Pi OS
- **Web Development**: CSS, HTML, XML, LaTeX
- **Others**: Pygame

Experience

- **School of Computing Science, University of Glasgow** — Glasgow, Scotland, UK
  MSc Thesis Student — *Jun 2022 - TBD*
  - **Currently working under the guidance of Dr. Nicolas Pugeault.**:

- **FLOX Robotics** — Remote(India) - Sweden
  Software Development(Simulation and Modelling) — *Jan 2021 - Jun 2021*
  - **Simulation**: Developed a simulation environment with Ignition gazebo to test the drone. The simulation files for the drone were developed from scratch using *Blender* software.
  - **3D Modelling**: Developed an algorithm to generate 3D models of landscapes, trees, and animals using Blender. These models were used to create the simulation environment to test the drones.
  - **Object Detection**: Implemented a model to perform real time object detection based on the Darknet framework. Additionally, the Yolo framework was incorporated to detect the temperature of the objects in real time.

- **HTIC, IIT-Madras Research Park** — Chennai, India
  Project Intern (Robotics) — *Sep 2019 - March 2020*
  - **UR5 Robotic Arm**: Developed and tested the RRT path planning algorithm for the UR5 robotic arm.
  - **RTDE**: Designed algorithms based on the real-time data exchange (RTDE) technique to acquire critically important data like joint angles, joint speed, TCP co-ordinates remotely.
  - **Kinodynamic Path Planning**: Implemented a path planning algorithm with ROS for highly constrained environments. [video][code]

- **CVIT, IIIT-Hyderabad** Hyderabad, India
  Summer Fellow(Machine Learning) *Jul 2019 - Jul 2019*
  - **CV Workshop**: Attended 4th Summer School on Computer Vision at CVIT.
  - **Experimented With GAN**: Worked with (Generative Adversarial Networks)GANs to deploy the model in Pytorch for artistic style transfer.
- **KUKA Robotics** Pune, India
  Robotics Intern *May 2018 - Jun 2018*
  - **Robot Path Planning**: Designed and implemented basic path planning algorithms on the KR3 and KR6 robotic arms.
  - **Trajectory Optimization**: Implemented algorithms for trajectory optimization in the KR6 robot.
  - **Robot Programming**: Used KUKA programming language to program the robots for various tasks.

Academic & Open-Source Projects

- **Autonomous Robot Chess Simulator** Supervisor- Dr. Gerardo Camarasa
  Frameworks and Languages: Python, C++, Eigen, Gazebo, Numpy, ROS, RViz, TF *Jan'22 - Apr'22*
  - **Algorithm Development**: designed and implemented an algorithm to enable the Baxter robot to play a choreographed game of chess.
  - **Pose Estimation**: to locate the spawned chess pieces using transformation matrices, a module was developed with the TF package.
  - **Object Manipulation**: created a position-map of the chess pieces and used the publisher-subscriber method to track and move the chess pieces.
  - **Simulation**: the algorithm was successfully tested in Gazebo. [code][video]
- **Autonomous Nao Robot Soccer Simulator** Supervisor- Dr. Euan Mcgookin
  Frameworks and Languages: Python, C++, Gazebo, Hector SLAM, Numpy, ROS, RViz *Jan'22 - Apr'22*
  - **3D Modelling**: developed 3D models of the soccer field and Nao robot from scratch.
  - **Algorithm Development**: implemented algorithms for navigation, motion planning, collision avoidance, control policies, and playing strategies.
  - **Object localisation & Pose estimation**: transformation matrices were used to estimate soccer ball location for the Nao robots. A SLAM-based module was developed using the data from LIDAR and SONAR sensor packages in ROS.
  - **Motion Planning**: implemented a simple kinodynamic RRT algorithm for highly constrained and dynamic environment.
  - **Simulation**: the algorithm was successfully tested in Gazebo. [video]
- **Weather Forecasting RASA Chatbot** Supervisor- Dr. Mary Ellen Foster
  Frameworks and Languages: Python, RASA, OpenWeatherMap API *Jan'22 - Apr'22*
  - **Weather Agent Development**: developed a task-oriented dialogue system that lets a user access the weather forecast for a given location and date.
  - **Algorithm Development**: developed an NLP pipeline using RASA framework to detect the slots and entites in the sample dialogues and estimate the prediction score.
  - **Model development & Training**: implemented a neural network model based on LSTM architecture, trained for 10 epochs with an estimated accuracy for slot prediction of 86%. The OpenWeatherMap API was incorporated to fetch current location and weather metrics.
  - **NLU Evaluation**: chatbot's efficiency was estimated on the basis of number of domain-relevant utterances made. [code]
- **Pyrrt - python bindings for RRT algorithm** Open Source Project
  Frameworks and Languages: Python, Pygame, Numpy *Jan'22 -*
  - **Algorithm Development**: developed a simple python based module for Rapidly-exploring Random Tree algorithm.
  - **Optimization**: implemented RRT-connect with manhattan distance metric to reduce the time for path estimation. [code]
- **Pymujoco - python bindings for the Mujoco simulator** Open Source Project
  Frameworks and Languages: Python, MuJoCo, Numpy, Pybullet *Nov'21 -*
  - **Algorithm Development**: developed a slider robot for testing the simulator. [code][working sample]
- **RoboSim - a python based simulator for serial robots** Supervisor - Mr. Keerthi Ram
  Frameworks and Languages: Python, Pygame, Numpy, ROS, RViz *Sept'19 - Dec'19*
  - **Algorithm Development**: developed a generic simulation framework using RViz for collision detection, obstacle avoidance, and motion planning.
  - **Testing & Deployment**: successfully tested for motion planning using the UR5e
- **Voice Controlled Robotic Arm** Supervisor(s)- Prof. Annu Abraham Dr. J H Nirmal
  Frameworks and Languages: Python, Arduino Uno, Eagle *Jun'18 - May'19*
  - **Hardware development, Circuit Design, & Testing**: A 3-DOF robotic arm was designed and assembled from scratch. The circuit was designed and implemented using Eagle.
  - **Algorithm Development**: developed an ASR (Asynchronous Speech Recognition) module using the HMM toolkit to enable the robot to recognize the human voice with an accuracy of 86%.

Publications

- **Journal Articles** — Published on: Jan'21
  HMM-based phoneme speech recognition system for control and command of industrial robots — *paper*
- **Technical Reports** — Published on: Apr'22
  Robotics Team Design Project Report — *report*
- **Coursework Reports** — Published on: Nov'21
  Computational Social Intelligence (COMPSCI 4080) — *report1 & report2*

Achievements

- Secured *2nd rank* for achieving highest marks in **MIS(Management of Information systems)** course (among 150 students)in the department of Electronics Engineering.
- Secured *1st rank* for achieving highest marks in **AVLSI** course (among 150 students)in the department of Electronics Engineering.
- Secured an internship opportunity at the prestigious HTIC lab funded by the Department of Science & Technology, Govt. of India.
- Bertelsmann Technology Scholarship by Udacity in Dec'21.

References

- References would be available upon request.

Developed with LaTeX
Last Modified: Saturday, 18th June, 16:51 PM