

# Subramanian Ramasamy

Chicago, Illinois 60607 • 312-973-7674

Email: [subramanian2698@gmail.com](mailto:subramanian2698@gmail.com) • LinkedIn: [www.linkedin.com/in/subramanian-ramasamy-041a35105/](https://www.linkedin.com/in/subramanian-ramasamy-041a35105/)

Github: [github.com/Subram0212](https://github.com/Subram0212) • Website: [https://subram0212.github.io/website\\_subram0212/](https://subram0212.github.io/website_subram0212/)

---

## Areas of Expertise

- Mechanical Engineering
  - Object oriented programming
  - Data structures and algorithms
  - Mathematical Programming
  - Combinatorial Optimization
  - Vehicle Routing Problem
  - Reinforcement Learning
  - Dynamic programming
  - Operations Research
- 

## EDUCATION

**PhD in Mechanical and Industrial Engineering** | UIC, College of Engineering, Chicago, IL, Expected 2024 (GPA: 4.0/4.0)

**Bachelor of Engineering in Mechanical Engineering** | Anna University, Chennai, TN, India, 2019 (CGPA: 8.36/10)

---

## TECHNICAL SKILLS

<b>Platforms:</b>	Linux (Ubuntu), MS Office, Github (version control system)
<b>Languages:</b>	C, C++, Python, ROS, SQL, R, HTML, CSS
<b>Solvers:</b>	Gurobi Optimizer, IBM CPLEX, Google OR-Tools
<b>Packages:</b>	Pytorch, Tensorflow, Scikit-learn, Numpy, Pandas, OpenCV
<b>Software:</b>	MuJoCo (Multi-Joint Dynamics with Contact) simulator, LINGO, Minitab, MATLAB, Simulink, Adobe Illustrator

---

## EXPERIENCE HIGHLIGHTS

**AMTRAK**, Washington, DC, **05/2022 – 12/2022**

### Operations Research Intern

- Developed algorithms to implement Predictive Maintenance of trainset components.
- Performed text mining analysis to concentrate on critical subset of components.
- A model is developed to estimate Remaining Useful Life (RUL) of critical components that predict failures before happening and a mathematical optimization model is developed subsequently to prescribe optimal repair times.
- Designed and implemented a Decision-Making System to perform failure analysis on various train consists by utilizing the model from RUL estimation.

**UNIVERSITY OF ILLINOIS AT CHICAGO**, IL, **10/2020 – Present**

### Graduate Research Assistant

- Working on route optimization of autonomous ground and aerial systems (UAVs and UGVs) by implementing mathematical programming techniques and novel heuristic algorithm frameworks.
- Python Programming language is used for developing a black-box function for optimization.
- Implemented global optimization algorithms like Genetic algorithm for UGV optimization and local search heuristics for UAV optimization to perform hierarchical bi-level optimization in any generic scenario map.
- Applied Reinforcement Learning algorithms for UAV optimization to improve the potential of applying such vehicle routing problems to dynamic scenarios.
- Results are validated in custom-GUI application which is developed in MATLAB for user visualization.

**Projected plans:** Develop a framework to support algorithms with **decision-making capabilities** for efficient computation of optimal solutions.

# Subramanian Ramasamy

Page Two of Two

---

## ACADEMIC PROJECTS

### Low-level control and Trajectory tracking of a 3D quadcopter with suspended payload

- Developed a control algorithm to perform a 3-dimensional quadcopter trajectory tracking along with suspended payload.
- Partial feedback linearization is performed along with PD control. LQR is applied to obtain gain parameters.

### Implementation of Genetic Algorithm for hyperparameter optimization of Unmanned Ground Vehicle routing

- Performed global optimization methods such as Genetic Algorithm to optimize the route hyperparameter of the Unmanned Ground Vehicle.
- These optimized hyperparameters are used to optimize the Unmanned Aerial Vehicle routing using local search methods in a hierarchical two-level optimization of UAV-UGV routing.

### Prediction of human balance using Machine Learning algorithms

- Developed a Machine Learning classification model using **Python** to accurately predict the fall risk of humans.

### Implementation of Reinforcement Learning to solve combinatorial optimization problem

- Developed a program to perform Reinforcement Learning using Neural Networks to solve Vehicle Routing Problem.

### Automated path planning and control of an AGV (Autonomous Guided Vehicles)

- Developed a mathematical program to explore shortest path of an AGV between any two locations given by executing a path-finding algorithm (A\* algorithm) and solved it using the **Python** code.

---

## PUBLICATIONS

**Coordinated route planning of multiple fuel-constrained Unmanned Aerial Vehicles with recharging on an Unmanned Ground Vehicle for mission coverage** – Journal of Intelligent and Robotic Systems. Published Date: September 17, 2022. Link: <https://link.springer.com/article/10.1007/s10846-022-01737-7>

**Heterogeneous Vehicle Routing: Comparing Parameter tuning using Genetic Algorithm and Bayesian Optimization**– Published Date: July 26, 2022. Link: <https://ieeexplore.ieee.org/abstract/document/9836044>

**Cooperative route planning of multiple fuel-constrained Unmanned Aerial Vehicles with recharging on an Unmanned Ground Vehicle** – Published Date: July 20, 2021. Link: <https://ieeexplore.ieee.org/document/9476848>