Subramanian Ramasamy

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I am a PhD student at The University of Illinois at Chicago. My research interests include solving complex and novel problems in the field of robotics, data science, operations research, path planning, Vehicle Routing Problem (VRP) and deep learning. I possess a good problem-solving and time-management abilities; able to identify root cause of issues and implement creative, targeted solutions. Multilingual with operational command over English, Tamil, and German.

Areas of Expertise

- Mechanical Engineering
- OpenCV Library
- Reinforcement Learning
- Control Systems & Robotics
- Combinatorial Optimization
- Python Programming
- Vehicle Routing Problem
- Path and route planning
- Operations Research

EDUCATION

PhD in Mechanical Engineering | UIC, College of Engineering, Chicago, IL, Expected 2024 (GPA: 4.0/4.0)
Coursework: Data Science - 1, Python programming masterclass, Time Series Analysis and Forecasting, Operations Research, Transportation Networks, Mechatronics, Dynamic Systems Analysis and Control, 3D printing/Additive Manufacturing

Bachelor of Engineering in Mechanical Engineering | Anna University, Chennai, TN, India, 2019 (CGPA: 8.36/10)
Coursework: Strength of Materials, Manufacturing Technology–1, Manufacturing Technology–2, Engineering Materials and Metallurgy, Finite Element Analysis, Mechatronics, Total Quality Management, Electrical Drives and Controls

TECHNICAL SKILLS

Platforms:	WINDOWS - MS Office – PowerPoint, Excel, Word, Access
Languages:	C, C++, Python, ROS, OpenCV Python, SQL, R
Solvers:	Gurobi Optimizer, IBM CPLEX, Google OR-Tools
Software:	AUTODESK(CAD/CAM/CNC), LINGO, CREO, MINITAB, COMSOL, MATLAB, SIMULINK, ANSYS

EXPERIENCE HIGHLIGHTS

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

Graduate Research Assistant

Working on a military funded project related to Vehicle Routing Problem (VRP), a type of combinatorial optimization problem related to Operations Research, for optimizing the route of the Unmanned Aerial Vehicles (UAVs) and Unmanned Ground Vehicles (UGVs) by developing and coding algorithms thereby minimizing the cost of the vehicle and at the same time performing the required tasks at the missions. The output of the simulation is then to be visualized in **ROS (Robot Operating System)** for evaluating the performance of the output.

Key Accomplishment:

- Implemented novel algorithms and heuristics to perform hierarchical bi-level optimization for optimizing the UGV as well as UAV route by developing a software in Python. Optimal route planning for the vehicle systems is achieved. Basic animation of the routes is achieved in MATLAB.

CHENNAI METCO, Chennai, TN, India, 12/2019

Value Engineer Intern

Worked on a project titled "Structural analysis in Value engineering" where the task of transforming raw data related to the product purchase into a structured and organized data by performing data preparation, data cleaning and data validation is to be achieved.

Key Accomplishment:

- Held full accountability for overseeing various function of the products and machines manufactured while working with cross-functional members. Achieved data preparation, data cleaning and data validation of products purchased, and data analysis was made to mitigate cost of purchase.

INDIAN INSTITUTE OF TECHNOLOGY - MADRAS, Chennai, TN, India, 6/2018

Research Intern, Machine Design Section (MDS)

Developed a software using MATLAB to simulate the defects occur in bearings. Recognized the mechanism of defects in the bearings by implementing effective procedures.

Key Accomplishment:

- Examined and studied defects in bearings by creating algorithms for the project titled "Modeling of Extended bearing defect."

ACADEMIC PROJECTS

Electric Vehicle Modeling in MATLAB/Simulink using motor, brake and battery controllers for increased performance

- Involves modeling of the electric vehicle by optimizing the parameters of the powertrain and **development of controllers and software** (motor, brake and battery controllers) to reduce total energy consumption and increase efficiency thereby improving performance.

Automated path planning and control of an AGV

- Developed a python code 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.

Time Series analysis and forecasting of wind energy generation in USA

- Involves modeling of the wind energy generation in US. This project applies a class of models known as Autoregressive Moving Average (ARMA) models. This model is used to predict and update the model values and forecast the future values.

Design and Fabrication of Vertical Axis Wind Turbine (VAWT) for highways using CREO Parametric

- Extracted electricity from moving vehicles on highways by designing and developing a **Savonius** VAWT.

PUBLICATIONS

Cooperative route planning of multiple fuel-constrained Unmanned Aerial Vehicles with recharging on an Unmanned Ground Vehicle – Accepted Date: July 20, 2021

- The problem is to find the time-or energy-optimal paths for the multiple fuel-constrained UAVs to visit a set of mission points while being recharged by stopping at the UGV, whose path also needs to be determined. This is a combinatorial optimization problem that is computationally challenging, but may be solved relatively fast using heuristics. In this paper, we present two-level optimization to solve such complex routing problems.

Effect of blade design on angular velocity of Vertical Axis Wind Turbines – Accepted Date: December 28, 2017

- A numerical optimization was done to study the effect of blade profile and thickness on a Savonius Vertical Axis Wind Turbine for a bi-directional wind flow input. It was observed that the curved profile with lesser thickness was the most suitable for bi-directional wind flow as the stable rotor velocity is achieved quickly, which is an important factor for stable power generation.

OTHER NOTABLE CERTIFICATIONS - OPENCV FOR PYTHON DEVELOPERS, 6/2020

Achieved a LinkedIn certified training in OpenCV library for image processing using Python.