Akshar Shravan Chavan

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EDUCATION

Wayne State University, Detroit — College of Engineering, *Detroit, MI*
Ph.D. in Computer Science — GPA: 3.67 / 4.00 *Aug 2020 – May 2024(expected)*

Wayne State University, Detroit — College of Engineering, *Detroit, MI*
Master of Industrial Engineering — GPA: 3.51 / 4.00 *Aug 2018 – May 2020*

University of Mumbai, Mumbai — Saraswati College of Engineering, *Mumbai, India*
Bachelor of Mechanical Engineering — GPA: 3.27 / 4.00 *Aug 2011 – Jun 2014*

RESEARCH PROJECTS

Energy-Aware Autonomous Mobile Robots (AMRs)
Guide: Dr. Marco Brocaneli — Energy-aware Autonomous Systems Lab *May 2021 – Present*

- Studied and modified the design of the existing prototype Autonomous Mobile Robot (AMR) to improve the localization of the AMR while mapping and navigating through obstacles.
- Built a prototype Autonomous Mobile Robot (AMR) operating on Robot Operating System (ROS), installed with cameras, lidar, computing unit, power/current sensors, Arduino, and motors to study and analyze the energy-aware model.
- Studied the energy consumption of the AMR under different operating conditions performing objective tasks and its effect on battery State of Health.
- Deployed Task and Charging Schedule Manager on multi-purpose AMR for high-quality battery life.

Maximizing Battery Lifespan in LoRaWAN Network
Guide: Dr. Abusayeed Saifullah, Dr. Marco Brocaneli — CRI Lab *Feb 2021 – Present*

- Used a non-linear battery degradation model to get the State of Health (SOH) of the LoRaWAN node's battery based on the SOC profile.
- Developed a time slot selection algorithm that considers battery SOH of LoRaWAN nodes and estimated harvested energy for data transfer to minimize the battery degradation rate of LoRaWAN network nodes.
- Simulation results study showed an increase in the lifespan of the LoRaWAN network by 69.7% with the proposed timeslot selection algorithm over the traditional approach.

Task and Charging Schedule Manager for Autonomous Mobile Robots
Guide: Dr. Marco Brocaneli — Energy-aware Autonomous Systems Lab *May 2020 – Present*

- Introduced and incorporated the concept of Energy Usage Effectiveness (EEF) to achieve high-quality battery life.
- Designed and implemented and investigated an Mixed Integer Non-Linear Programming model for joint task allocation and charge scheduling of a Swarm of Autonomous Mobile Robots.
- Investigate the model for the trade off between task downtime and battery lifespan, EEF at different SOC thresholds for a high-quality battery life.
- Designed and implemented a min-batch gradient descent greedy algorithm that provides task allocation and charge schedule for AMRs with a performance ratio of 1.16 executing in polynomial time.

Opportunistic maintenance scheduling of connected vehicles
Guide: Dr. Murat Yildirim — Cyber-Physical Analytics *Feb 2019 – Dec 2019*

- Developed a unified maintenance scheduling framework for a large fleet of connected vehicles that integrate multi-vehicle routing, maintenance, and predictive analytics using real-time sensor-driven data.
- Modeled mixed fleet dynamic vehicle routing problems (DVRP) considering uncertainties and drone delivery.
- Investigated the impact of disruptions on logistics for heterogeneous vehicle fleets.

PUBLICATIONS

- A. Chavan, M. Brocanelli, *'Task and Charge Scheduling of Autonomous Mobile Robots for High-Quality Battery Life,'* ACSOS 2022 (Accepted).
- S. Fahmida, A. Chavan, P. Modekurthy, A. Saifullah, and M. Brocanelli, *'Battery Lifespan-Aware Sustainable LoRa,'* MOBICOM, 2022 (Under review).

LEADERSHIP/TEAMWORK

Team Guide - St. John College of Engineering and Management, Palghar, MH, India
Team Yunicorn - FKDC *Jun 2016 – May 2018*

- Provided mentoring and support to team captain, team manager, and department lead during the planning, designing, manufacturing, assembly, and testing of the project.
- Conducted corrective action program and applied root cause analysis techniques resulting in improving the team position from 3rd place in season-1 to 1st place in season-2.

SKILLS & CERTIFICATIONS

Programming Language: Python, ROS and C++
Certifications: IBM Data Science Specialization - Coursera