

# Dilli Bhaskar

Student Researcher

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## Education

### Thiagarajar College of Engineering (TCE)

Madurai, India

B.E. in Mechanical Engineering

Sept 2020 - Current

- CGPA : 9.03/10.00
- Best Outgoing Student of batch 2024
- Advisor: Prof. S. Saravana Perumal
- **Government Aided (Autonomous) Institution and affiliated to Anna University, India**

### Velammal Matriculation Higher Secondary School

Chennai, India

Higher School

June 2018 - May 2020

- Higher Secondary School Examination - 92.3 percentage
- President of Robotics and Aeromodelling Club

## Research Interest

Robot Learning | Multi-Agent Robotic Systems | Optimal Control | Deep Reinforcement Learning

## Skills

<b>Programming</b>	Python, C, C++, Lua, MATLAB, Pytorch, Tensor Flow, Robotic Operating System
<b>Design and Analysis Softwares</b>	SolidWorks, CREO, AutoCAD, Ansys Fluent, Ansys Workbench, Copelliasim
<b>Languages</b>	Tamil (Native), English

## Awards and Honors

2024	<b>Honorary Title:</b> SOLIDWORKS Associate	India
2023	<b>Contest:</b> Ranked Top 6 in the DePondFi'23 Challenge	India
2022	<b>Contest:</b> First Place in "Smart India Hackathon", Govt. of India	India
2022	<b>Contest:</b> Third Place in "Hack4Good Hackathon", IEEE Computational Intelligence Society	India
2017	<b>Honorary Title:</b> "Best Student Aeromodeller"	India
2016	<b>Contest:</b> First Place in "Beat My Robo" Competition	India

## Publications

### CONFERENCE PROCEEDINGS

Bhaskar, Dilli and Chitraganti, Shaikshavali. "Normalized Advantage Function based Continuous Control for Mapless Navigation of Mobile Robot". *Under Review*. (2024).

Dilli Bhaskar, Selva Kumar Chandrasekar and Subramanian, Saravana Perumaal. "Congestion-aware path planning for multiple shelf carrying mobile robots in Robotic Mobile Fulfillment System". *Under conference proceedings*. (2024).

Dilli, B. and Suguna, M. "Early Thermal Forest Fire Detection using UAV and Saliency map". *5th International Conference on Contemporary Computing and Informatics (IC3I)*. (2022), pp. 1523–1528. [10.1109/IC3I56241.2022.10072674](https://doi.org/10.1109/IC3I56241.2022.10072674).

## Patents

Dilli, B., Amalwin Joe, J., Madesh, M., Akilesh Kruthik, M., Saravana Perumaal, S., et al. "Robotic Duct Vacuum Cleaner". U.K. Design Patent Application No.6339408. (Mar. 2024).

## Research Experience

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### Indian Institute of Technology Palakkad

Palakkad, India

Project Intern

June. 2023 - Present

- **Guide: Prof. Shaikshavali Chitraganti**
- Developed a novel motion planning approach for mobile robots, comparing Deep Deterministic Policy Gradient (DDPG) and Normalized Advantage Functions (NAF).
- The NAF based optimal mapless motion planner was deployed on turtlebot 3, working with ROS Noetic.
- Significantly boosted the motion planner's success rate by 10 per episode whereas the state of the art DDPG has only 3.5 per episode.

### Vision Systems Lab, TCE

Madurai, India

Student Researcher

Aug. 2023 - Present

- **Guide: Prof. S.Saravana Perumaal, Prof. C. Selva Kumar**
- Engaged in multi-agent task scheduling leveraging reinforcement learning techniques to minimize queuing duration in complex systems
- Devised a novel path planning algorithm for Robotic Mobile Fulfillment Systems (RMFS) integrating reinforcement learning with dynamic action space.

### Artificial Intelligence Lab, TCE

Madurai, India

Student Researcher

Feb. 2020 - Aug. 2023

- **Guide: Prof. M. Suguna**
- Object detector for fire was designed using Thermal images.
- Saliency Maps of Thermal images was obtained using Deep Saliency Network (BAS-Net).
- Saliency maps are fused with thermal images to increase contextual information.
- Using Yolo-v7 object detection is performed on the regenerated fused thermal images.

### Sri Balaji Automations

Chennai, India

Student Intern

Jan. 2022 - Feb. 2022

- Worked on control panel fabrication for industrial machinery utilizing Programmable Logic Controllers (PLCs), Human-Machine Interfaces (HMIs), and various sensors.
- Involved in a team of 4 members in control panel assembly, including material procurement, wiring, and PLC programming, completing each project within an average timeframe of 4 weeks.

## Research Grants

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### FAER - McAfee Scholar Program

[\[Link\]](#)

Foundation for Advancement of Education and Research

Ongoing

- Project focuses on optimizing dairy logistics using Deep Reinforcement Learning (DRL) and cross-docking.
- Project aims to reduce costs, time, fuel usage, and carbon footprint in Indian dairy markets.
- Unique integration of Deep Reinforcement Learning for route planning with real-time adaptability
- Selected for next round with a grant of 6,000 INR under the guidance of mentor **Dr. Arulalan Rajan, IISc Bangalore.**

### Title Winner | Smart India Hackathon

[\[Link\]](#)

Ministry of Education, Government of India

2022

- Real time Waste detection on CCTV camera(Rendered @30 FPS)
- Waste sorting and detecting of 7 classes model was built.
- Won the coveted cash prize of 1 Lakhs INR
- Over 150 teams from All over India

## Research Projects

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### PondFishDet

[\[Link\]](#)

DePondFi'23

- Developed CLAHE-YOLOv8 and MSR-YOLOv8 algorithm to enhance underwater image analysis for accurate fish detection.
- Trained on real-time underwater images, accounting for variable lighting conditions.
- Achieved a MAP score of 0.964 for MSR-YOLOv8s and 0.970 for CLAHE-YOLOv8s
- Ranked Top 6 in the DePondFi '23 Challenge, National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics -2023.
- **Tech Stack:** PyTorch, NumPy, Matplotlib, Opencv

### Street Litter Detection

[\[Link\]](#) [\[Video\]](#)

Hack4Good Hackathon 2022

- Developed a street litter detector using Yolo-v5 model based on Euclidean approach
- Trained on Pennfudan and TACO Dataset
- Achieved a commendable F1 score of 89 percent in the developed model's performance evaluation.
- Successfully deployed the model on real-time CCTVs for efficient litter detection in practical scenarios.
- **Tech Stack:** PyTorch, NumPy, Matplotlib, Opencv

### AI-assisted Waste Recycling System

[\[Link\]](#)

Smart India Hackathon 2022

- Created three DL models achieving 87 percent accuracy in identifying road waste with CCTVs.
- Achieved a classification accuracy of 92 percent for categorizing waste into seven recycling/disposal categories.
- Successfully classified plastic items with 85 percent accuracy into five subcategories based on shapes.
- Designed and deployed a user-friendly website and mobile app for e-commerce of recyclable items.
- Ongoing implementation collaboration with International Council for Circular Economy (ICCE) for practical deployment of models and platforms.
- **Tech Stack:** PyTorch, NumPy, Matplotlib, Opencv

### LQR controlled Self Balancing Bike

[\[Link\]](#)

E-Yantra Robotics Competition

- Developed and implemented a specialized Linear Quadratic Regulator (LQR) controller for a single reaction wheel-based self-balancing robot.
- Verified and assessed the algorithm's performance through simulations in V-rep software.
- Successfully constructed a self-balancing bike utilizing Solidworks 2023, emphasizing autonomous item delivery capabilities.
- Signifies an academic fusion of theoretical control design, simulation validation, and practical fabrication, enhancing autonomous robotic systems for real-world item delivery applications.
- Placed 18/198 participants
- **Tech Stack:** V-rep, C, Lua, Octave, Solidworks 2023

### IOT integration on Shaker Machine

[\[Video\]](#)

Thiagarajar College of Engineering -Technology Business Incubator (TCE-TBI)

- Developed a low cost non-contact AC sensor for check the status of components of shaker machine available in Product Reliability lab, TCE.
- Intended for small-scale and manufacturing industries, to prevent accidents caused by unattended machines.
- Automated monitoring and facilitating cloud-based monthly report storage was developed.
- **Tech Stack:** Google Cloud, Arduino IOT cloud Platform, C, ESP8266

## Position of Responsibilities

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### Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE)

Madurai, India

K-12 Student Chair

2023 - Present

- Responsible for orchestrating STEM awareness events in government schools and guiding college students in developing robotics and HVAC projects.
- Roles involve planning engaging STEM activities, collaborating with educational institutions, mentoring project development, and fostering innovation.

## **TCE – Technology Business Incubator (TCE-TBI)**

*Madurai, India*

Department Student Coordinator

*2022 - 2023*

- Mentoring of various potential interdisciplinary projects, helping students to build proof of concept, later develop market ready products.
- Responsible for organizing workshops to increase the awareness of Entrepreneurship among the students.

## **National Service Scheme**

*Madurai, India*

Volunteer

*2020 - 2022*

- Volunteered in Blood Donation Camp at TCE.
- Participated in the 7 days camp on social volunteering at Sambakulam, Tamil Nadu, India.

## **References**

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- Prof. Shaikshavali Chitraganti  
Assistant Professor of Electrical Engineering, Indian Institute of Technology Palakkad, Palakkad, India  
✉ [shaik@iitpkd.ac.in](mailto:shaik@iitpkd.ac.in)
- Prof. S. Saravana Perumal  
Associate Professor of Mechanical Engineering, National Institute of Teachers Training and Research, Chennai, India  
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