

# Balamurugan S

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## EDUCATION

### SASTRA Deemed University

*Bachelor of Technology in Electrical and Electronics Engineering, Minor in Artificial Intelligence*

Thanjavur, TN

2023 – 2027

- CGPA: 8.413 / 10 (Major), 7.00 / 10 (Minor)

## TECHNICAL EXPERIENCE

### ERSS Research Intern – Department of EEE (under Dr.Venkata Kirthiga) June 2025 – July 2025

NIT Trichy

Trichy, TN

- Investigated about potential flaws and problems faced by people working in PSAP Points under the ERSS Initiative of Indian Government
- Developed an AI-powered Emergency Dispatcher system that intelligently handles emergency calls, classifies the type of emergency (fire, medical, accident, etc.), conducts structured assessments through dynamic questioning, dispatches the nearest appropriate emergency service, and offers real-time first aid guidance and mental support until help arrives.
- Built and tested internally at the ERSS Laboratory in NIT Trichy

## PROJECTS

### Automated pothole mapping and Driver Alerting System | PyTorch, OpenCV, OpenStreetMap API [\[Github\]](#)

- Developed a camera-based hardware system mounted on public buses to detect potholes using contour and texture analysis with OpenCV.
- Uploaded detected pothole locations to Firebase in real-time, enabling civic authorities to identify and prioritize road repairs.
- Implemented driver-side alerting system using geofencing logic to warn nearby vehicles of upcoming potholes via location APIs until the pothole was repaired.

### Real-time Emotion Detection using YOLOv8 | Python, OpenCV, Roboflow

[\[GitHub\]](#)

- Trained YOLOv8s on 6.6k images (8 emotions) from a 9.4k dataset with 70/20/10 train/val/test split.
- Built real-time webcam inference with OpenCV overlays and confidence thresholding.
- Currently supports webcam inference; designed with future CCTV-based distress detection in mind.

### AI-Powered STEM Learning Game | Python, Flask, React, Cohere API, Firebase

[\[GitHub\]](#)

- Developed an interactive web game that generates real-world, application-based STEM questions using Cohere AI to assess users' critical thinking skills.
- Implemented adaptive difficulty, dynamic question generation, and a progression system with user tracking via local storage.
- Designed a two-mode interface ("Start Game" and "My Best") to display performance analytics and suggest personalized STEM career paths based on user strengths.

## TECHNOLOGIES & TOOLS

**Languages:** Python, C++, Javascript, HTML

**Frameworks & Libraries:** PyTorch, Pandas, OpenCV, OpenStreetMap API, OpenRouter API, YOLOv8, Cohere API

**Tools & Platforms:** GitHub, Kaggle, Google Colab, Jupyter Notebook, VS Code, Firebase, Arduino IDE

**CS Fundamentals:** Data Structures, Algorithms, Object-Oriented Programming

## ACHIEVEMENTS

- Won 1st Prize in a School-Level Science Expo (2022) for developing an Accident Identification and Alerting System that detects crashes and alerts emergency services automatically.
- Designed and built an off-road Go-Kart from scratch; learned fundamentals of mechanical design and fabrication.
- Secured 3rd Place in the EFWDC 2024 Electric Four-Wheeler Design Challenge, Southern Section, organized by SAE India as a Powertrain Engineer.

## LEADERSHIP & EXTRACURRICULAR

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<b>Chapter Coordinator</b>	Aug 2023 – Present
<i>OWASP Student Chapter</i>	<i>Thanjavur, TN</i>
<ul style="list-style-type: none"><li>Initiated planning for monthly cybersecurity events, including technical quizzes</li><li>Organized 2 expert-led workshops on cybersecurity fundamentals and OWASP Top 10, featuring industrial professionals; attended by 100+ students across departments.</li></ul>	
<b>Powertrain Engineer, SAE Student Member</b>	Aug 2023 – Present
<i>SASTRA Racing Team</i>	<i>Thanjavur, TN</i>
<ul style="list-style-type: none"><li>Developed and implemented an electronic differential system</li><li>Participated in the EFWDC'24 SAEINDIA competition; contributed to securing 3rd place in Southern Section.</li></ul>	