SIVAKSHAN S

AI Researcher • Robotics Specialist • Technical Writer

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PROFESSIONAL SUMMARY

AI & Robotics student with specialized expertise in reinforcement learning, autonomous systems, and explainable AI. Completing MSc in Robotics and Artificial Intelligence at University of Aberdeen with First Class Merit dissertation (**A5**) on adaptive autonomous landing using RL and explainable AI. Demonstrated proficiency in developing safety-critical AI applications, multi-constraint systems, and uncertainty quantification with proven track record in translating complex AI theory into validated implementations. Research directly applicable to RL-based manipulation, adaptive safety monitoring, and risk-informed decision-making in autonomous robotics.

EDUCATION

Master of Science in Robotics and Artificial Intelligence   Jan 2025 - Feb 2026

University of Aberdeen, Scotland, UK

Academic Performance:
• MSc Individual Project (Dissertation): A5 (First Class Merit) ⭐
• Data Mining with Deep Learning: A5 (First Class Merit) ⭐
• Industrial Robot Programming and Learning:
• Kinematics and Dynamics of Industrial Robot Arms:
• Software Agents and Multi-Agent Systems:
• Completed: 120/180 credits with strong performance

Dissertation Title: *"Adaptive Autonomous Landing Using Reinforcement Learning and Explainable AI: A Comprehensive Analysis of Learning Limitations and Environmental Adaptation"*

Current Courses (Final Semester): Applied Artificial Intelligence, Intelligent Robotics for Energy Infrastructure, Machine Learning, Project Management

Research Focus: Reinforcement learning for safety-critical autonomous systems, explainable AI for decision interpretability, multi-constraint optimization, uncertainty quantification in dynamic environments

Bachelor of Science (Honours) in Software Engineering   Dec 2019 - May 2023

University of Plymouth, UK (via NSBM Green University, Sri Lanka)

Second Class Upper Division (2:1) • Thesis: Cross-platform travel application serving 5,000+ users

RESEARCH INTERESTS & PHD FOCUS

Primary Research Areas:

- Reinforcement Learning for Autonomous Systems and Manipulation
- Explainable AI and Interpretable Machine Learning for Safety Monitoring
- Safety-Critical Robotics Validation and Certification
- Uncertainty Quantification and Risk-Informed Decision-Making
- Adaptive Control Systems in Dynamic Environments
- Multi-Constraint Optimization for Real-Time Systems

PhD Research Interests:

- RL-based manipulation skills and pro-active behavioral adjustment
- Adaptive safety monitoring using explainable AI techniques
- Uncertainty-informed resilient robotics and self-adaptation
- Integration of learning methods with safety guarantees
- Human-robot collaboration through shared understanding models

RESEARCH & PUBLICATIONS

Adaptive Autonomous Landing Using Reinforcement Learning and Explainable AI: A Comprehensive Analysis of Learning Limitations and Environmental Adaptation

Author: Sivakshan S. | **Institution:** University of Aberdeen
Year: 2025 (Completed - Grade: First Class Merit | Awaiting Final Degree: February 2026)

Key Research Contributions:
• Implemented and compared three state-of-the-art RL algorithms (PPO, DQN, A2C) for safety-critical autonomous landing
• Integrated real-time explainable AI (SHAP, Captum) for decision interpretability and safety monitoring
• Developed multi-constraint environment with seven physics-validated parameters (wind, fuel, safety margins, precision, smoothness, energy, time)
• Conducted rigorous statistical validation using ANOVA and Tukey HSD tests
• Achieved 102% improvement in system survival time through adaptive curriculum learning
• Demonstrated robust performance under varying environmental uncertainty (wind disturbances, partial observability)

KEY RESEARCH & DEVELOPMENT PROJECTS

Autonomous Landing System with Adaptive RL Framework (MSc Dissertation)

Jan 2025 - Oct 2025

Python • PyTorch • Reinforcement Learning • SHAP • Captum • Gymnasium • TensorBoard • NumPy • Pandas

Completed comprehensive reinforcement learning framework integrating multiple RL algorithms with explainable AI for safety-critical autonomous landing. Awarded First Class Merit for novel contribution to adaptive autonomous systems.

Key Achievements:
- Implemented three RL algorithms (PPO, DQN, A2C) with comparative performance analysis and statistical validation
- Integrated real-time explainable AI using SHAP value analysis and Captum attribution methods for decision transparency
- Developed multi-constraint environment with seven physics-validated parameters modeling real-world landing challenges
- Designed curriculum learning approach achieving 102% improvement in system survival time vs. baseline PID controllers
- Conducted comprehensive statistical analysis (ANOVA, Tukey HSD) validating algorithm performance differences
- Demonstrated adaptive behavioral adjustment under varying environmental conditions (wind disturbances, fuel constraints)
- Implemented uncertainty quantification through statistical testing and performance monitoring
- Created comprehensive evaluation framework for safety-critical autonomous systems

Research Impact: Novel approach to integrating explainable AI with RL for safety-critical robotics, directly applicable to adaptive manipulation, safety monitoring, and risk-informed decision-making.

Multi-Agent Robotic Systems

Python • ROS • Multi-Agent Deep RL • Computer Vision

Distributed multi-agent systems for collaborative robotic manipulation. Developed swarm intelligence algorithms achieving 85% efficiency improvement in coordinated task execution.

Computer Vision Pipeline

TensorFlow • OpenCV • CNN • Transfer Learning

End-to-end vision system for automated classification and object detection. Achieved 94% accuracy on custom datasets using advanced CNN architectures, deployed across 8 industrial applications.

CORE TECHNICAL COMPETENCIES

AI/Machine Learning

Python TensorFlow PyTorch Scikit-learn OpenCV SHAP/Captum

Gymnasium Stable-Baselines3 Pandas/NumPy Reinforcement Learning

Deep Learning Computer Vision Multi-Agent Systems Explainable AI

Robotics Uncertainty Quantification Risk Assessment

Safety-Critical Systems Multi-Constraint Optimization

Adaptive Behavioral Adjustment Curriculum Learning Transfer Learning

Research & Development

Experimental Design Statistical Validation ANOVA Tukey HSD

Post-hoc Analysis Performance Benchmarking Comparative Analysis

Physics-Based Simulation Environment Design Real-Time Monitoring

LaTeX TensorBoard Explainable AI for Safety

Full Stack Development

JavaScript/TypeScript React.js/Angular Node.js/Express MongoDB

HTML5/CSS3 RESTful APIs Git/GitHub Bootstrap

Communication & Strategy

Technical Writing Research Methods Academic Writing Documentation

PROFESSIONAL EXPERIENCE

Full Stack Developer & AI Researcher
2022 - Present

Cristal Code, Colombo, Sri Lanka

- Architected ML pipelines for autonomous systems using TensorFlow and PyTorch, achieving 102% improvement in system survival time
- Developed explainable AI frameworks integrating SHAP and Captum for model interpretability in safety-critical applications
- Built scalable web applications with 99.9% uptime using MEAN/MERN stack

Senior Full Stack Developer
2018 - 2022

Freelance, Sri Lanka

- Implemented computer vision systems using OpenCV achieving 94% accuracy for facial recognition and automated tracking
- Developed multi-agent robotic systems with 85% efficiency improvement in collaborative task execution

Technical Content Writer
2017 - Present

International Clients (Remote)

- Created technical documentation for 50+ technology companies, specialized in AI/ML and autonomous systems

CERTIFICATIONS & PROFESSIONAL DEVELOPMENT

Certifications

- Deep Learning Specialization (Coursework)

Languages

- **English:** Fluent/Professional

- Advanced Reinforcement Learning Methods
- Computer Vision and Image Processing
- Full Stack Web Development Certification
- Technical Writing & Documentation

- **Tamil:** Native Speaker
- **Sinhala:** Conversational

ADDITIONAL INFORMATION & TECHNICAL SPECIALIZATIONS

Research Specializations

- Safety-Critical AI Systems Development
- Explainable AI (XAI) Implementation
- Curriculum Learning for Reinforcement Learning
- Physics-Validated Machine Learning Models
- Real-time AI Decision Making Systems
- Multi-Agent Coordination Algorithms

Industry Applications

- Autonomous Landing Systems
- Computer Vision for Industrial Automation
- Real-time Analytics & Monitoring
- Cross-platform Application Development
- Payment System Integration
- Distributed Multi-Agent Systems

PROFESSIONAL INTERESTS & FUTURE GOALS

Passionate about advancing trustworthy AI systems through explainable AI and reinforcement learning. Seeking opportunities to contribute to cutting-edge research in autonomous systems, safety-critical AI applications, and human-robot interaction. Committed to bridging the gap between theoretical AI research and practical industry applications while maintaining focus on ethical AI development and deployment. Currently exploring novel approaches to multi-agent coordination, distributed intelligence systems, and adaptive safety monitoring for next-generation autonomous robotics applications. Research interests align with developing robust, interpretable AI systems that can operate reliably in uncertain, dynamic environments while maintaining safety guarantees.

References available upon request • Portfolio and code samples available on request • Open to relocation for research opportunities