Shakila Praveen Rathnayake

Robotics Engineer Sri Lanka
GitHub | LinkedIn | Portfolio

SUMMARY

I am interested in AI and robotics research and development. I focus mainly on the software side, with experience in middlewares like ROS 2 and its ecosystem, including SLAM Toolbox, Nav2, localization, and path planning using Python and a bit of C++.

My background also covers embedded systems, communication protocols, and RTOS, alongside CAD work in SOLIDWORKS and AutoCAD, and circuit simulation in Proteus. I don’t limit myself to a specific stack. I am always ready to research and explore new tools because in robotics, the same solution rarely works for every problem.

SKILLS

- **Core Stack**: ROS2, Nav2, C++, Python
- **Robotics & AI**: Computer Vision, Machine Learning, Localization, Path Planning, SLAM, Sensor Fusion
- **Control Systems**: PID Control, Fuzzy Logic (ANFIS), MPC (Model Predictive Control)
- **Hardware & Embedded**: Arduino, ESP32, Raspberry Pi, LiDAR
- **Tools & Simulation**: MATLAB, Simulink, SolidWorks, Proteus, Gazebo

EXPERIENCE

Robotics Related Freelancer | Self-Employed
2024 - Present

- Developing custom robotics solutions for international clients.
- Implementing systems using IoT, ROS2, Embedded Systems, Machine Vision, and Deep Learning.

- Focusing on robust localization and path planning algorithms for autonomous platforms.

PROJECTS

Hierarchical Supervisory Motion Planning for Frontal Following Robots *(Ongoing Research) ROS 2, Nav2, MPPI, Python, C++*

- Developing a governance system for stable human-following robot navigation on ROS 2.
- Implemented **Guided-MPPI** and **Dynamic Virtual Rail (DVR)** to decouple trajectory geometry from human kinematics.
- Designed a Curvature-Preserving Velocity Filter to ensure geometric validity at varying speeds.

Hybrid LSTM-ANFIS MagLev Control *MATLAB, Deep Learning, LSTM, ANFIS, Fuzzy Logic*

- Designed an advanced control system combining **LSTM neural networks** and **ANFIS** for nonlinear magnetic levitation stability.
- Leveraged deep learning for temporal pattern recognition and fuzzy logic for interpretable control rules.
- Achieved superior tracking performance and disturbance rejection compared to standalone methods.

Ping Pong Ball Levitation PID Control *Arduino, C++, MATLAB, Simulink, Python*

- Engineered a PID-controlled aerodynamic system to levitate a ping pong ball at precise heights.
- Implemented real-time control loops on **Arduino UNO** with feedback from an ultrasonic sensor.
- Performed system identification and tuning using **MATLAB/Simulink** models.

PipeRover - Tube Climbing Robot *Robotics, Mechanical Design, Embedded Systems, CAD*

- Designed a PVC pipe climbing robot for inspection and maintenance of pipe networks.

- Developed a unique wheel design with flexible polyurethane foam for enhanced traction.
- Validated performance on varying diameters and obstacle traversal.

Handwritten Character Recognition Engine *Python, TensorFlow, OpenCV, Deep Learning*

- Built a deep learning model for recognizing handwritten characters using **Python** and **OpenCV**.
- Trained Convolutional Neural Networks (CNNs) on the **EMNIST** dataset for high generalization accuracy.

Neuro-Fuzzy Maglev Control *MATLAB, ANFIS, Fuzzy Logic, Simulink*

- Implemented an Adaptive Neuro-Fuzzy Inference System (ANFIS) to stabilize nonlinear maglev systems.
- Utilized hybrid learning algorithms to tune fuzzy membership functions.

RESEARCH PUBLICATIONS & PROPOSALS

- **Enhancing Accuracy in Automated Solid Waste Segregation** (2024) - Research Proposal investigating multi-sensor cross-verification for improved waste sorting efficiency.
- **PipeRover - Tube Climbing Robot Design** - ResearchGate Publication.

EDUCATION

B.Sc. in Mechatronics Engineering
Open University of Sri Lanka | *Undergraduate (Coursework Completed)*

G.C.E. Advanced Level (Physical Stream)
St. Thomas College, Matale | *Passed*