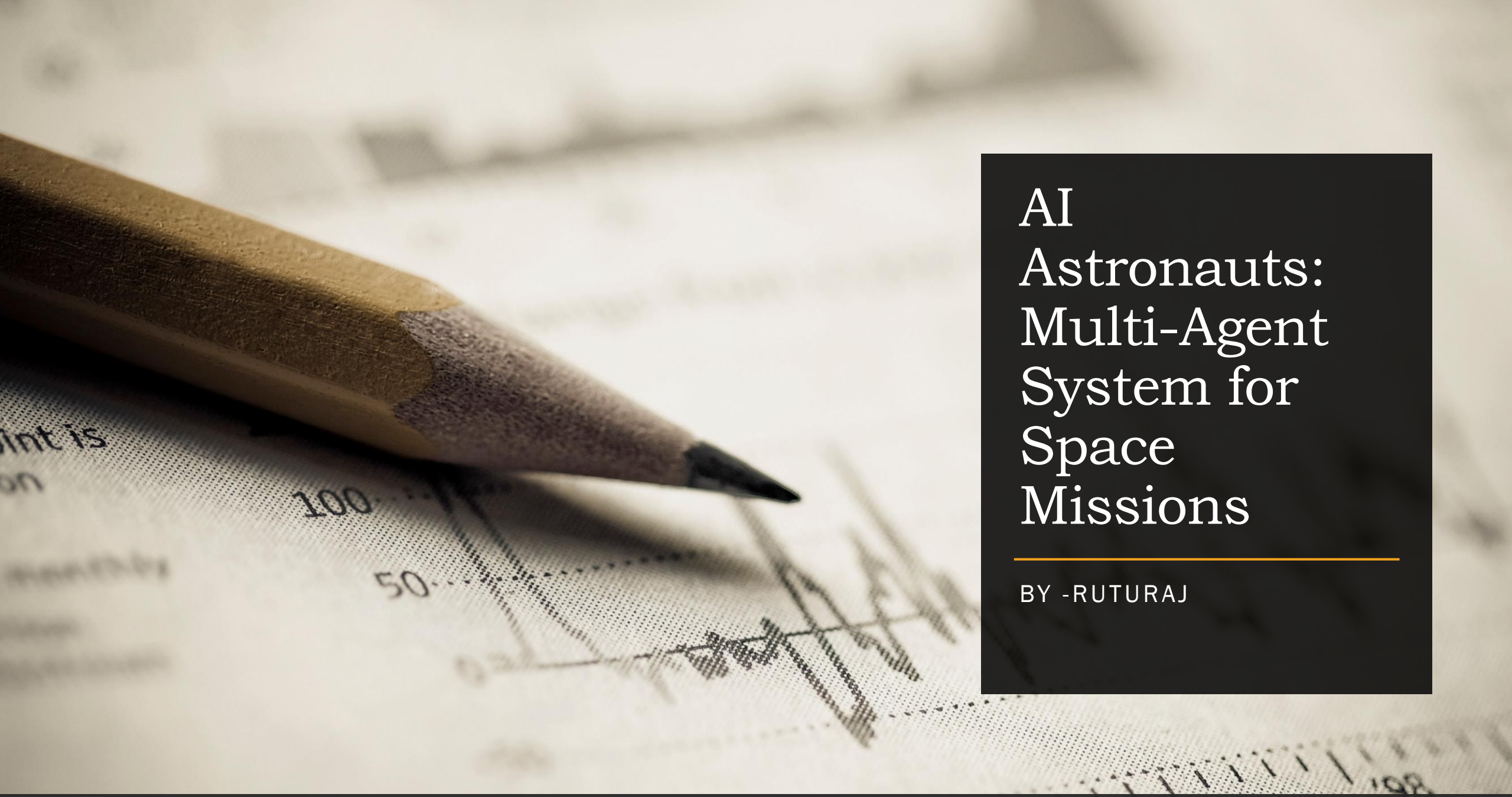

AI Astronauts: Multi-Agent System for Space Missions

BY -RUTURAJ

•**Objective**:

- Develop an intelligent multi-agent framework for real-time decision-making and collaboration.

Why This Matters:

•AI-driven multi-agent system for autonomous space missions.
•Enables seamless coordination between spacecraft, lander, and rover.
•Enhances efficiency and adaptability in space exploration.

Problem Statement

•Space missions require intelligent decision-making in real-time.
•Current systems lack adaptive inter-agent communication.
•Autonomous coordination reduces human dependency.

Key Components

•Agent managers for lander, rover, and spacecraft.
•Inter-agent communication for seamless data exchange.
•Hierarchical decision-making for efficient task execution.

Rover Subsystem

•Autonomous navigation and obstacle avoidance.
•Data collection and analysis using AI models.
•Real-time adaptability to mission constraints.

Technologies Used

•LangChain for AI-driven conversational agents.
•Python, Streamlit for simulations and visualization.
•Reinforcement Learning for adaptive decision-making.

AI & Decision-Making

•Predictive analytics for mission-critical decisions.
•Real-time response to environmental changes.
•Continuous learning for enhanced efficiency.

Simulation & Testing

•Interactive Streamlit-based simulation dashboard.
•Real-world scenario testing for mission validation.
•Iterative improvements through data-driven insights.

Future Scope

•Expansion to deep space exploration and Mars missions.
•Integration with NASA/ISRO frameworks for real deployment.
•Incorporation of IoT and sensor networks for real-time updates.

Conclusion

- AI-powered multi-agent system enhances space exploration.
- Reduces human intervention and improves mission success.
- Paving the way for intelligent, autonomous space missions.