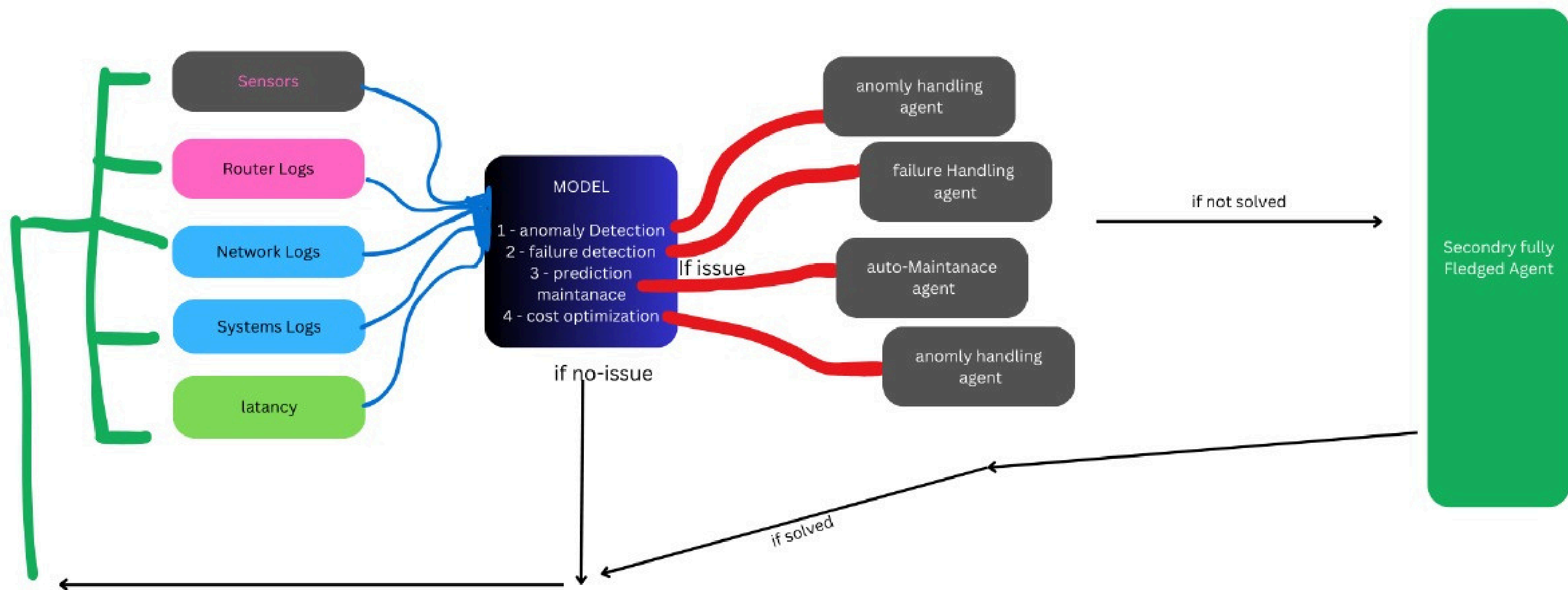# AI-DRIVEN NETWORK MANAGEME NT SYSTEM

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# GROUP MEMBERS

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# AI-DRIVEN NETWORK MANAGEMENT SYSTEM

- A robust, intelligent system for real-time network monitoring, predictive maintenance, cost optimization, and energy efficiency.
- Uses advanced AI models for anomaly detection and automation

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# KEY COMPONENTS

- **Anomaly Detection\* (PyOD, DeepAnT)**

- **Predictive Maintenance\* (LSTM, XGBoost)**

- **Cost Optimization\* (Stable-Baselines3 RL)**

  - **Agents & Tools\* (OpenTelemetry, Prometheus, Kafka, MLflow, etc.**

- **Energy Efficiency\* (Bayesian Optimization)**

# WORKFLOW OVERVIEW

- Collect logs from sensors
- Process logs through AI models in parallel
- Identify and resolve issues using AI-driven agents
- If unresolved, escalate to advanced agent layers
- Repeat process every 5-10 seconds

# STEP 1 – INSTALL DEPENDENCIES

**1**

**- Install required libraries:**

**bash**

**pip install pyod deepant tensorflow xgboost stable-baselines3 bayesian-optimization prometheus-client kafka-python mlflow**

# STEP 2 – LOAD PRETRAINED AI MODELS

**1**

**- Load models for each AI component:**

**- Anomaly Detection (DeepAnT, PyOD)**

**- Predictive Maintenance (LSTM, XGBoost)**

**- Reinforcement Learning (Stable-Baselines3)**

**- Energy Optimization (Bayesian Optimization)**

# STEP 3 – NETWORK MONITORING & ANOMALY DETECTION

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**- Collect sensor logs and metrics**

**- Pass logs through anomaly detection models**

**- If anomaly detected, trigger resolution agents**

# STEP 4 – PREDICTIVE MAINTENANCE & FAILURE FORECASTING

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- LSTM model predicts future failures
- XGBoost enhances prediction accuracy
- Preemptive action taken by AI agents

# STEP 5 – COST OPTIMIZATION USING REINFORCEMENT LEARNING

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**- Stable-Baselines3 RL models optimize cost dynamically**

**- Adjusts resource allocation based on network conditions**

# STEP 6 – ENERGY EFFICIENCY AI MODEL

**I**

**- Bayesian Optimization minimizes energy consumption**

**- AI adapts power usage based on network traffic**

# STEP 7 – DEPLOY & AUTOMATE AI AGENT

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- AI-driven agents handle issue resolution in layers
- First layer resolves minor issues
- Escalation to higher layers for critical problems

# NETWORK RESILIENCE PROCESS FLOW

**Sensors Collect Data**

**→ AI Models Process Data**

**→ Issues Detected**

**→ AI Agents Resolve**

**→ Escalation if Needed**

**→ Continuous Monitoring**

# CONCLUSION

- Efficient, AI-powered network management
- Real-time anomaly detection and cost-effective operations
- Scalable, resilient, and energy-efficient solution



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# THANK YOU