

The background features three vertical stripes on the left: a wide pink stripe, a medium blue stripe, and a narrow light beige stripe. The right side of the image has a light beige background with a pattern of small, faint pink dots arranged in a grid-like fashion, with some dots missing to create a sparse effect.

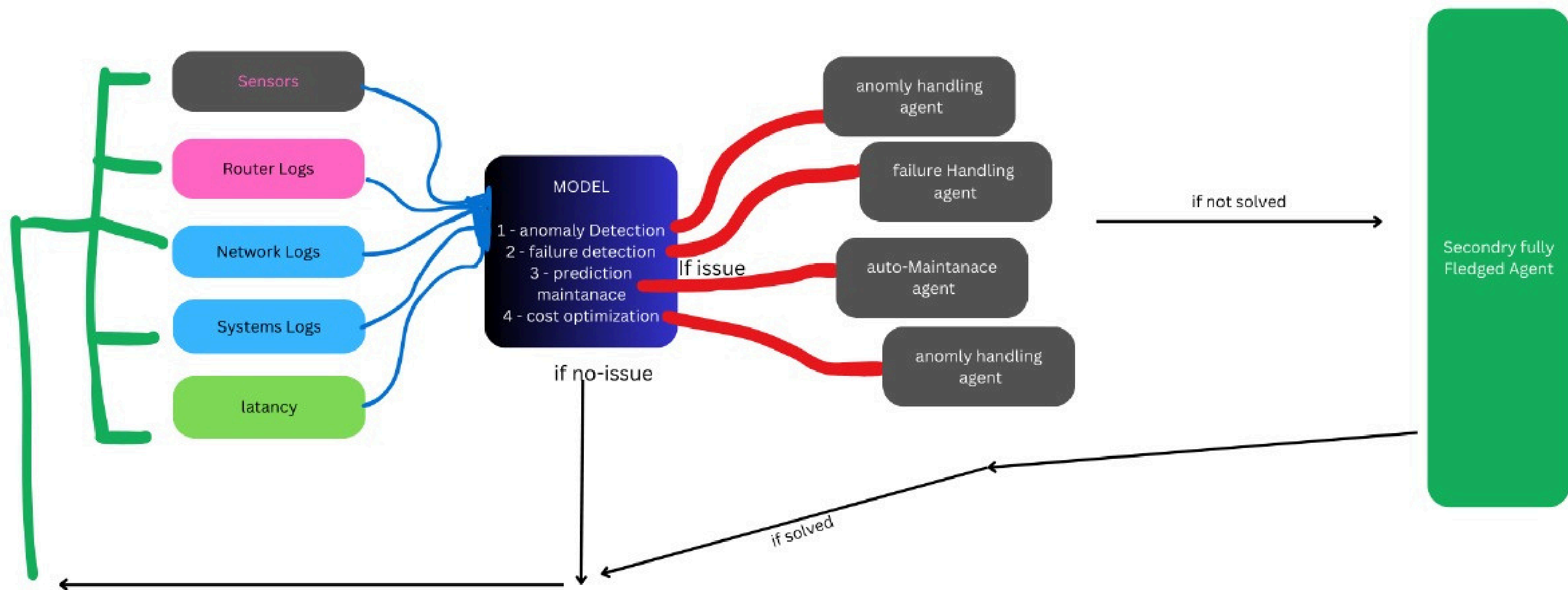
# AI-DRIVEN NETWORK MANAGEMENT SYSTEM

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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

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- 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

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- 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

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- 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



The background features three vertical bars on the left: a wide pink bar, a medium blue bar, and a narrow beige bar. In the top right and bottom right corners, there are rectangular areas filled with a grid of dots. The dots in the top right are larger and more prominent, while the dots in the bottom right are smaller and more faded.

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**THANK YOU**