# Bayesian Network for Nuclear Power Plant Alarm System

This document presents a Bayesian network model for a nuclear power plant alarm system. The network consists of Boolean variable nodes and multivalued sensor nodes, representing the interactions between the alarm, temperature gauge, and potential faults.

## Nodes in the Bayesian Network

### Boolean Variable Nodes (0 or 1)

1. \*\*A (Alarm sounds):\*\* 1 if the alarm sounds, 0 otherwise.

2. \*\*FA (Alarm is faulty):\*\* 1 if the alarm is faulty, 0 otherwise.

3. \*\*FG (Gauge is faulty):\*\* 1 if the gauge is faulty, 0 otherwise.

### Multivalued Sensor Nodes

4. \*\*G (Gauge reading):\*\* The reading displayed by the gauge.

5. \*\*T (Core temperature):\*\* The actual temperature of the core.

## Connections and Justifications

1. \*\*T → G (Core temperature affects the gauge reading):\*\* The gauge's reading is determined by the actual core temperature unless the gauge is faulty.

2. \*\*FG → G (A faulty gauge may give incorrect readings):\*\* If the gauge is faulty, the readings may not accurately reflect the actual core temperature.

3. \*\*G → A (The alarm sounds based on the gauge reading):\*\* If the gauge shows a temperature above the threshold, the alarm will sound unless it is faulty.

4. \*\*FA → A (A faulty alarm may not function properly):\*\* If the alarm is faulty, it may either fail to sound when it should or trigger falsely.

5. \*\*FG ⊥ T (The core temperature does not directly cause the gauge to be faulty):\*\* The gauge’s malfunction is independent of the actual temperature. However, environmental factors or equipment wear can contribute to faults over time.

A diagram of a network system

Description automatically generated

**Figure 1**  
Bayesian Network Diagram for a Nuclear Power Plant Alarm System  
Note. This image was AI-generated using OpenAI’s DALL·E

References

OpenAI. (2025). Bayesian Network diagram for a nuclear power plant alarm system [AI-generated image]. DALL·E. Retrieved from ChatGPT.