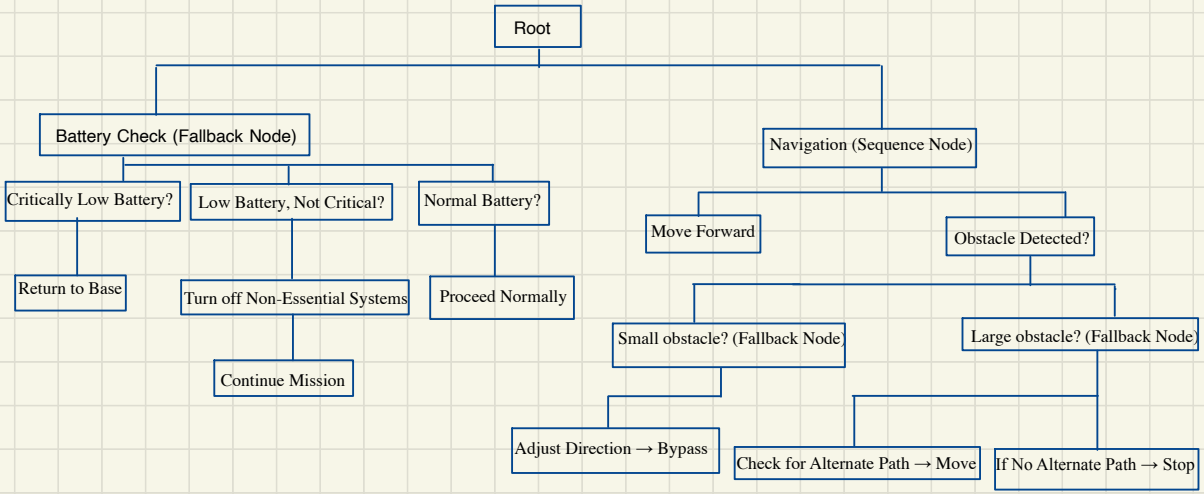
Hard dose: Question 3 Sagar K Pillai ME24B2037



How does the Fallback Node help in making better decisions?

Fallback Nodes (also called Selector Nodes) improve decision-making by providing prioritized alternatives that execute in sequence until one succeeds. In your diagram, the Battery Check Fallback Node demonstrates this perfectly by first checking if the battery is critically low, then if it's low but not critical, and finally if it's normal. This creates a priority-based decision system where the most urgent conditions (critical battery) are handled first before considering less critical situations. This prioritization ensures the rover always takes the most appropriate action for its current state, making the decision process both robust and adaptable to changing conditions.

Why is this better than using long if-else conditions?

The behavior tree approach shown in your diagram is superior to long if-else conditions for several reasons:

Visual clarity: The diagram makes the decision flow immediately understandable, unlike nested if-else statements that become increasingly difficult to follow

Modularity: Each node is self-contained, allowing you to modify or replace individual behaviors without disrupting the entire system

Hierarchical organization: Decisions are organized in a clear hierarchy with explicit priorities

Easier debugging: When issues arise, you can trace exactly which node is failing without wading through complex code

Scalability: New behaviors can be added by simply attaching new nodes rather than rewriting conditional logic

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What happens if the battery is low but not critically low? How does your tree handle this?

When the battery is low but not critically low, your tree handles it through the following path:

The "Critically Low Battery?" check fails (returns failure)

The "Low Battery, Not Critical?" check succeeds

Since this is part of a Fallback Node, the successful check triggers its corresponding action

The rover executes "Turn off Non-Essential Systems" to conserve power

Then proceeds with "Continue Mission" at reduced power consumption

This approach allows the rover to adapt to the situation by taking power-saving measures without aborting the mission. It demonstrates a middle-ground strategy between full operation and complete mission abort, extending mission capabilities through adaptive power management.