

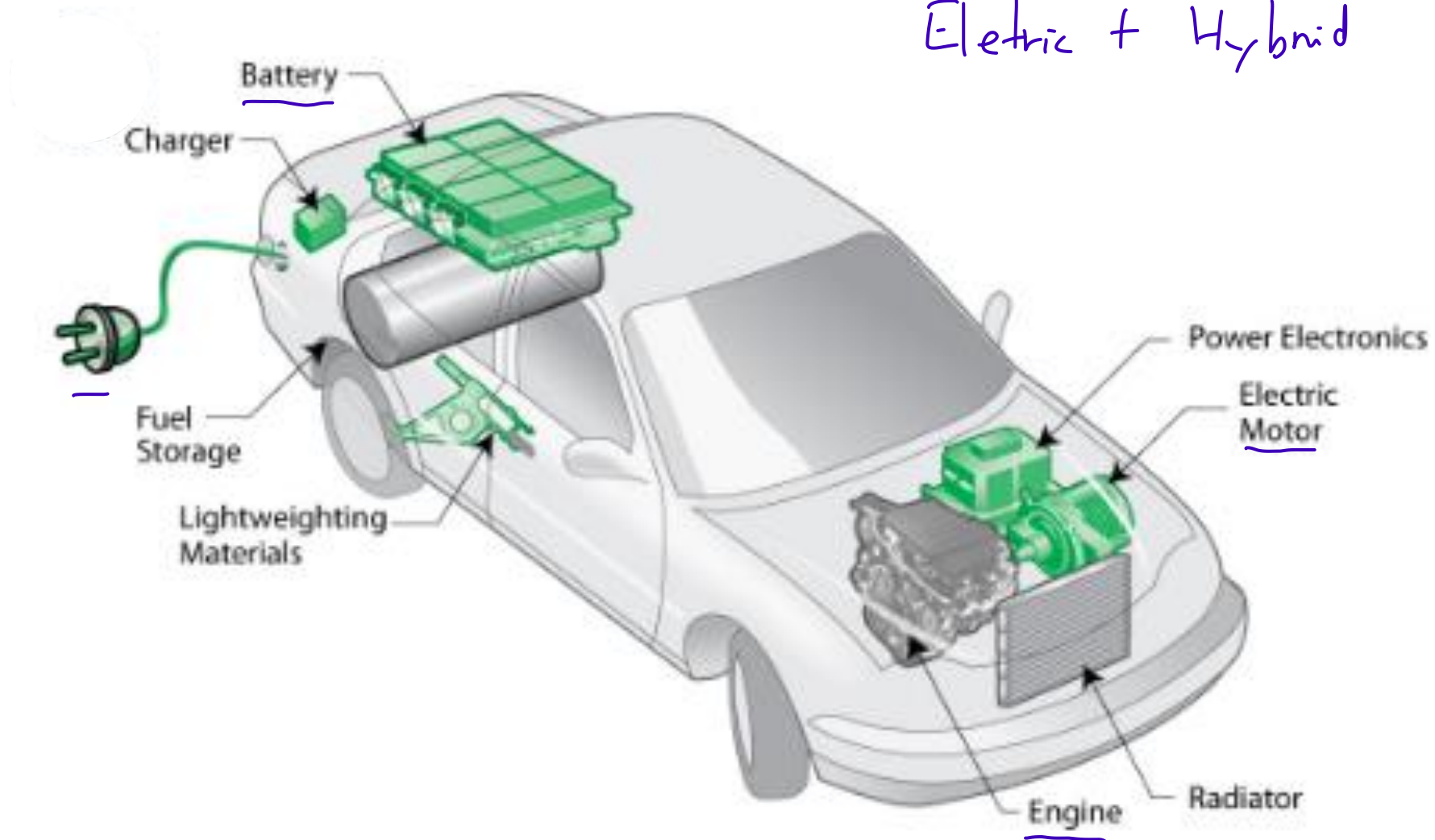
PHEV Simulation

with ^①Visitor, ^②Observer, ^③Singleton, (Abstract
Factory, Memento, Builder) Patterns

2022, OODP
The 2nd Draft

Pluggable Hybrid Electric Vehicle

Electric + Hybrid



PHEV Checkingus log

Gasoline Engine Being Checked

- Checking Engine
- Engine OK

Checked Electric Motor

- Motor Checked
- Electric Motor is OK

Checking Regenerative Brake System

- Regenerative Brake Checked
- Gegenerative Brake System OK

HTML file

Electric Motor

Builder

HW

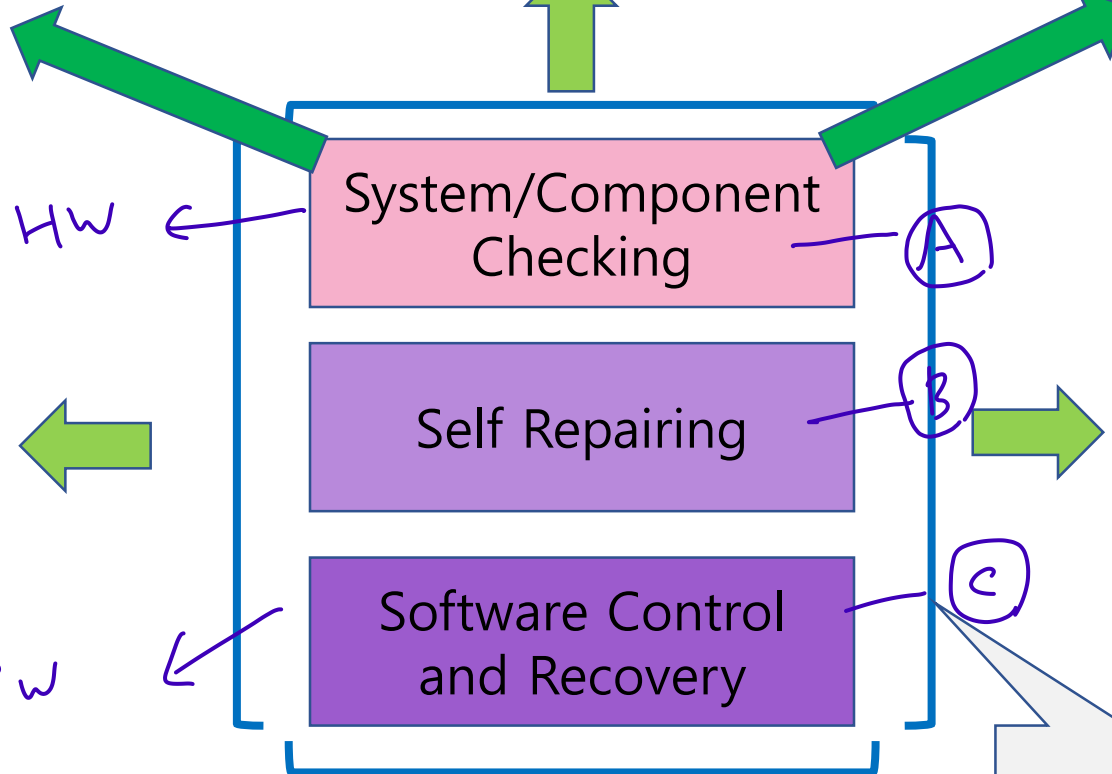
SW

Gasoline Engine

Running Mode

Regenerative Brake System

Three Visitor



=E: System/Component Checking on Gasoline Engine
Irregular Engine Power with Gasoline Engine
Gasoline Engine Log: Suggesting Spark Plug Checking

=M: System/Component Checking on Electric Motor
Irregular Motor Power with Electric Motor
Electric Motor Log: Suggesting Motor Brush Contact

=B: System/Component Checking on Regenerative Brake System
Abnormal Speed Decrease with Regenerative Brake System
Regenerative Brake System Log: Suggesting Brake and Generator Gear Checking

=E: Self Repairing on Gasoline Engine
Self clean the spark plug of Gasoline Engine
Gasoline Engine Log: Repairing Irregular Engine Power Warning

=M: Self Repairing on Electric Motor
Apply oil to motor brush contact of Electric Motor
Electric Motor Log: Repairing Irregular Motor Power Warning

=B: Self Repairing on Regenerative Brake System
Monitoring Brake and Generator Gear of Regenerative Brake System
Regenerative Brake System Log: Repairing Abnormal Speed Decrease with Regenerative Brake System

==E: Software Control and Recovery for Gasoline Engine
No Software Resetting for Gasoline Engine
Gasoline Engine Log: No Software Resetting for Irregular Engine Power Warning

==M: Software Control and Recovery for Electric Motor
No Software Resetting for Irregular Motor Power Monitoring Electric Motor
Electric Motor Log: No Software Resetting for Irregular Motor Power

==B: Software Control and Recovery for Regenerative Brake System
Initiate Speed monitoring SW for Regenerative Brake System
Regenerative Brake System Log: Resetting Speed Monitoring SW with Regenerative Brake System

E: Engine

M: Motor

1st Visitor

Observe Pattern

B: Regen. Brake

"Singleton"
for keeping
checking result

2nd Visitor

3rd Visitor

=E: System/Component Checking on Gasoline Engine
Engine Oil To Be Checked on Gasoline Engine
Gasoline Engine Log: Suggesting Oil Change ...

1st Visitor

=M: System/Component Checking on Electric Motor
Motor Power Reduced with Electric Motor
Electric Motor Log : Suggesting Motor Battery Power Checking

=B: System/Component Checking on Regenerative Brake System
No Electricity Generated with Regenerative Brake System
Regenerative Brake System Log : Suggesting Brake Generator Contact Checking

==E: Self Repairing on Gasoline Engine
Exchange oil for Gasoline Engine
Gasoline Engine Log: Repairing engine oil warning

Observer

==M: Self Repairing on Electric Motor
Exchanging Motor Battery Pack for Electric Motor
Electric Motor Log : Repairing Reduced Motor Power status

==B: Self Repairing on Regenerative Brake System
Apply Oil to Brake Generator Contact Point of Regenerative Brake System
Regenerative Brake System Log : Repairing No Electricity Generated for Regenerative Brake System

Singleton

===E: Software Control and Recovery for Gasoline Engine
Increase the control software level of oil supply for Gasoline Engine
Gasoline Engine Log: Resetting Oil Level for engine oil warning

3rd Visitor

===M: Software Control and Recovery for Electric Motor
Increase Motor Battery Pack Power Monitoring Loop for Electric Motor
Electric Motor Log : Resetting the SW for Reduced Motor Power Monitoring

===B: Software Control and Recovery for Regenerative Brake System
Initiate the monitoring SW for No Electricity Problem from Regenerative Brake System
Regenerative Brake System Log : Resetting Electricity Monitoring SW for Regenerative Brake System

=E: System/Component Checking on Gasoline Engine
Irregular Engine Power with Gasoline Engine
Gasoline Engine Log: Suggesting Spark Plug Checking

=M: System/Component Checking on Electric Motor
Motor Power Reduced with Electric Motor
Electric Motor Log : Suggesting Motor Battery Power Checking

=B: System/Component Checking on Regenerative Brake System
Weak Generative Electricity with Regenerative Brake System
Regenerative Brake System Log : Suggesting Generator Coil Damage Checking

==E: Self Repairing on Gasoline Engine
Self clean the spark plug of Gasoline Engine
Gasoline Engine Log: Repairing Irregular Engine Power Warning

==M: Self Repairing on Electric Motor
Exchanging Motor Battery Pack for Electric Motor
Electric Motor Log : Repairing Reduced Motor Power status

==B: Self Repairing on Regenerative Brake System
Use an extra generator system for Regenerative Brake System
Regenerative Brake System Log : Repairing Generator Coil Damage for Regenerative Brake System

===E: Software Control and Recovery for Gasoline Engine
No Software Resetting for Gasoline Engine
Gasoline Engine Log: No Software Resetting for Irregular Engine Power Warning

===M: Software Control and Recovery for Electric Motor
Increase Motor Battery Pack Power Monitoring Loop for Electric Motor
Electric Motor Log : Resetting the SW for Reduced Motor Power Monitoring

===B: Software Control and Recovery for Regenerative Brake System
Initiate the monitoring SW for Weak Electricity Problem of Regenerative Brake System
Regenerative Brake System Log : Resetting Coil Damage Monitoring SW for Regenerative Brake System

=E: System/Component Checking on Gasoline Engine
Engine Power Reduced with Gasoline Engine
Gasoline Engine Log/Observer: Suggesting Battery Power Checking

=M: System/Component Checking on Electric Motor
Irregular Motor Power with Electric Motor
Electric Motor Log/Observer : Suggesting Motor Brush Contact

=B: System/Component Checking on Regenerative Brake System
No Electricity Generated with Regenerative Brake System
Regenerative Brake System Log/Observer : Suggesting Brake Generator Contact Checking

==E: Self Repairing on Gasoline Engine
Supply more power from extra battery pack for Gasoline Engine
Generating a battery pack from the Abstract Factory
A Battery Pack Generated/Got Ready to be Used
Gasoline Engine Log/Observer: Repairing Engine Power Reduced Warning

Abstract Factory Applied for a HW

==M: Self Repairing on Electric Motor
Apply oil to motor brush contact of Electric Motor
Electric Motor Log/Observer : Repairing Irregular Motor Power Warning

==B: Self Repairing on Regenerative Brake System
Apply Oil to Brake Generator Contact Point of Regenerative Brake System
Regenerative Brake System Log/Observer : Repairing No Electricity Generated for Regenerative Brake System

===E: Software Control and Recovery for Gasoline Engine
Increase minimum power level for Gasoline Engine
Gasoline Engine Log/Observer: Resetting Minimum Power Level for Engine Power Reduced Warning

Abstract Factory Applied for a SW

===M: Software Control and Recovery for Electric Motor
Generating a Motor Power Monitoring Module from the Abstract Factory Electric Motor
SW Control for Motor Power Monitoring Module Made
Electric Motor Log/Observer : Software Resetting with Motor Power Monitoring Module for Irregular Motor Power Warning

===B: Software Control and Recovery for Regenerative Brake System
Initiate the monitoring SW for No Electricity Problem from Regenerative Brake System
Regenerative Brake System Log/Observer : Resetting Electricity Monitoring SW for Regenerative Brake System

