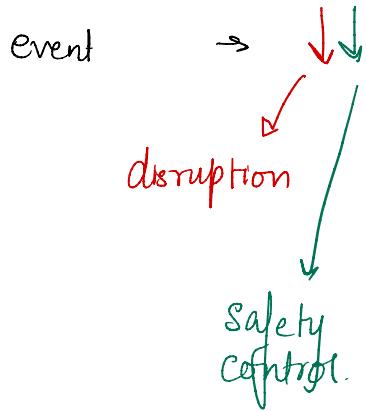
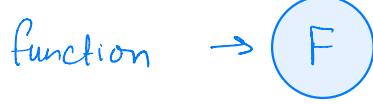
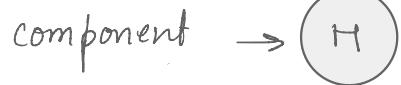


KEY

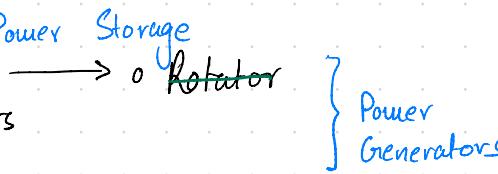
FUNCTIONALITY
DIAGRAMS



Power Systems

- Thermal
- Data
- Software

- Batteries
- Solar Arrays
- Nuclear Reactors
- Generators



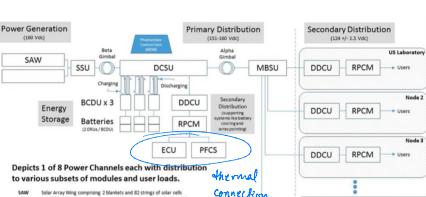
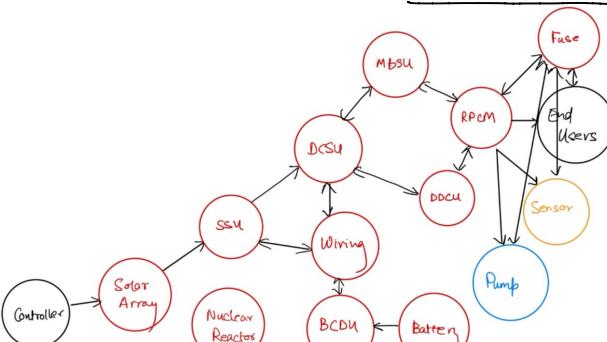
Power distribution systems

- Sequential Shunt Unit
- Direct Current Switching Unit
- Battery Charge Discharge Unit
- DC to DC Converter Unit
- Remote power controller modules
- Main Bus Switching Unit

- Electrical Control Unit

- ① a very high level functionality diagram just showing how the components
- ② add to one diagram how the components are functionally related - using words.
- ③ component-level functionality diagram.

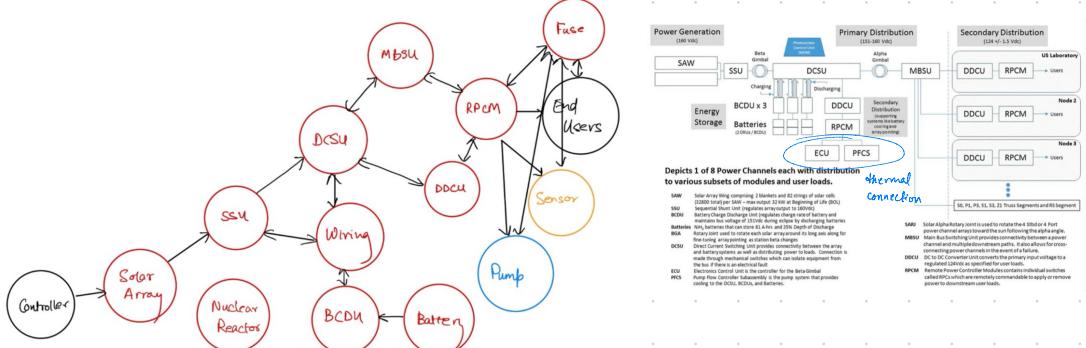
PREVIOUS WORK



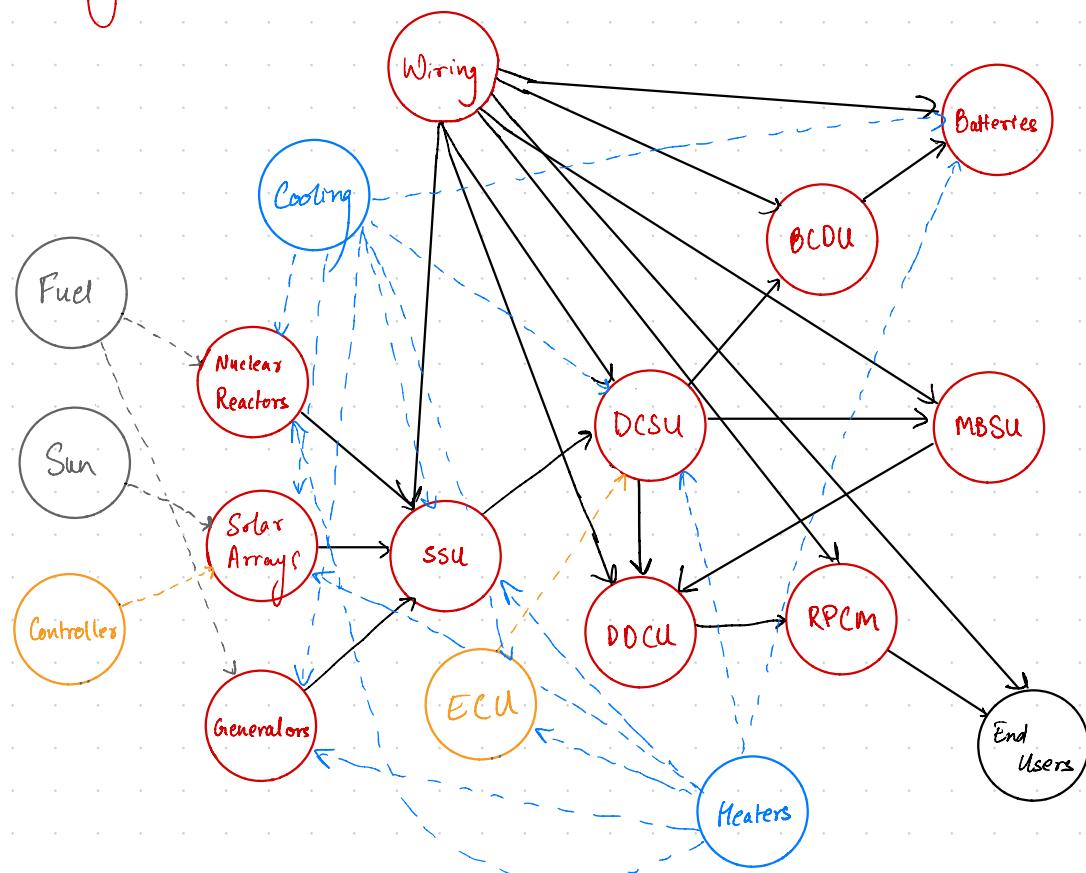
SAW: Solar Array Wing comprising 2 batteries and 82 strings of solar cells
SSU: Sequential Shunt Unit (regulates array voltage to 120V)
DCSU: Digital Control Subsystem Unit (DCSU) provides connectivity between a power source and the bus if there is an electrical fault
DDCU: Digital Distribution Control Unit (DDCU) provides connectivity between the bus and the users
ECU: Electronic Control Unit (ECU) provides connectivity between the bus and the users
PFCs: Power Factor Correction (PFCs) module for the Beta Gimbal Power Controller Subsystem in the pump system that provides control for the DDCU, EDCU, and DDCU

RPCM: Remote Power Controller Module (RPCM) which are remotely commandable to apply or remove power to components user loads.

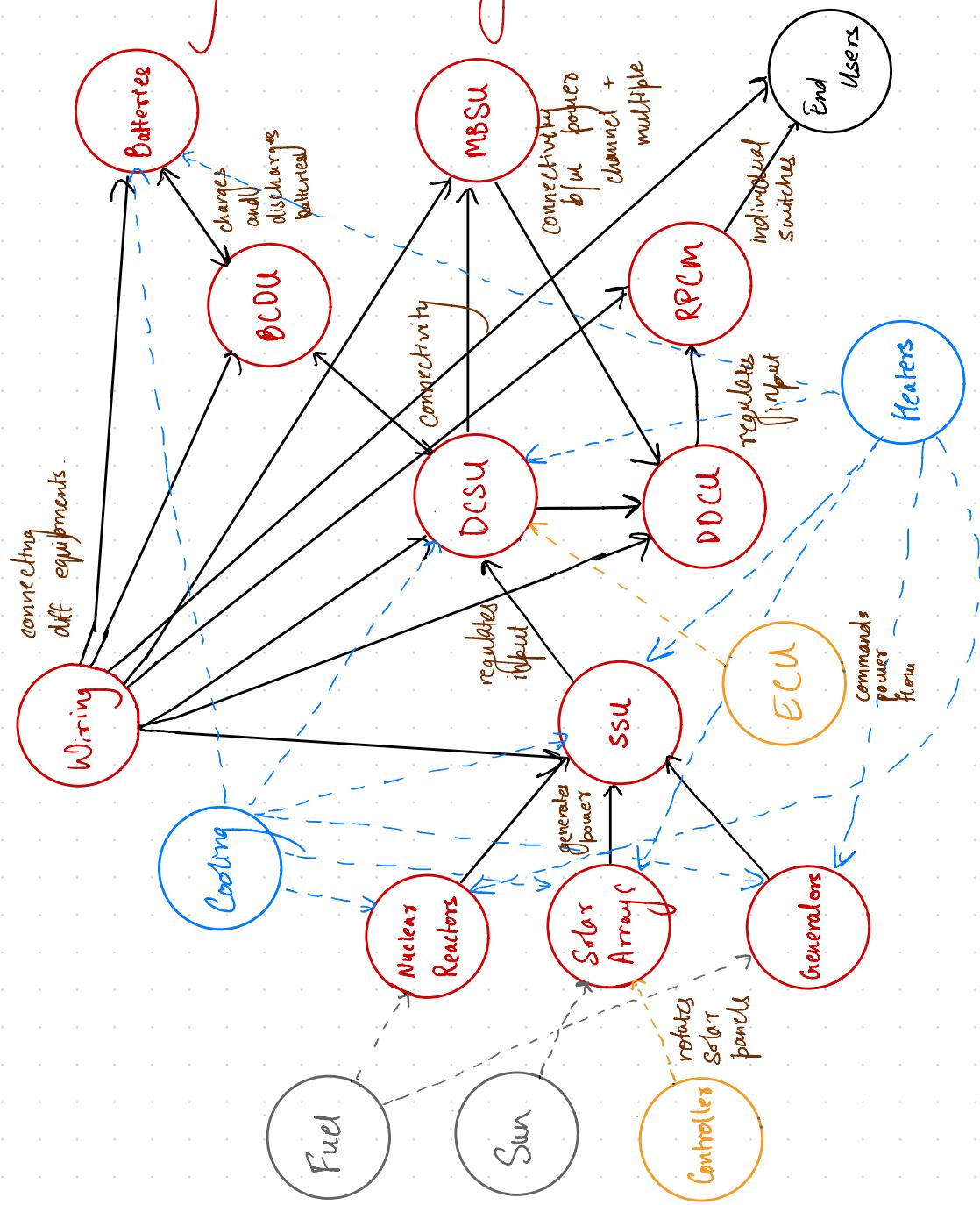
PREVIOUS WORK



① a very high level functionality diagram just showing how the components

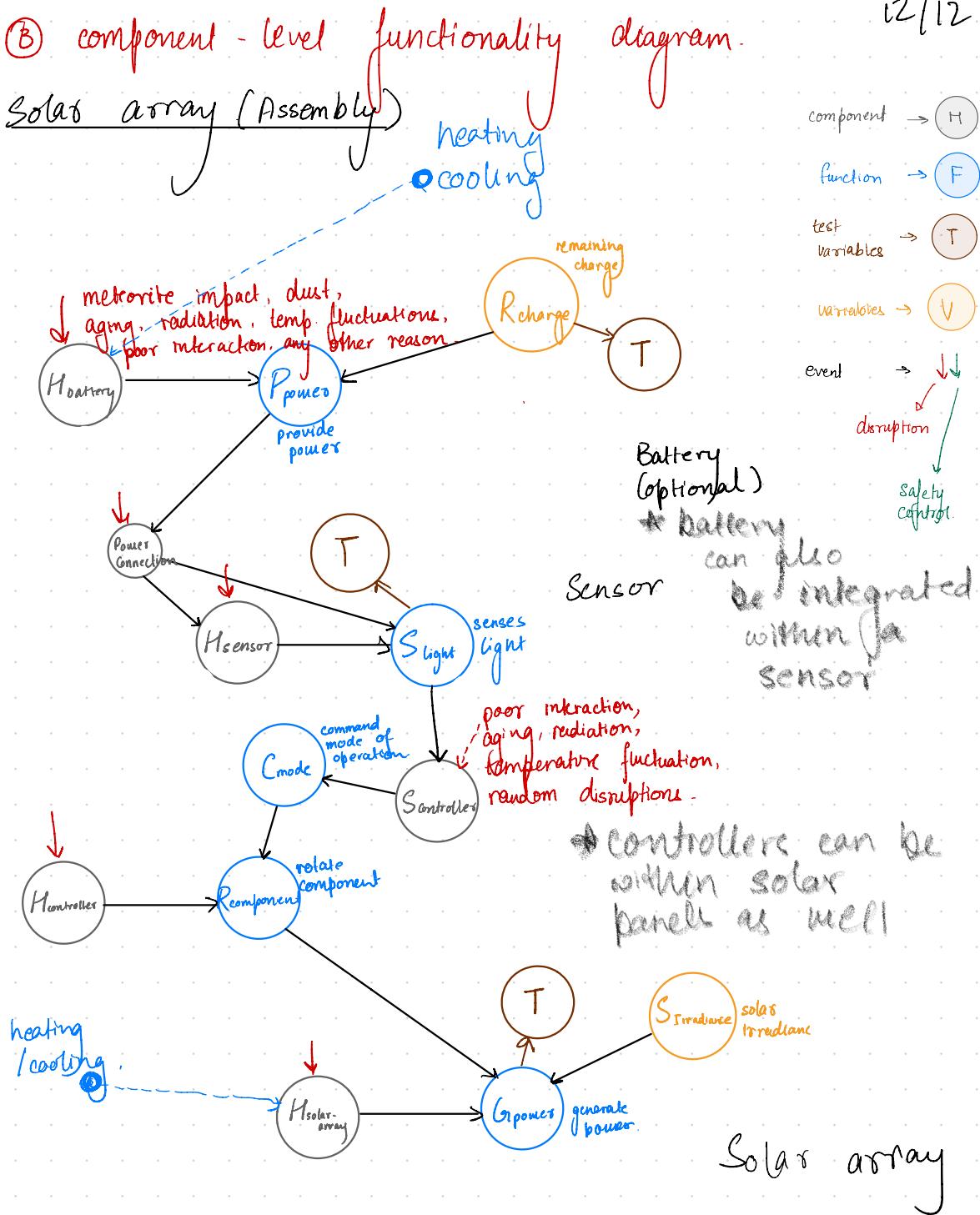


② add to our diagram how the components are functionally related - using words.



(B) component - level functionality diagram.

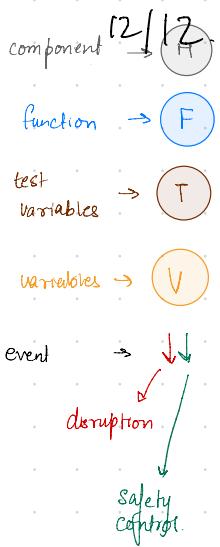
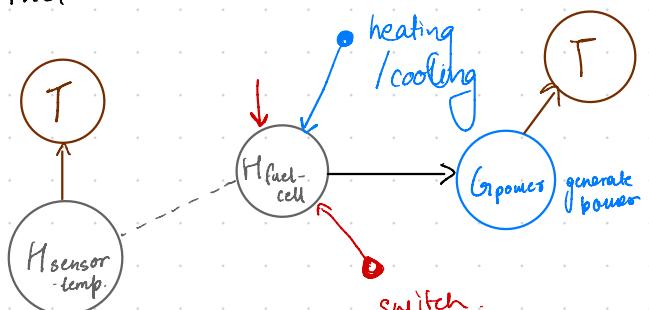
Solar array (Assembly)



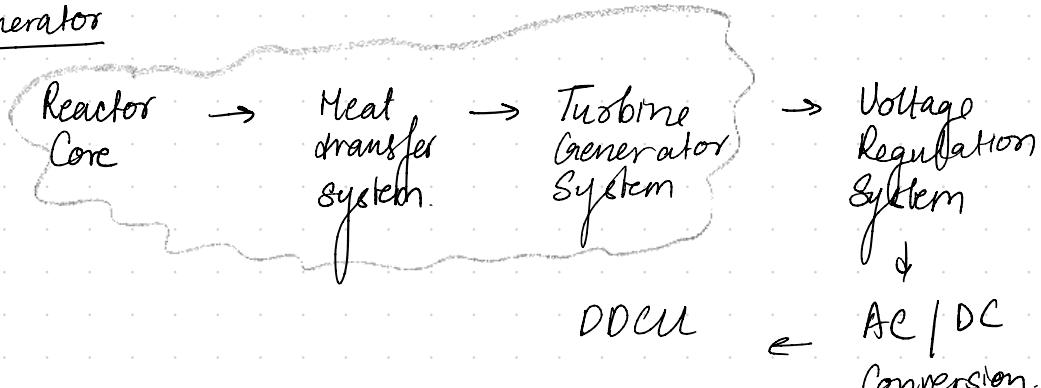
* all T values go into computer systems for testing.

(Chemical) based generators

Fuel Cells



Nuclear Generator



Generator

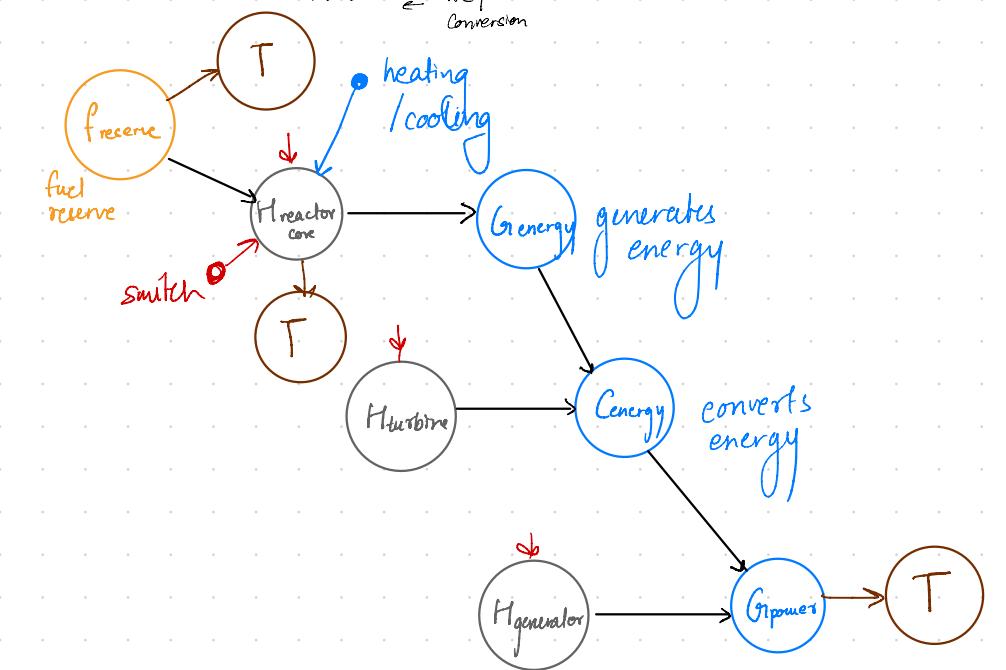
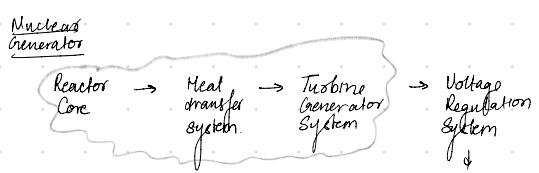
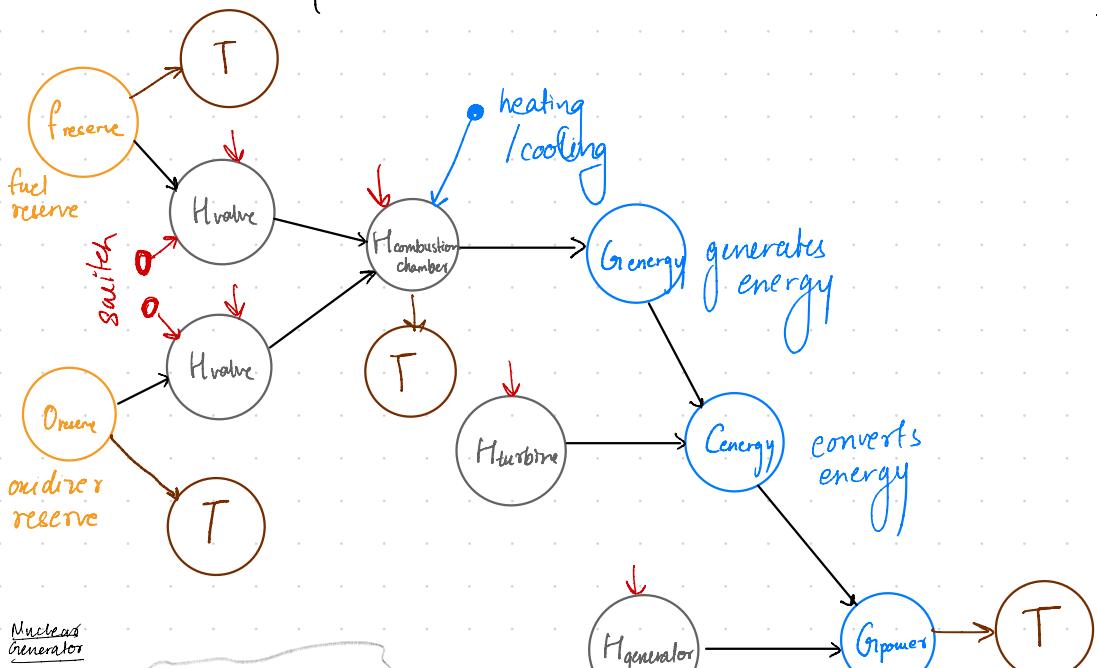
Chemical
(Fuel Cells)

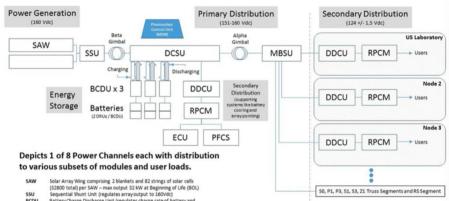
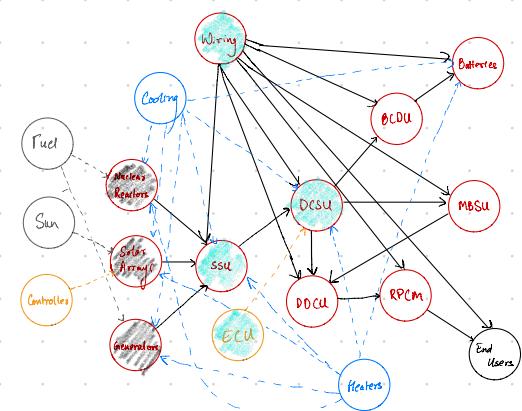
Combustion

Voltage Regulation System ← Turbine Generator

Chemical Based / Combustion

12/12



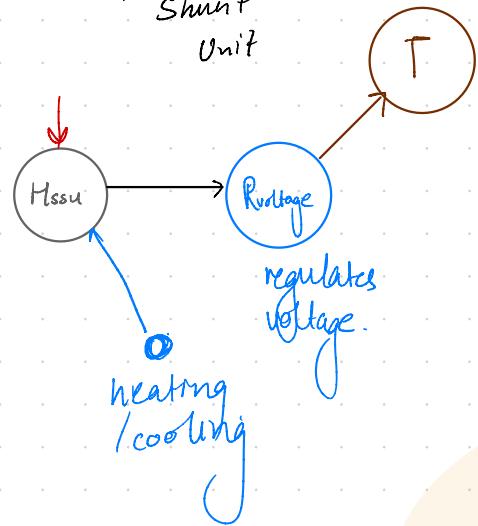


Depicts 1 of 8 Power Channels each with distribution to various subsets of modules and user loads.

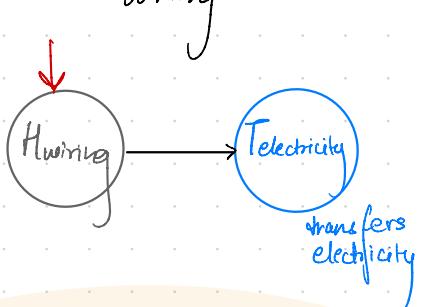
SAR: Solar array string comprising 2 batteries and 82 strings of solar cells.
SSU: Sequential Shunt Unit which monitors the battery voltage and controls the battery charge/discharge rate.
DCSU: DC/DC converter which provides power conversion between the main bus and the battery bus.
DDCU: DC/DC converter which provides power conversion between the main bus and the heater bus.
Battery: NiMH batteries that can store 8.1 Ah and 35% depth of discharge.
ECU: Electronic Control Unit which monitors the system and performs logic for the system.
PFCS: Power Flow Controller which monitors the system and performs logic for the system.
RPCM: Remote Power Controller which monitors the system and performs logic for the system.

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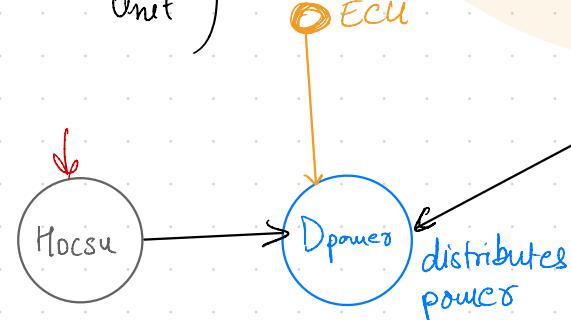
Sequential Shunt Unit



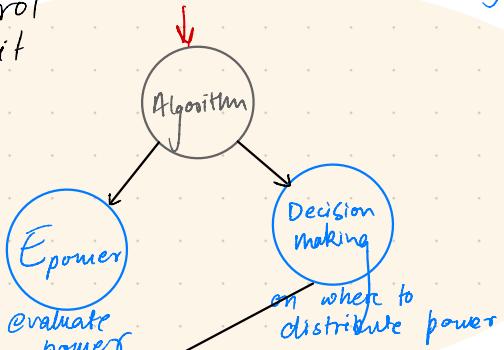
Wiring

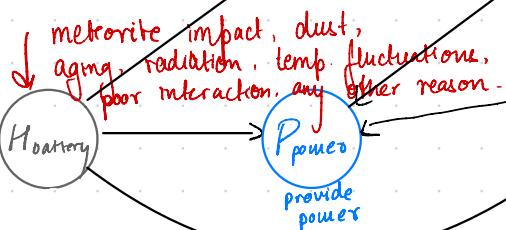
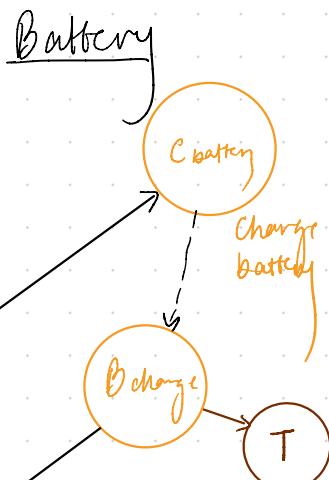
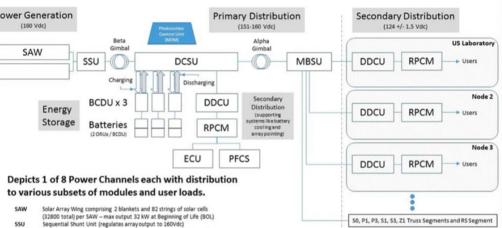
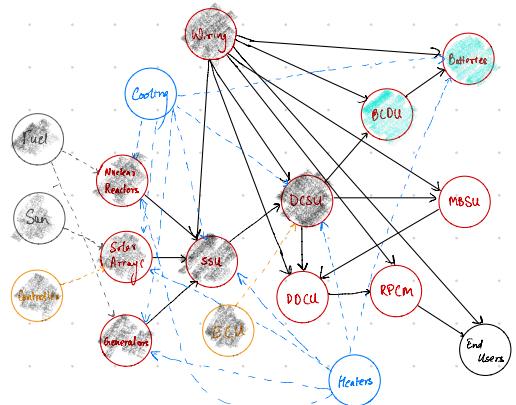


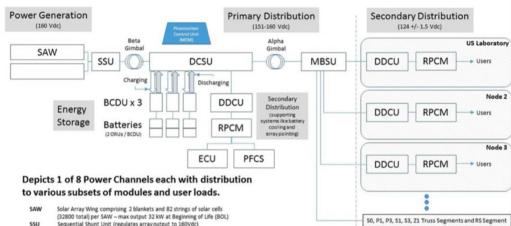
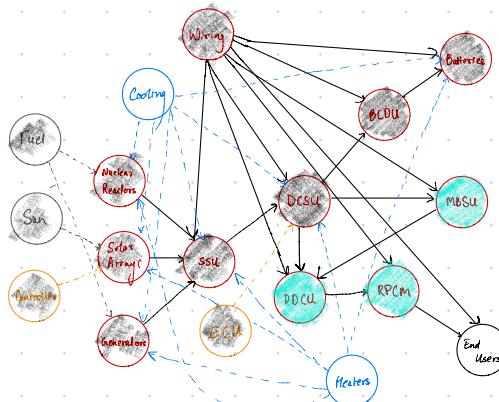
Direct Current Switching Unit



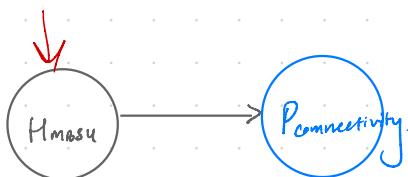
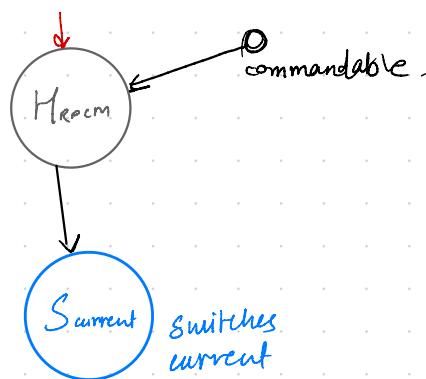
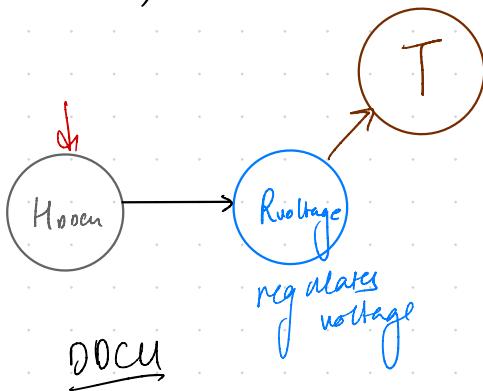
Electronical Control Unit

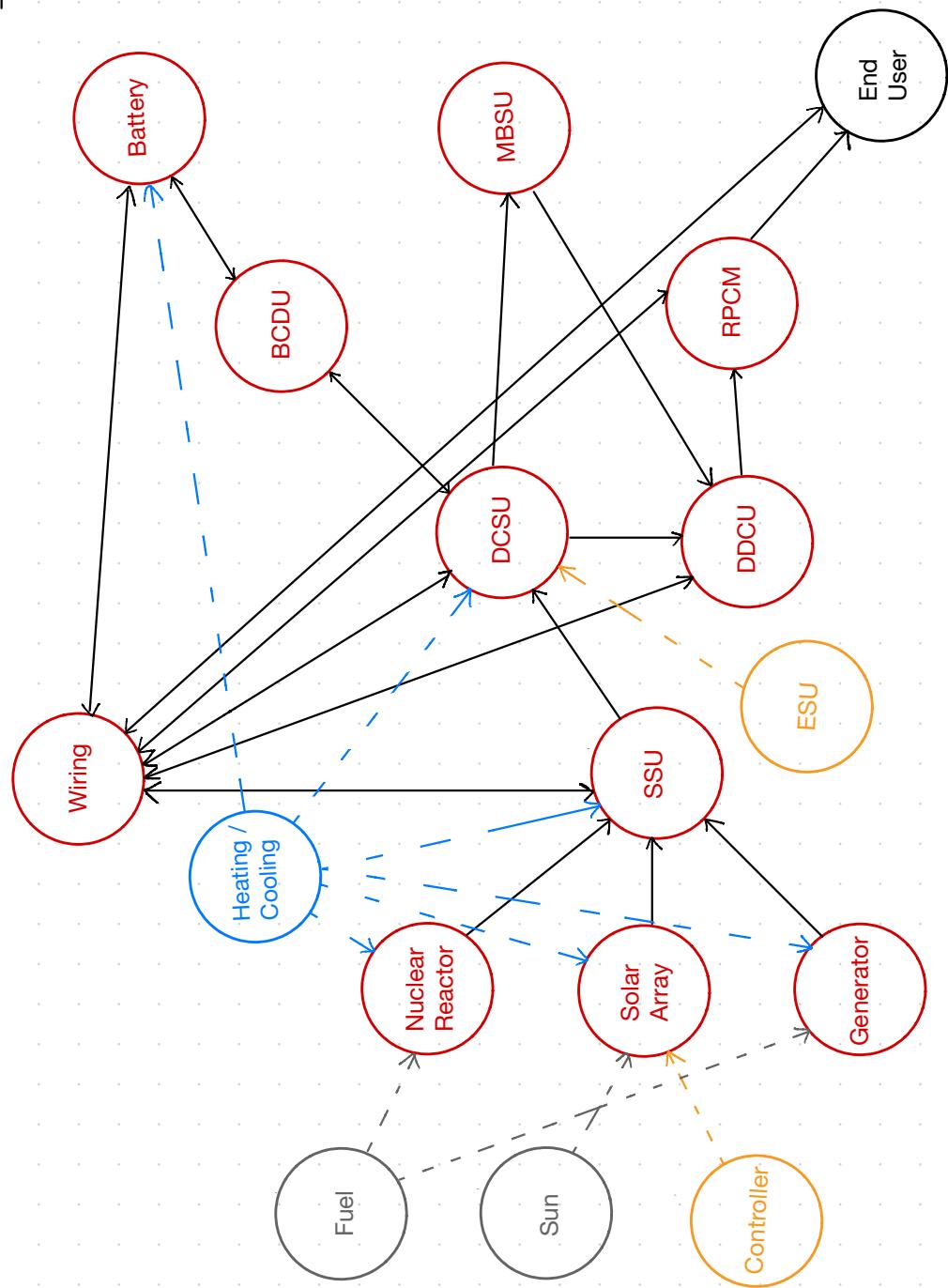


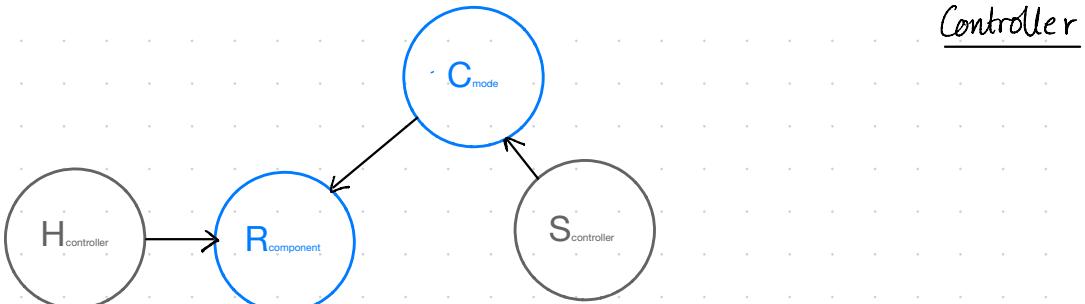
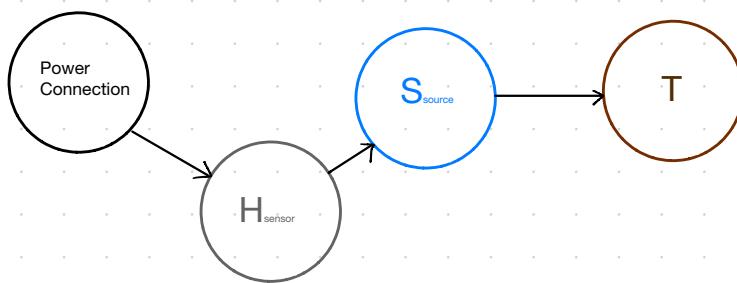
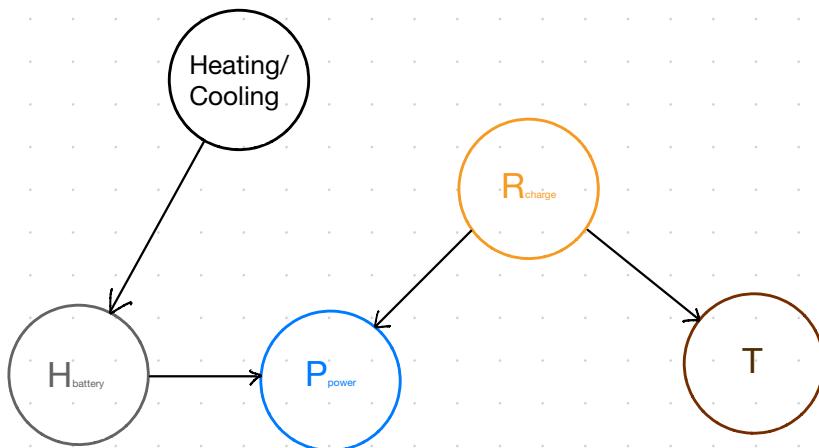




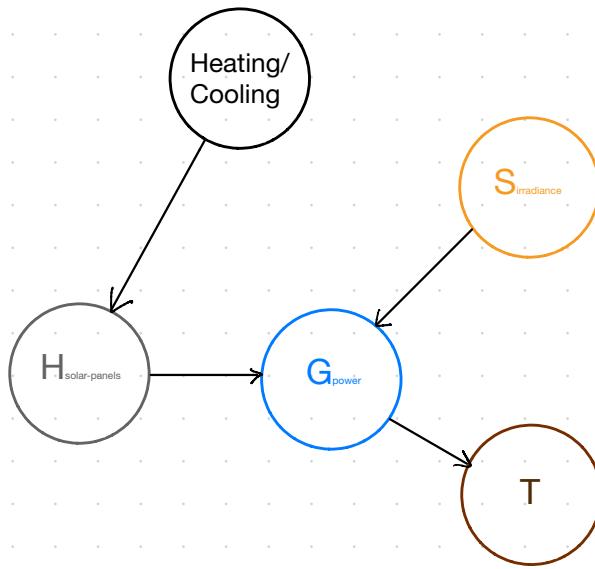
* rule: every electric component has a wire attached -





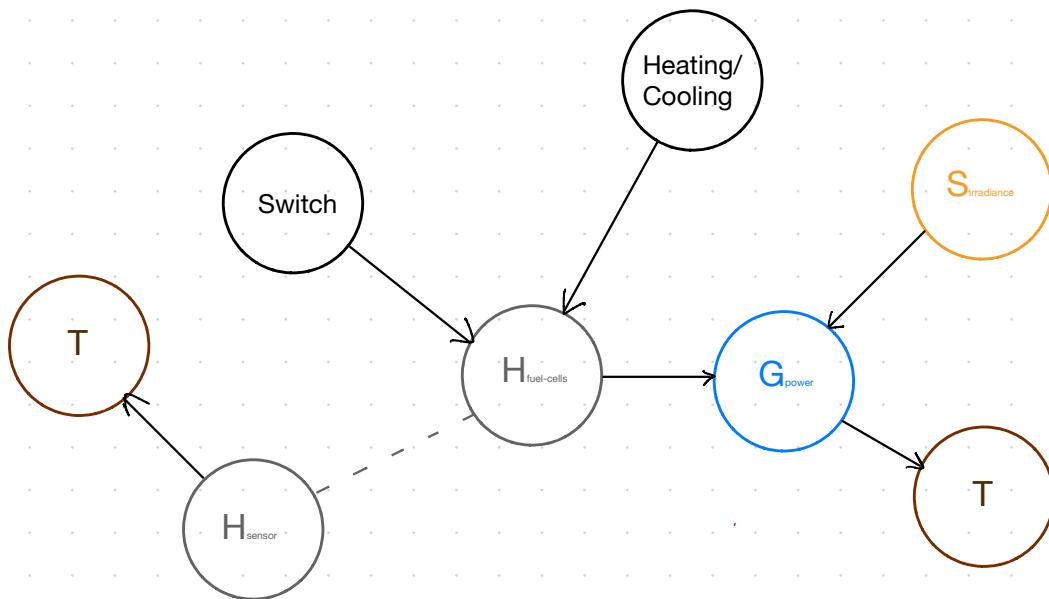


Solar Array

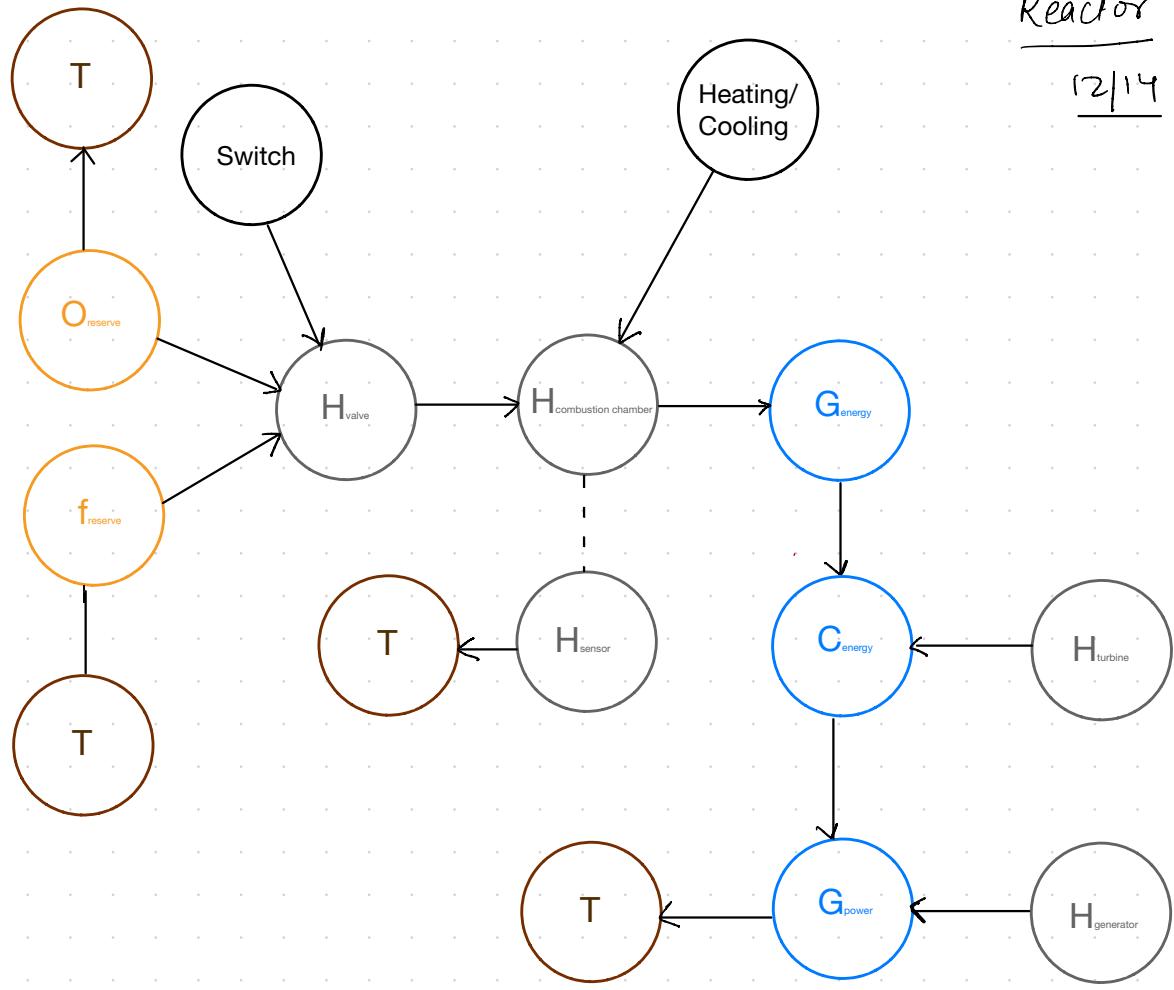


* These switches could be modeled the same as RPCM's.

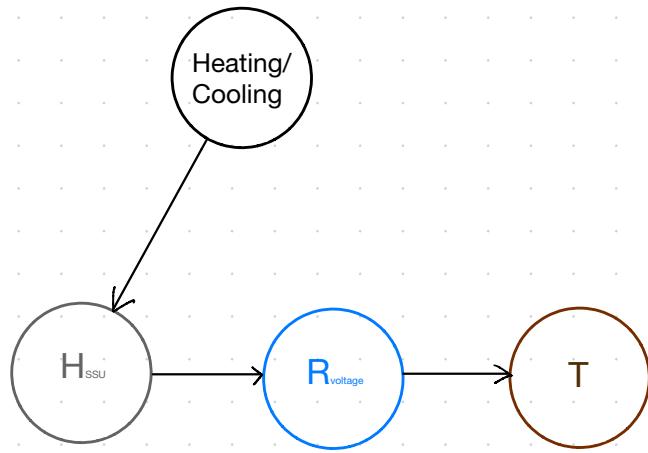
Fuel Cells



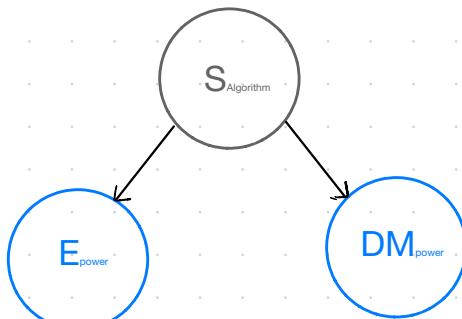
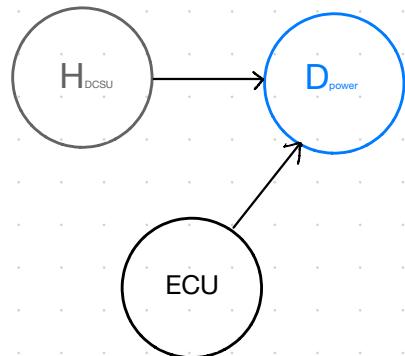
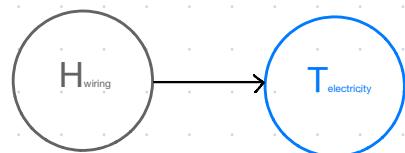
Nuclear
Reactor
12/14



Sequential Shunt Unit



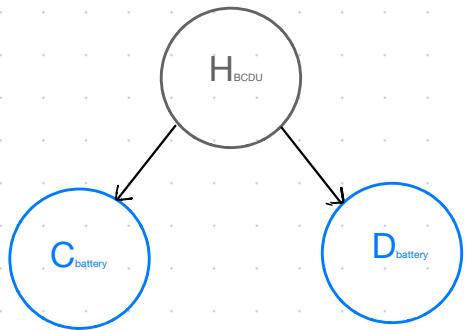
Wiring



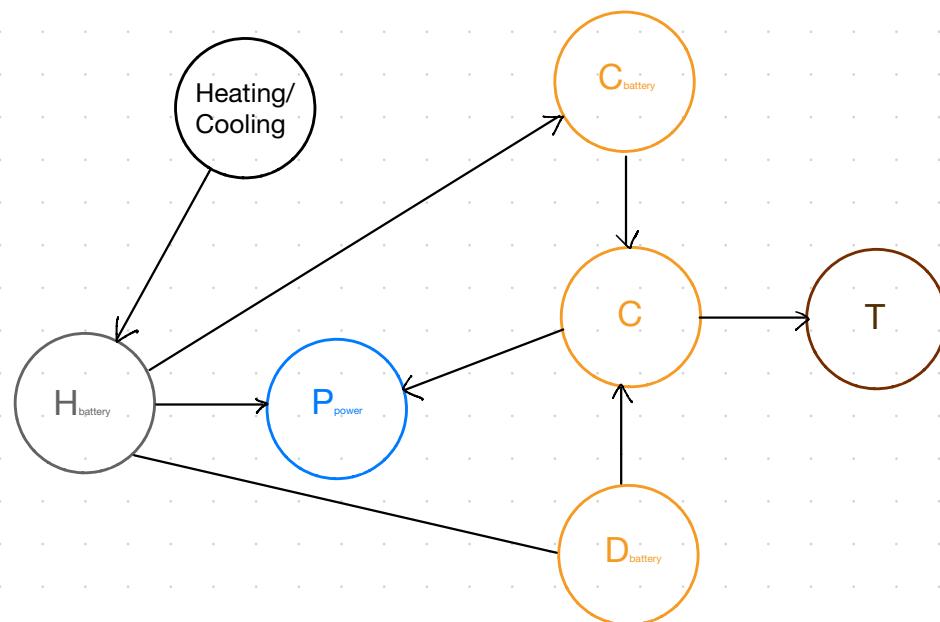
Direct
Current
Switching
Unit

Electronics
Control
Unit

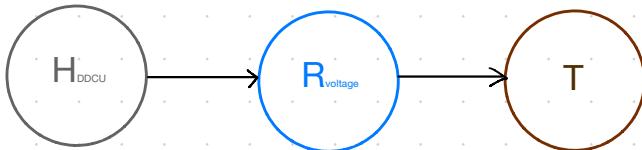
Battery
Charged
Discharge
Voltage



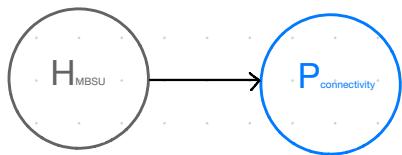
Rechargeable
Battery



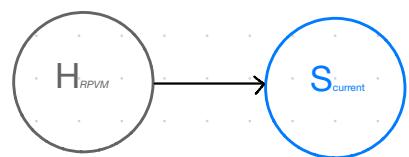
DC - DC
Converter
Unit

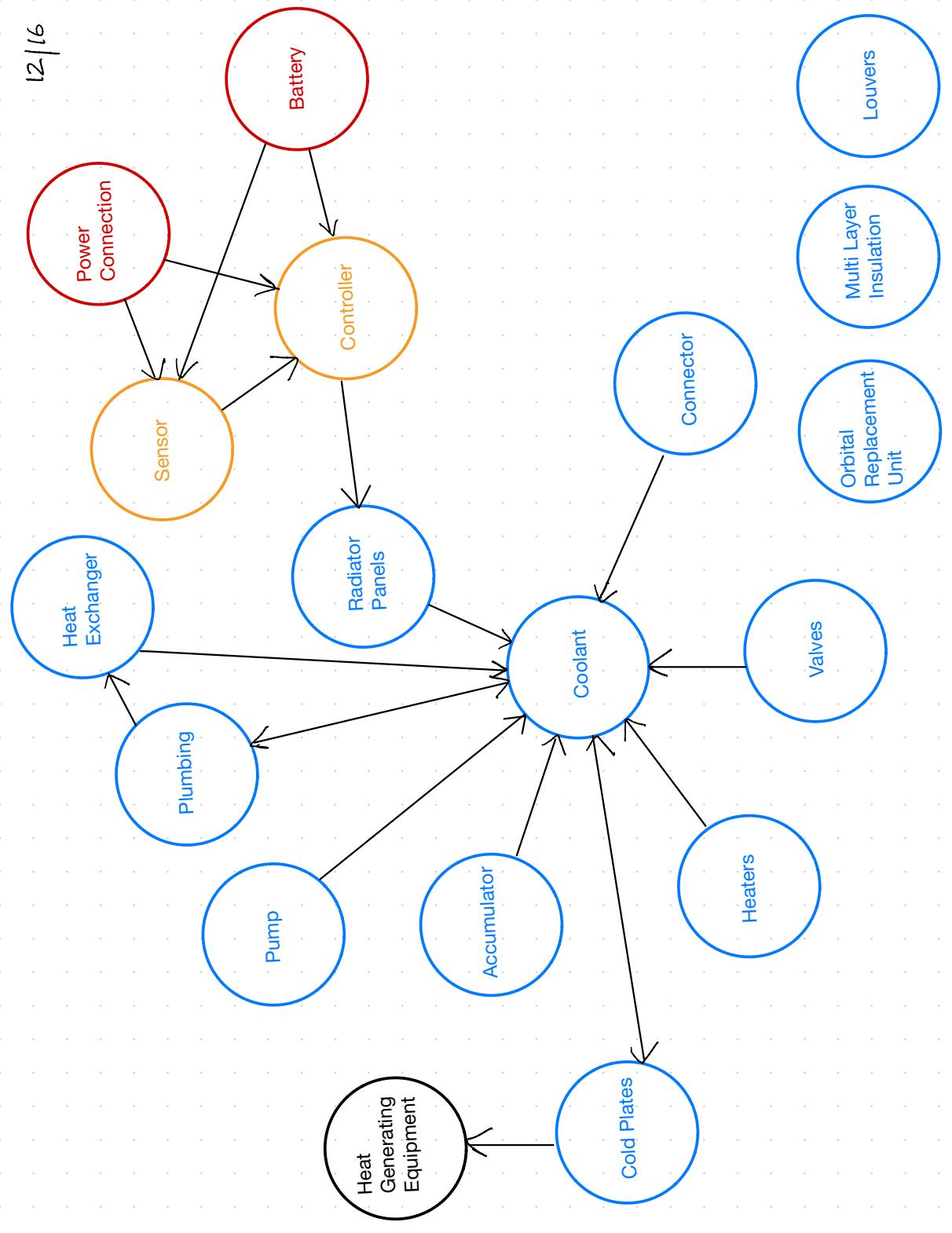


MBSU



RPCM





12f(a)