



FAMU-FSU  
College of  
Engineering

# Solar Wind Generator (K.A.R.E.N) Presentation 4

Team 303 12/08/2023

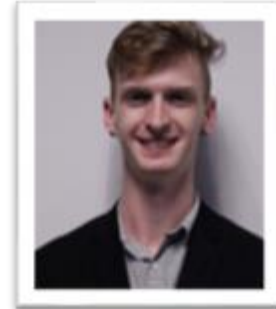
# Team Introductions



**William Touza**  
- *Team Lead*



**Andrew Putnam**  
- *Technical Lead*



**Tristan Witkowski**  
- *CAD Designer*



**Alberto San Segundo**  
- *CAD Designer*



**Brandon Ortiz**  
- *Treasurer*



**Carlos Vilarino**  
- *Documentation Specialist*



# Sponsor and Advisor

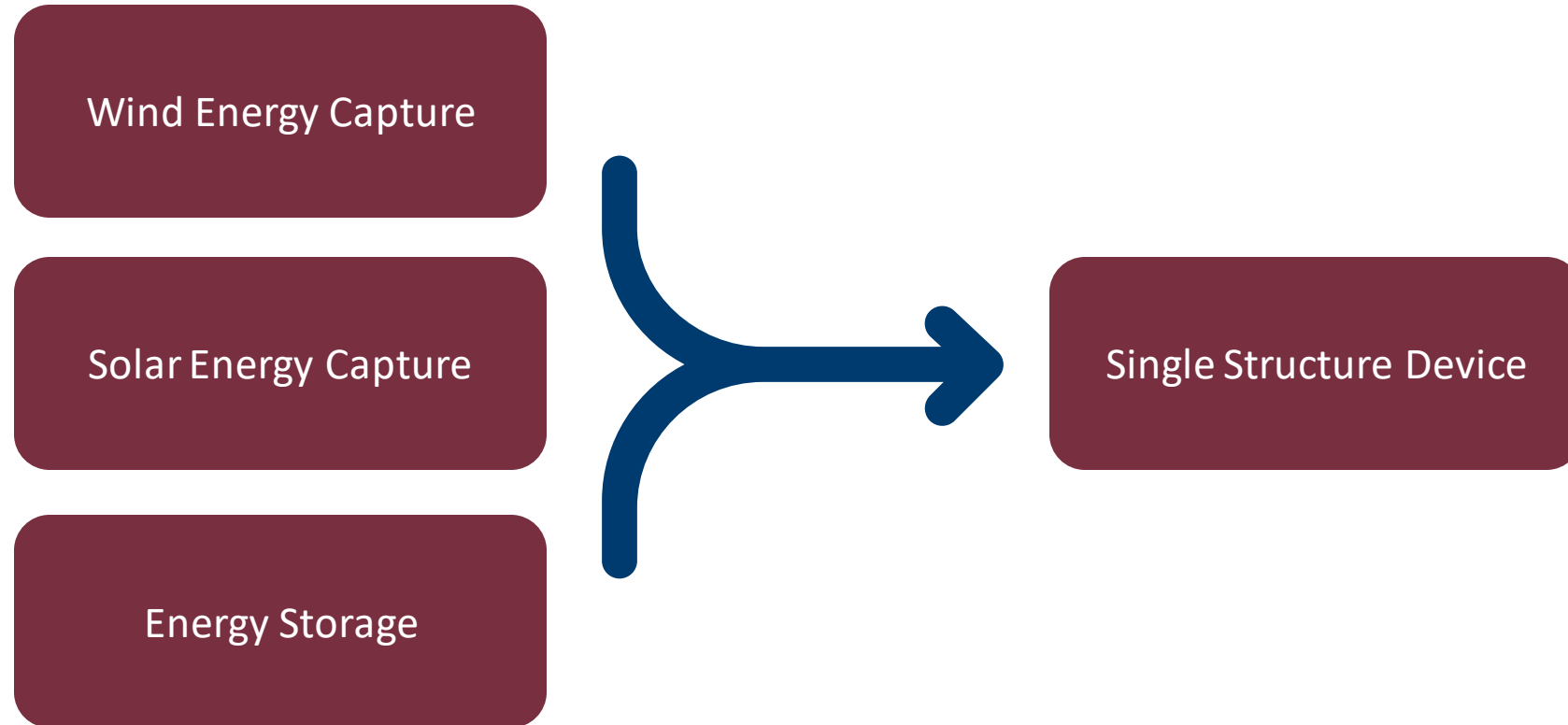


**Bruce Morrison**  
*-Sponsor*



**Dr. Simon Foo**  
*-Advisor*

# Project Objective

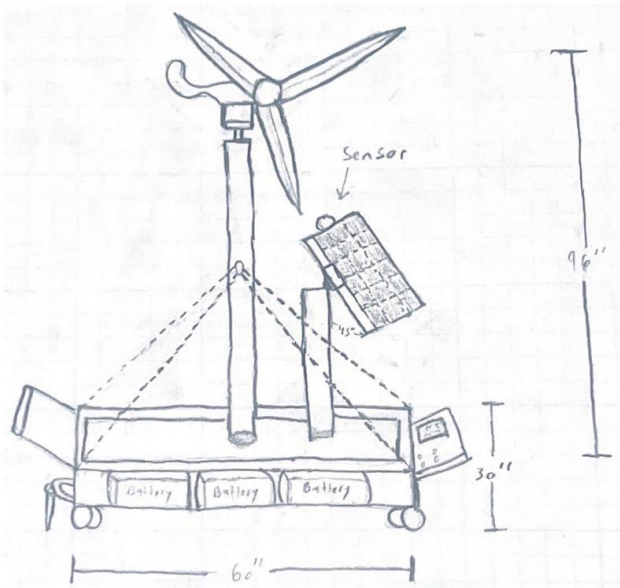


# Recap of Last Semester



# Final Selected Concept

## Sunflower



# Critical Targets

- 100 W power generation
- 10% max electrical losses
- 45 mph max wind speed
- 5 Year Durability
- 50 m portability

# Technical Design

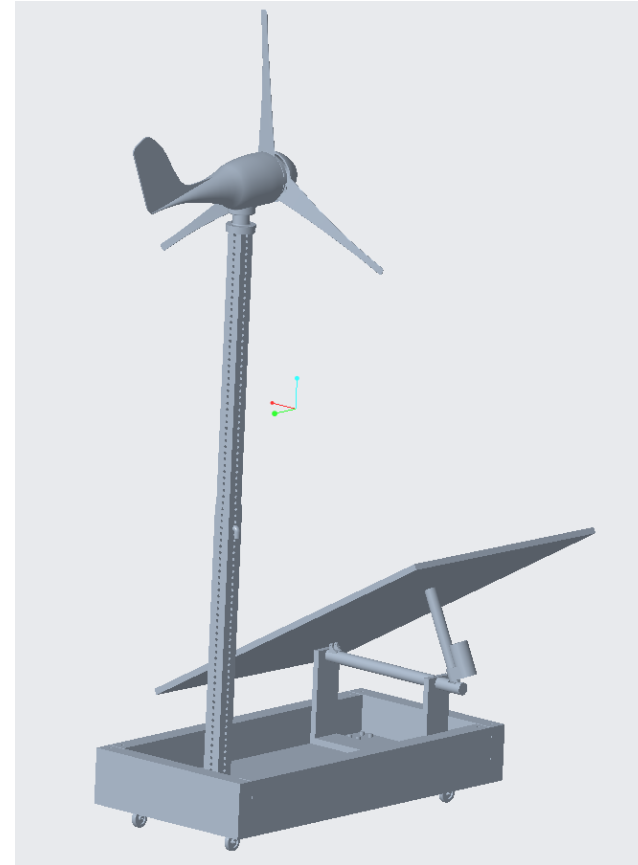
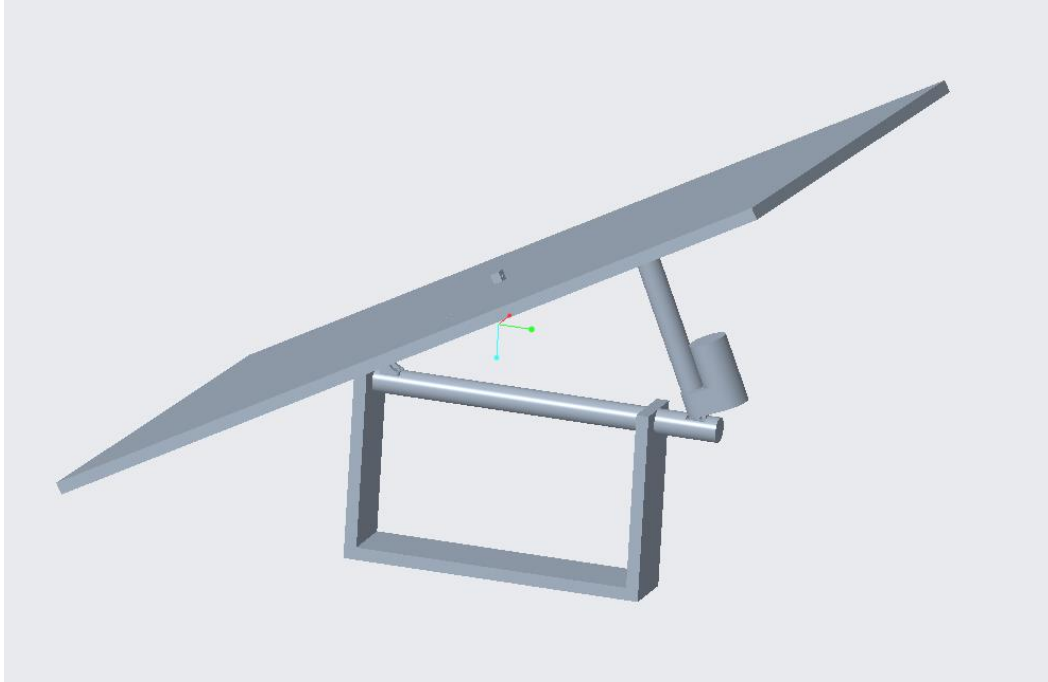




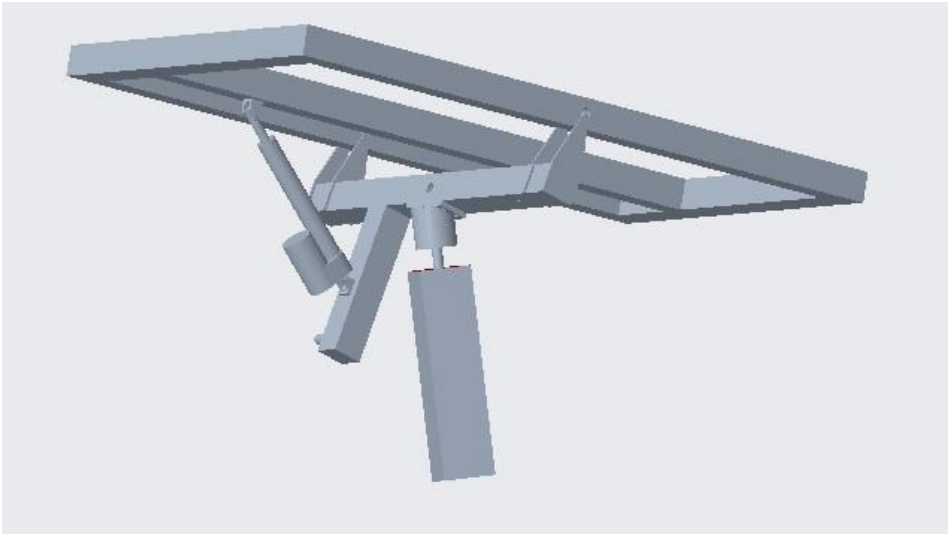
# Old Solar Mount Design



# Old Solar Mount Design



# New Solar Mount Design



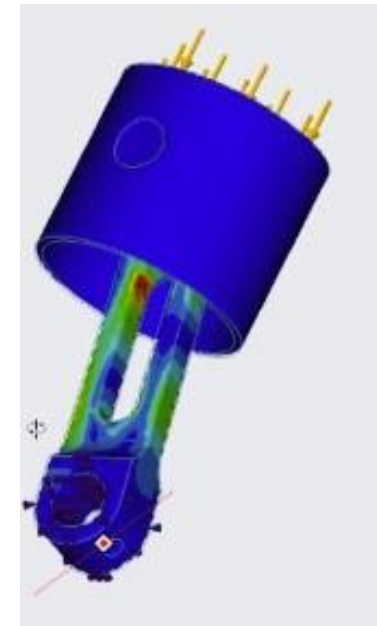
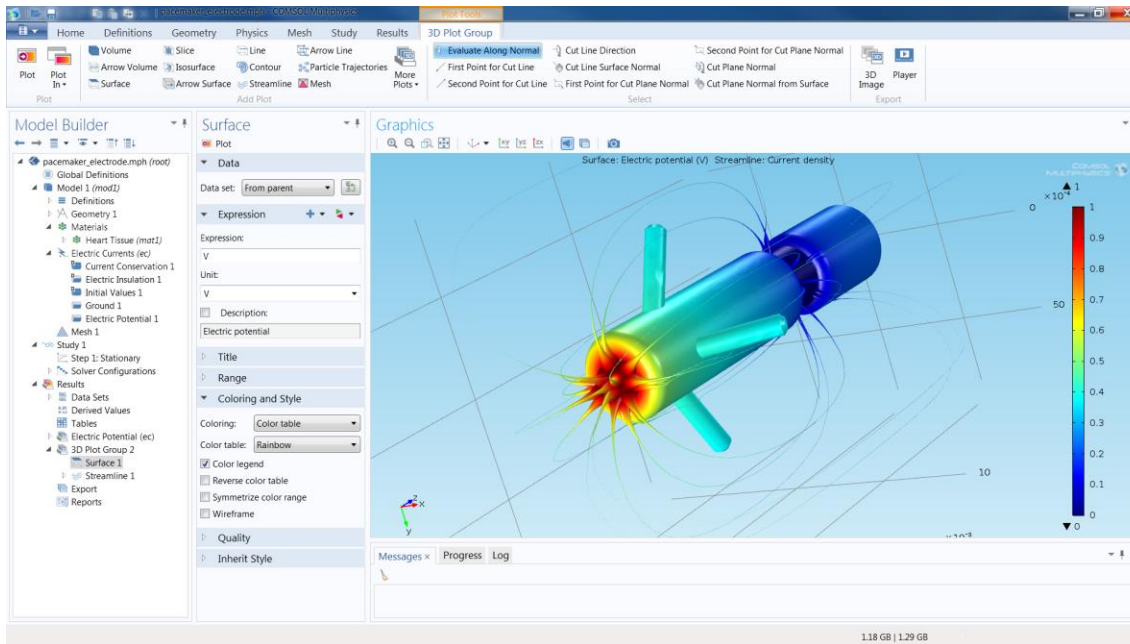
- Uses one linear actuator and a stepper motor to achieve the desired dual – axis motion

# New Solar Mount Design

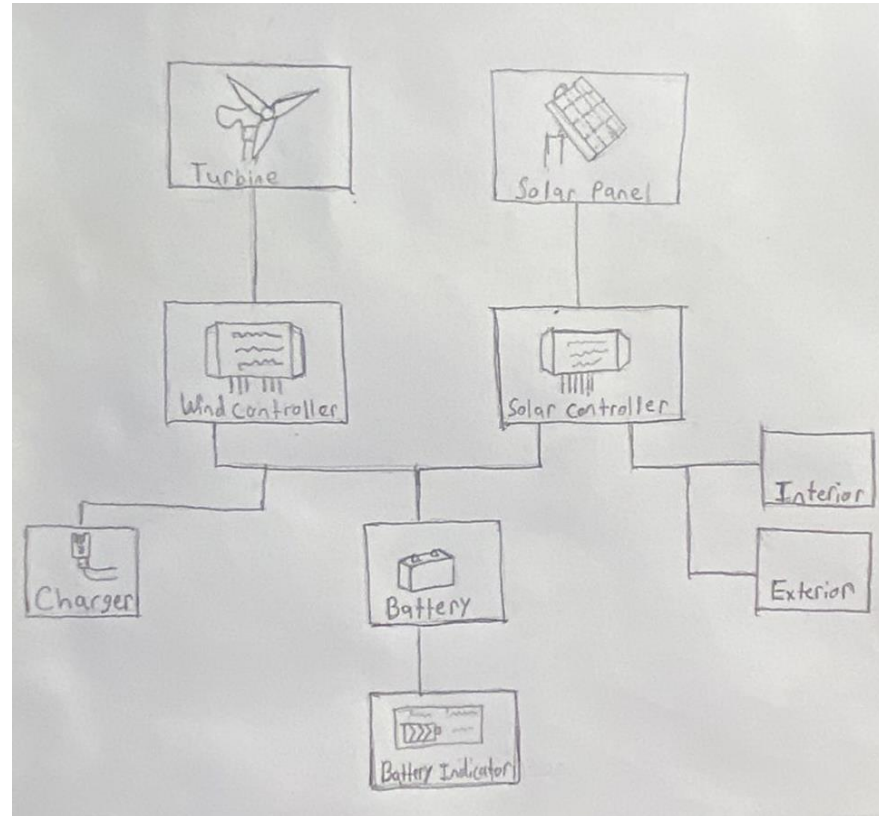




# Structural Simulations



# Electrical Connections



# Solar Tracking Psuedo Code

- Start Continuous Loop
  - Read Photoresistor and switch values
  - Calculate photoresistor sums and differences
  - If ( North south difference > Error)
    - Adjust linear actuator
  - Ifelse( East west difference > Error)
    - Adjust stepper motor
  - Ifelse(Sumed Photoresistor Values < Night)
    - Adjust linear actuator and stepper motor to standby position
    - Enter Low power mode for set period of time
  - Ifelse( Switch is flipped)
    - Adjust linear actuator and stepper motor to standby position
    - Enter Low power mode
- End

# Up and Coming





# Future Work

- Creating gear box mechanism
- COMSOL Testing
- CREO Testing

# Questions?

# Backup Slides

# Project Scope



# Project Background

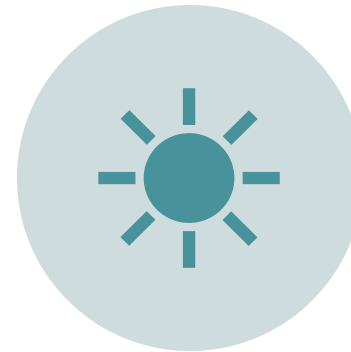
# Key Goals



SUPPLY 100W



SEMI PORTABLE



HARNESSES SOLAR  
AND WIND ENERGY

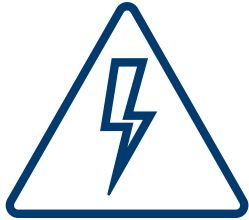
# Assumptions

Device will be placed outside

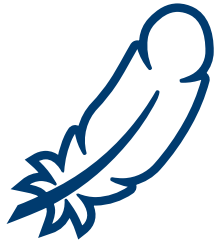
Sufficient solar and wind energy provided

Proper usage of the device is expected

# Technical Challenges

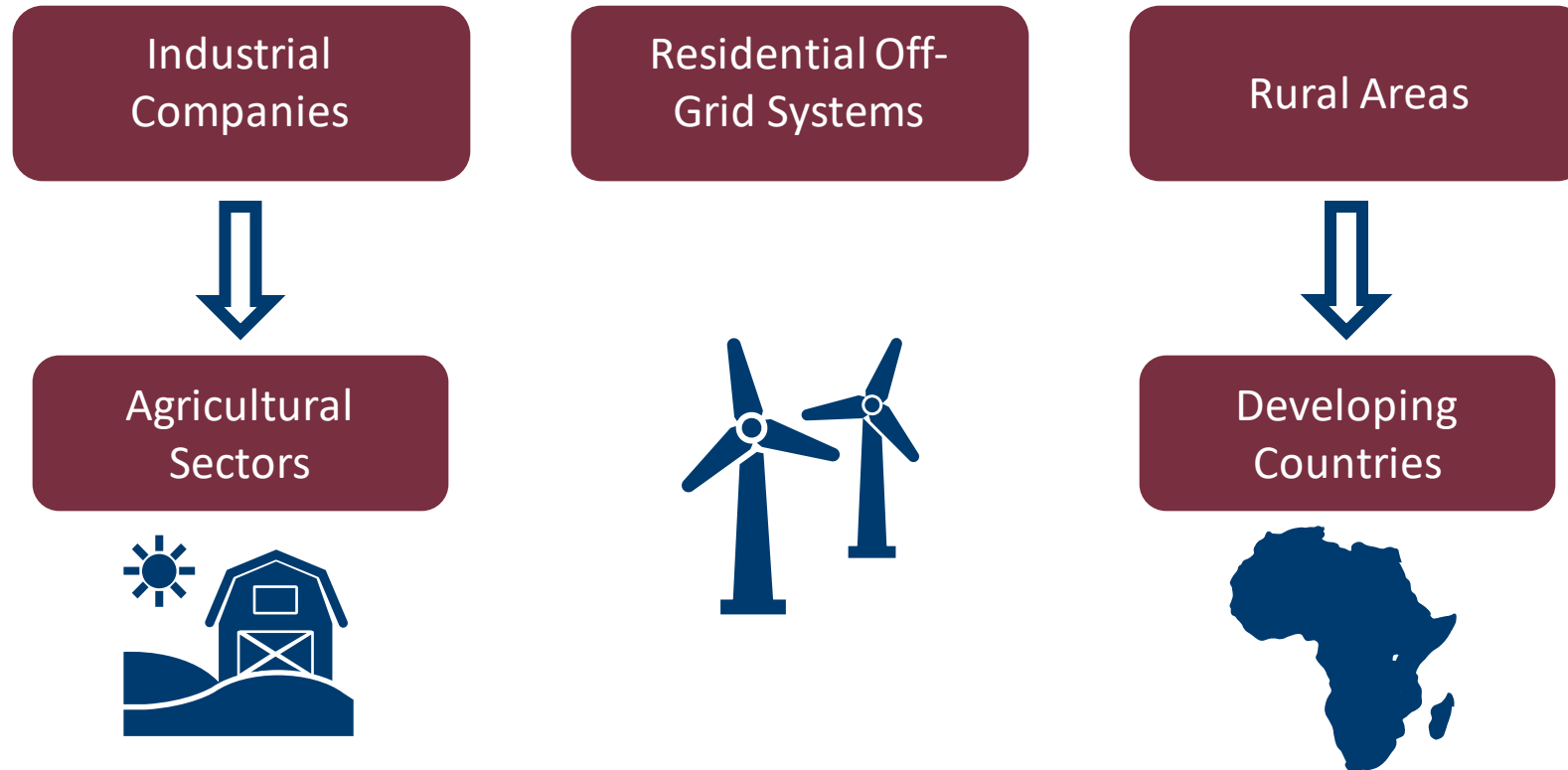


Designing a device that can capture both wind and solar energy efficiently

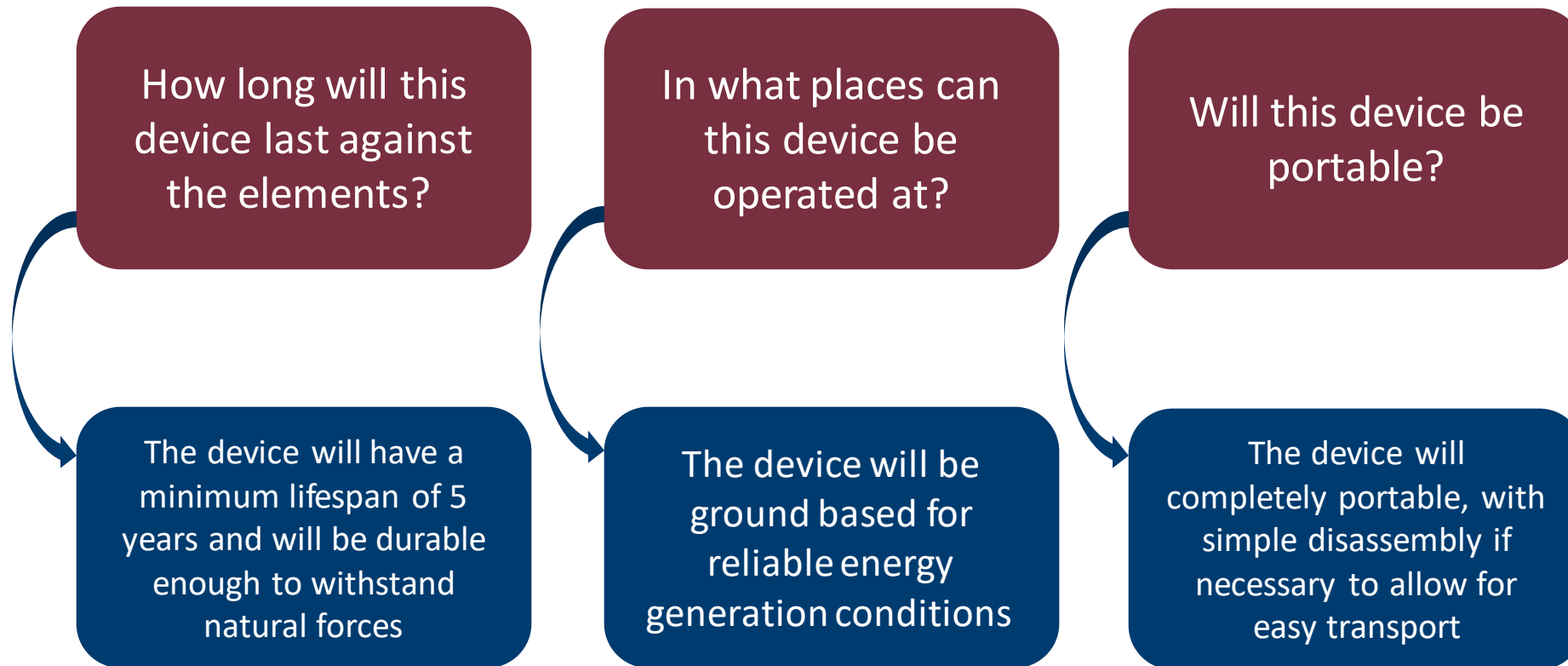


Creating a structurally sound device that is also portable

# Expected markets

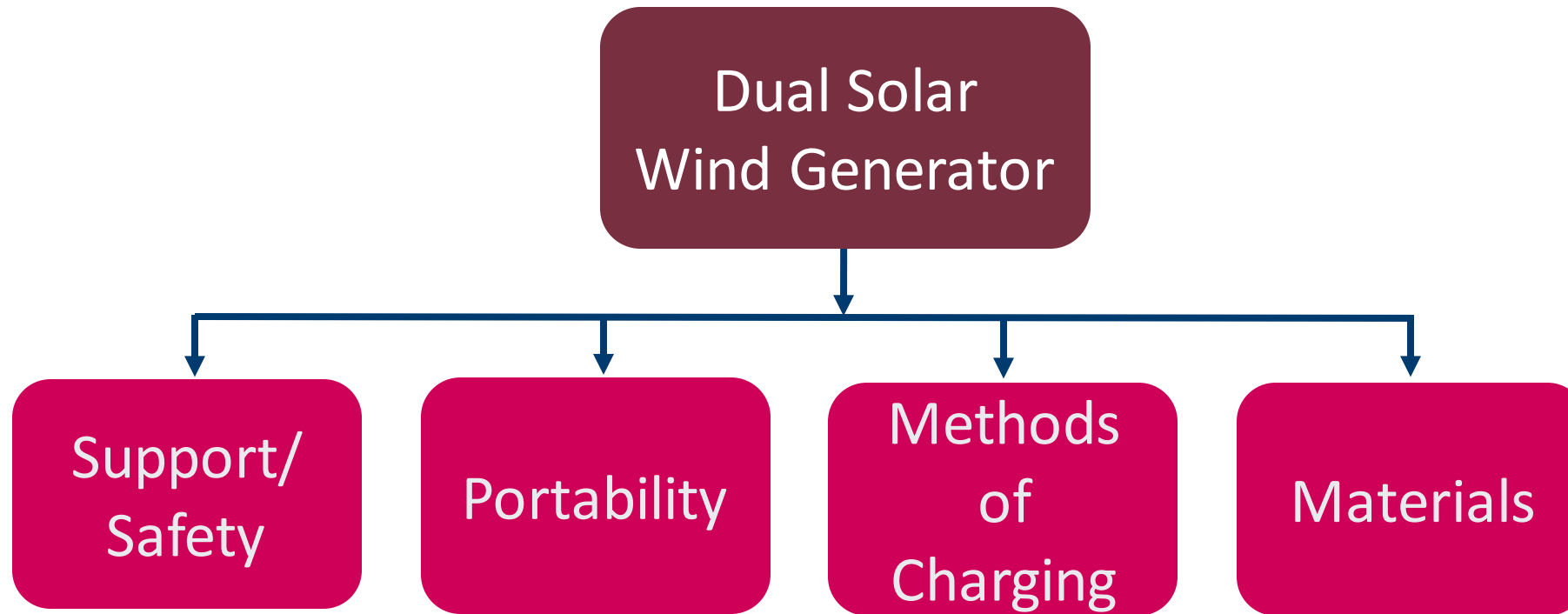


# Customer Needs

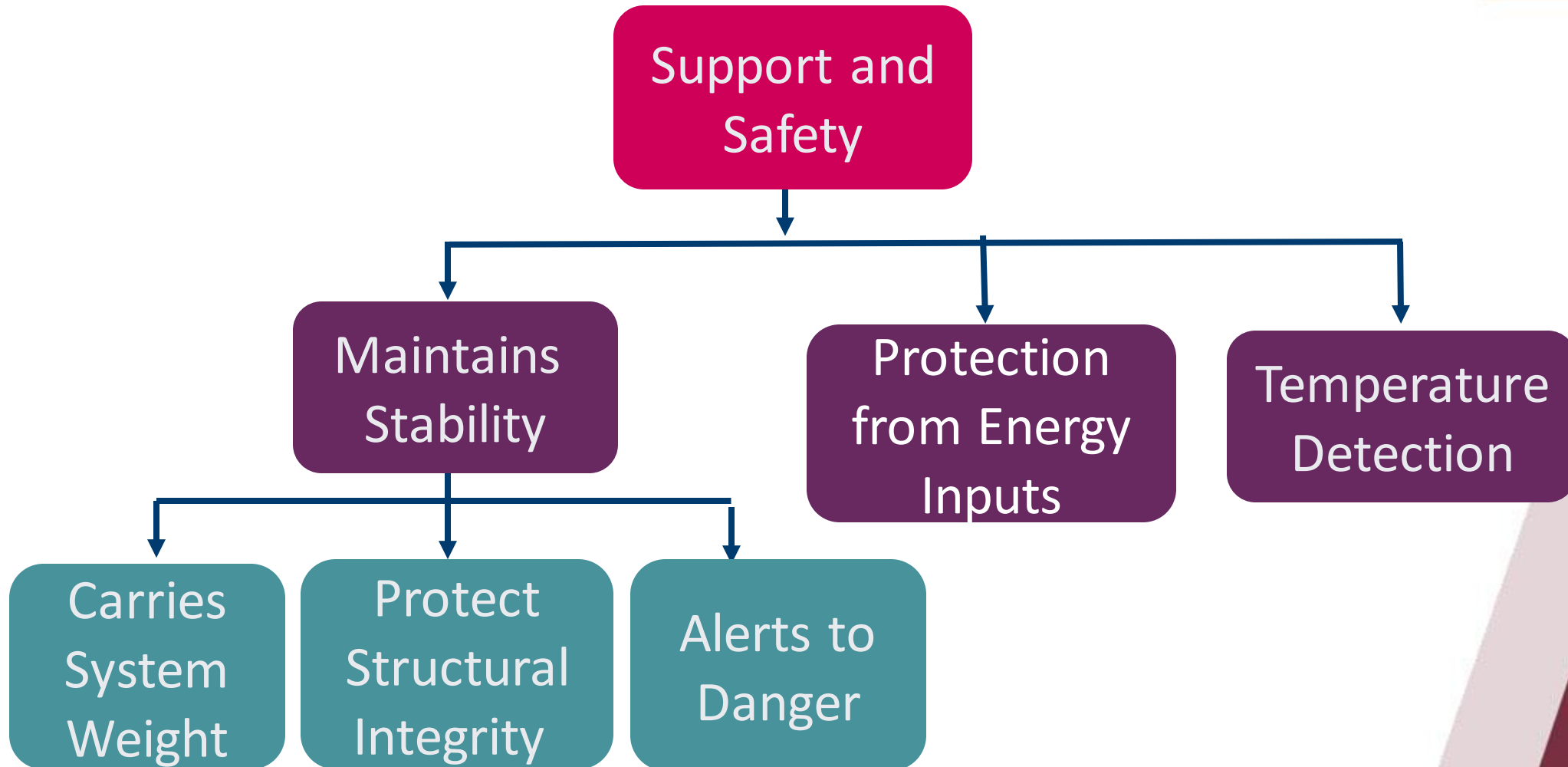




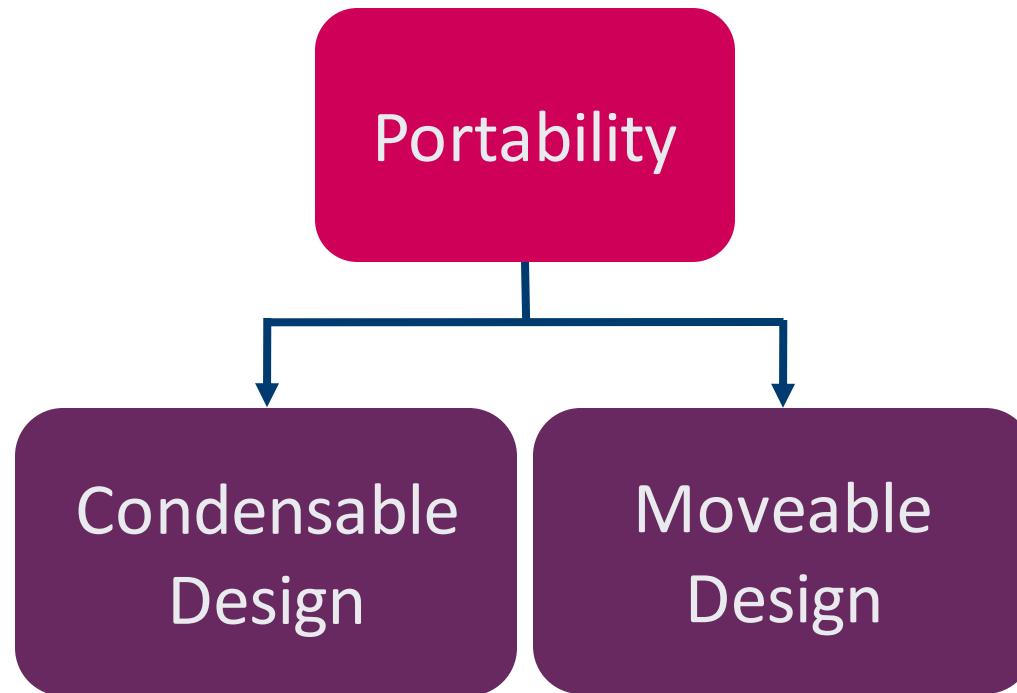
# Functional Decomposition



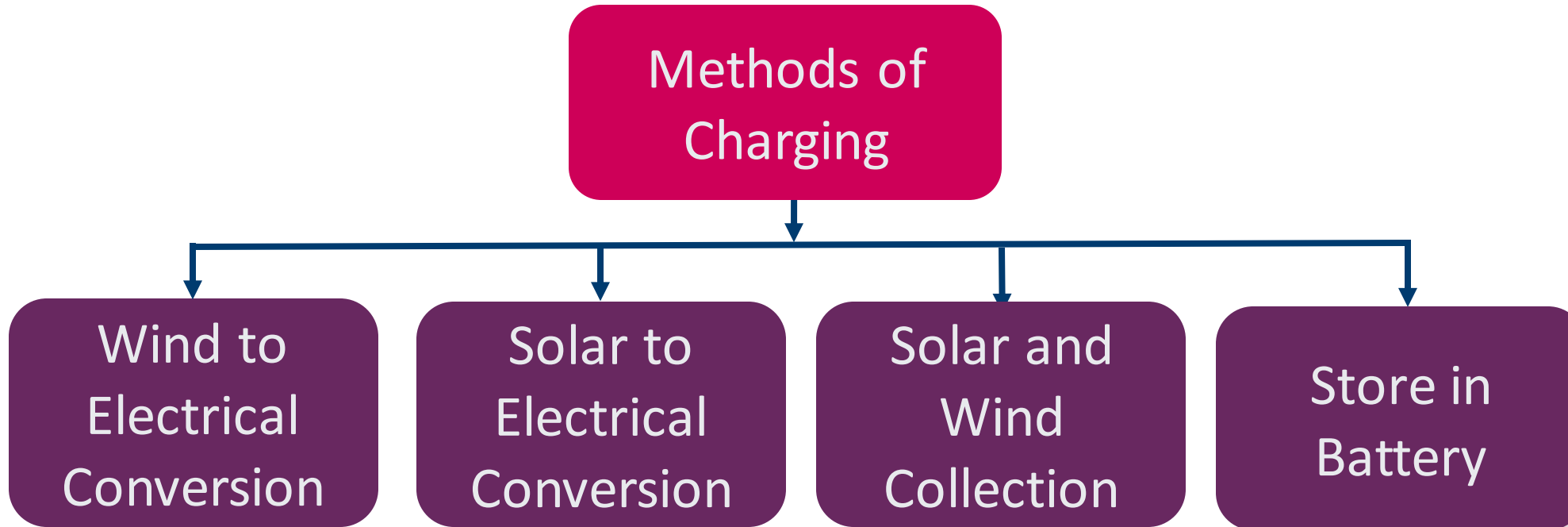
# Functional Decomposition



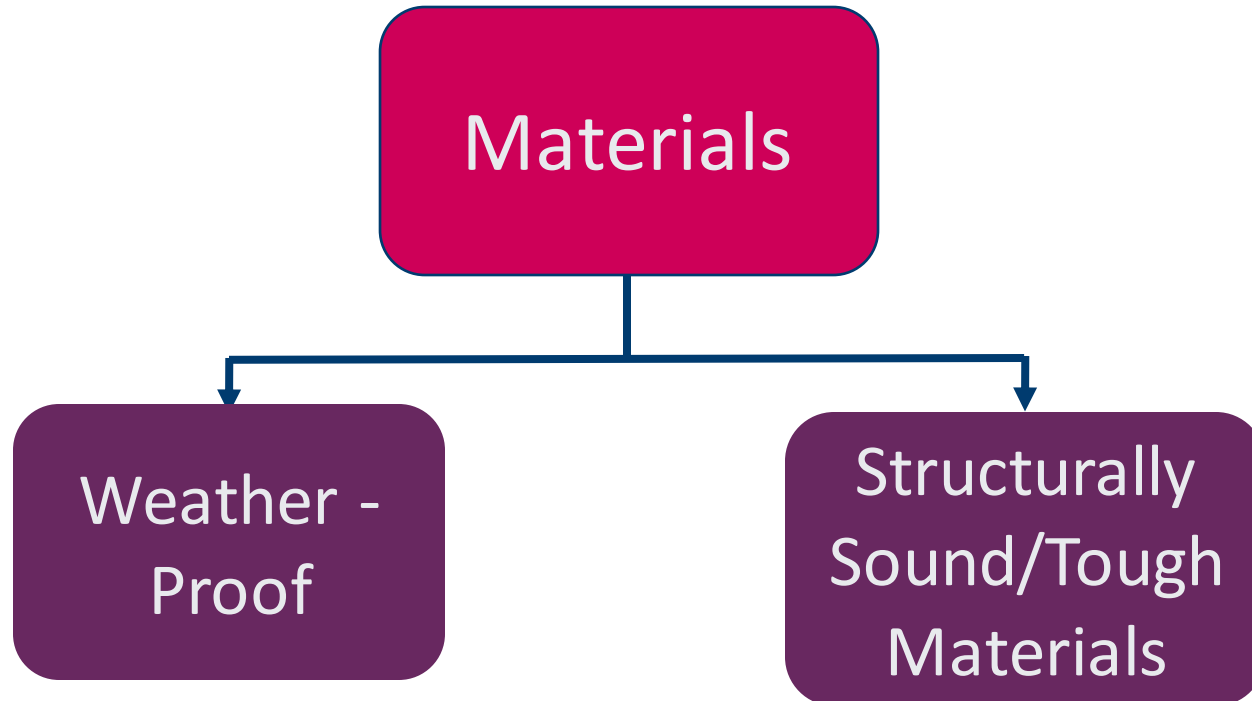
# Functional Decomposition



# Functional Decomposition



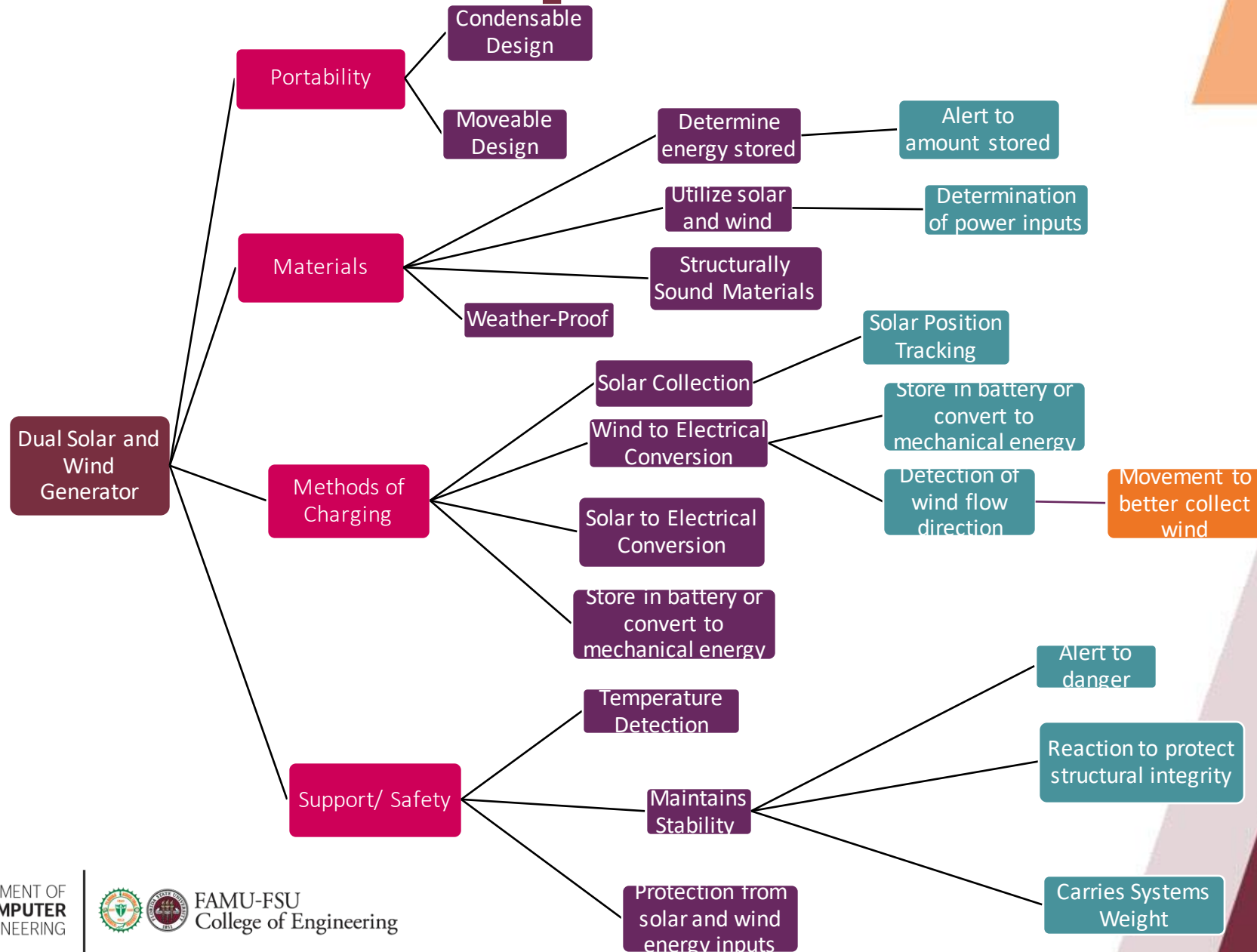
# Functional Decomposition



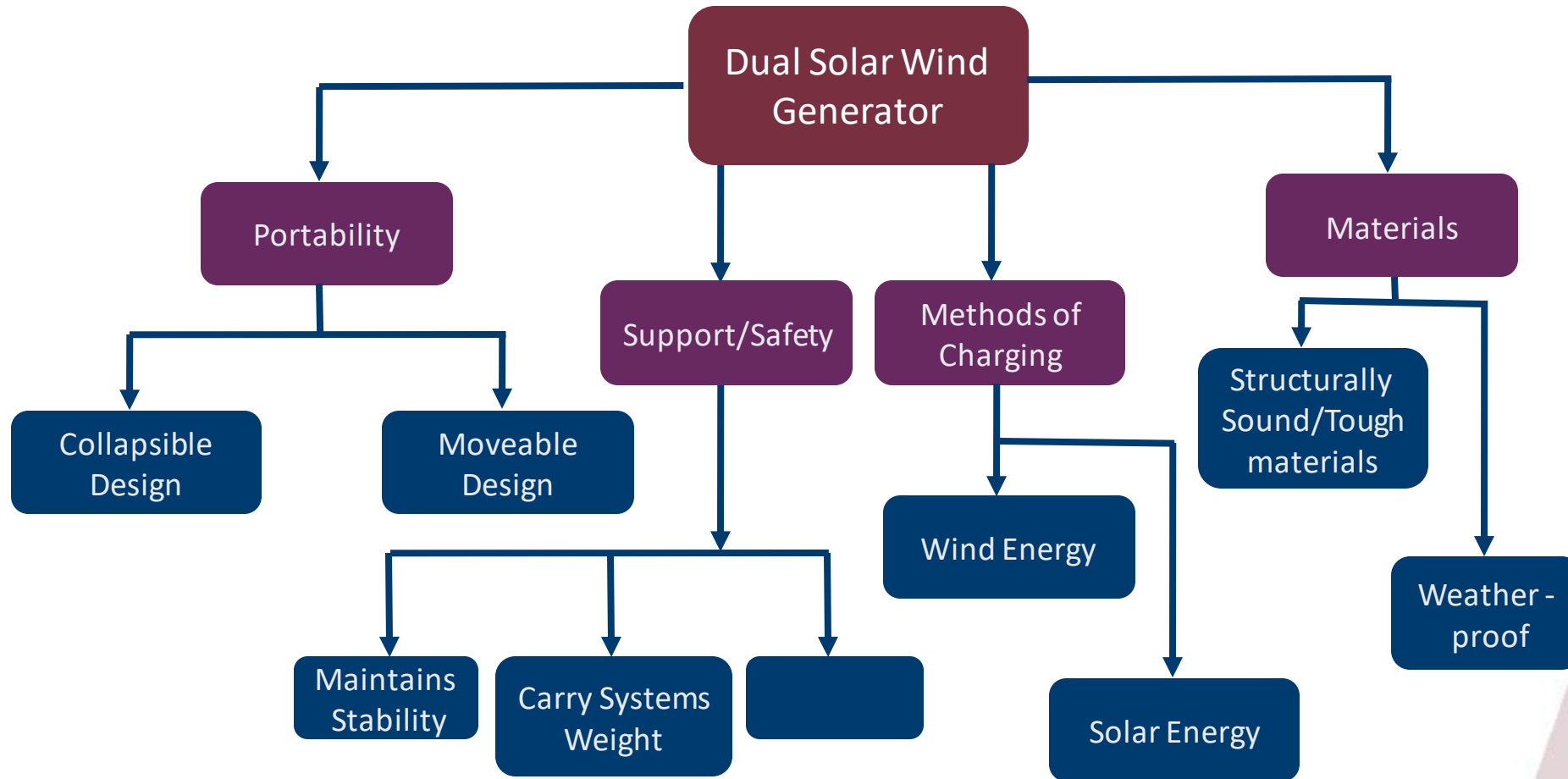
# Risk Assessment



# Functional Decomposition



# Functional Decomposition



# Binary Pairwise Chart

Customer Need	Priority
Generating Solar/Wind Energy	7
Charges Battery	6
Transportable	5
Single Structure	4
Environmental Forces	3
5 Year Durability	2
Ground Based	1
Doesn't Need Scalability	0

# House of Quality Results

Engineering Characteristic	Criteria Weight
Structurally Sound (MPa/m <sup>2</sup> )	16.88%
Energy Generated by Solar (Wh)	13.96%
Energy Generated by Wind (Wh)	13.96%
Energy Stored (Wh)	12.50%
Force Required to Move (N/m)	10.71%

# Pugh Chart Results

Concept	Fish Turbines	Solar Cylinders	Sunflower
Number of Pluses	2	3	1
Number of Minuses	1	0	2

# Analytical Hierarchy Process

Concept	Alternative Value
Fish Turbines	0.250
Solar Cylinders	0.329
Sunflower	0.421



# Concept Generation

## Medium Fidelity:

- Heat Cylinders
- Fish Turbines
- Solar Cylinders
- Turtleneck
- Car Spinner

## High Fidelity:

- Parallel Solarness
- Box Man
- Sunflower

# Critical Targets

- 100 W power generation
- 10% max electrical losses
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