

HOME POWER SAVING DOOR LOCK SYSTEM

ME 3201: Engineering Design Methodology

GROUP 17

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Agenda



Introduction



Methodology



Questionnaire



Objectives



Design



Results & Discussion



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INTRODUCTION

- There are power saving systems that will interrupt the unwanted power supplies when no one is at home.
- The challenge was to design a component that work accurately in recognizing the presence of people in the house.
- So, we designed a door lock that can accurately recognize the presence of people in the house by adding a small function.

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METHODOLOGY

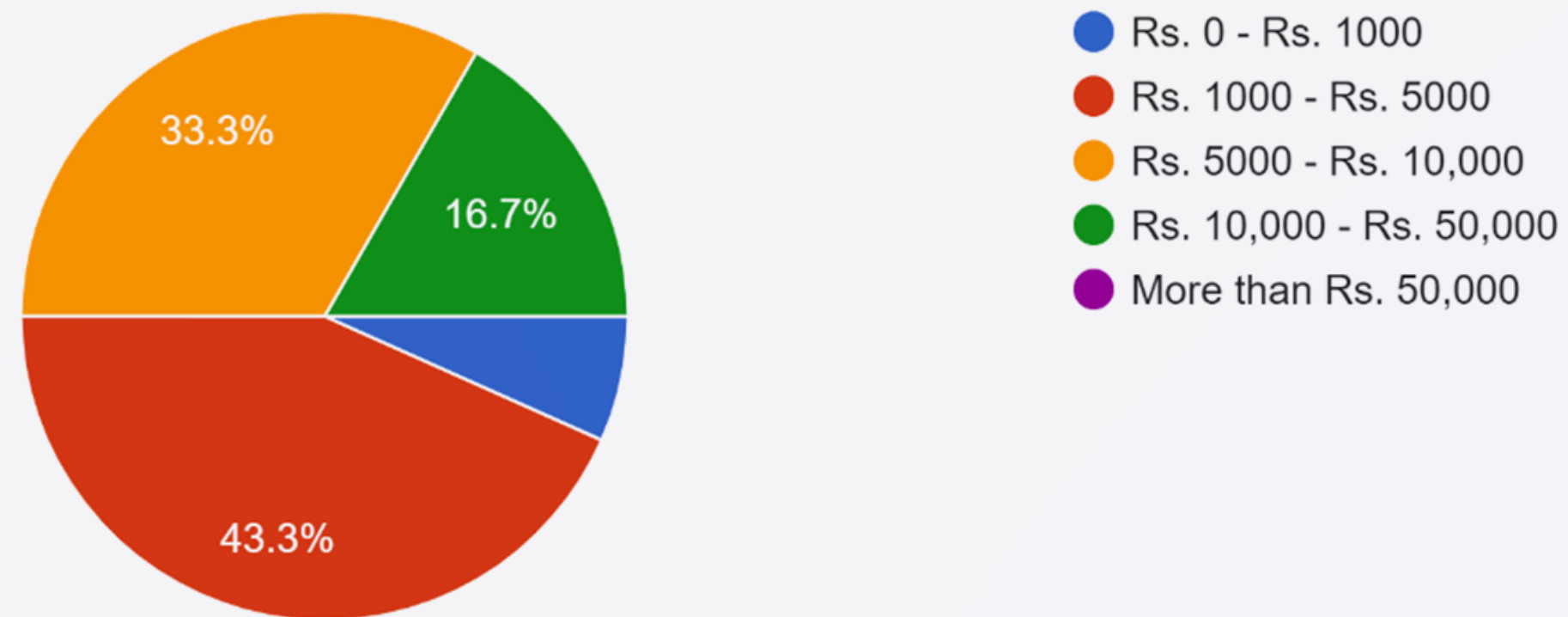
Survey

To gather valuable insights for the project, a comprehensive survey was conducted among university students.



Select the range from below that includes your usual monthly home/boarding electricity bill amount.
(Ex: If your bill amount is Rs.1000, use the range Rs.0-Rs.1000)

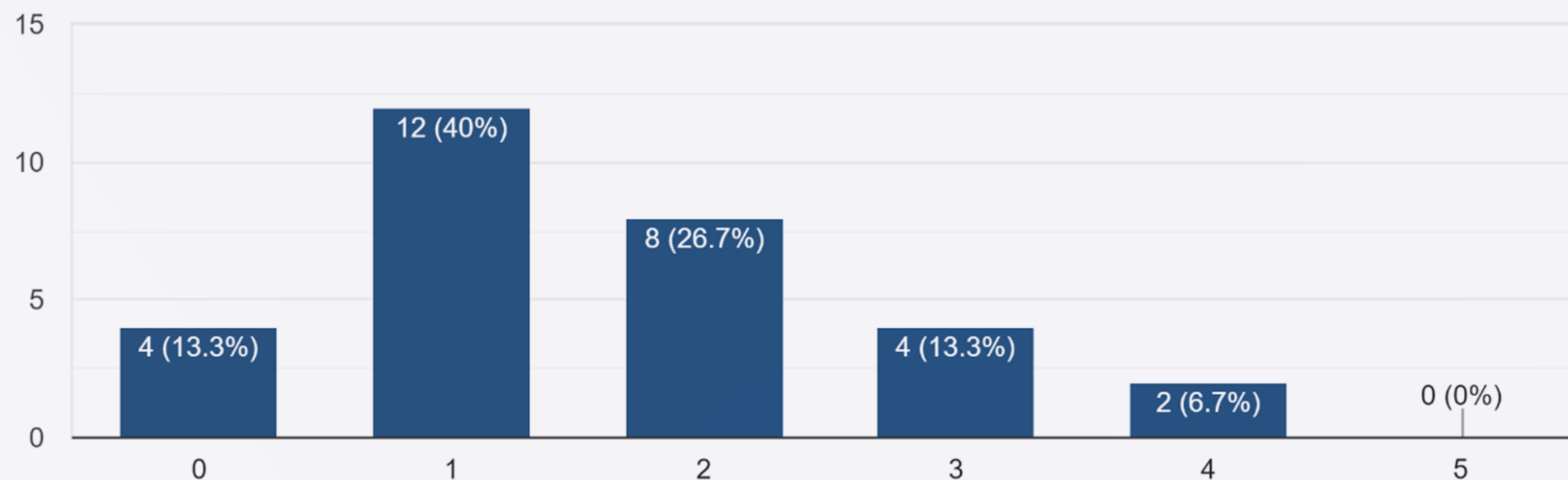
30 responses





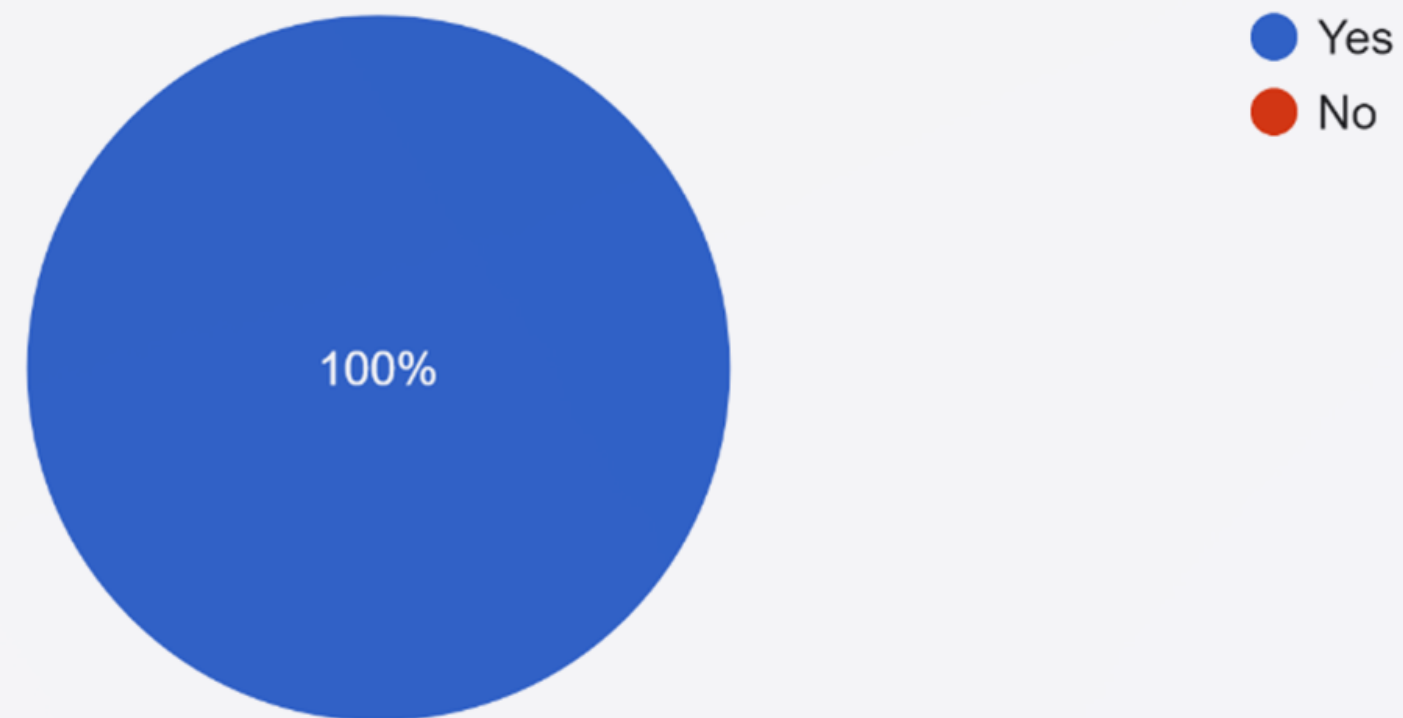
The possibility of leaving the house/boarding with turned on electric devices or unwanted power supplies negligibly. (Note: Rate 0 if there is no p...o turn off the devices when leaving house/boarding)

30 responses



Would you like to avoid this waste of electricity, by only adding a small function to the door lock which will turn off all the electric devices that you ...t to turn off when leaving the house, automatically?

30 responses



OBJECTIVES

OBJECTIVE TREE

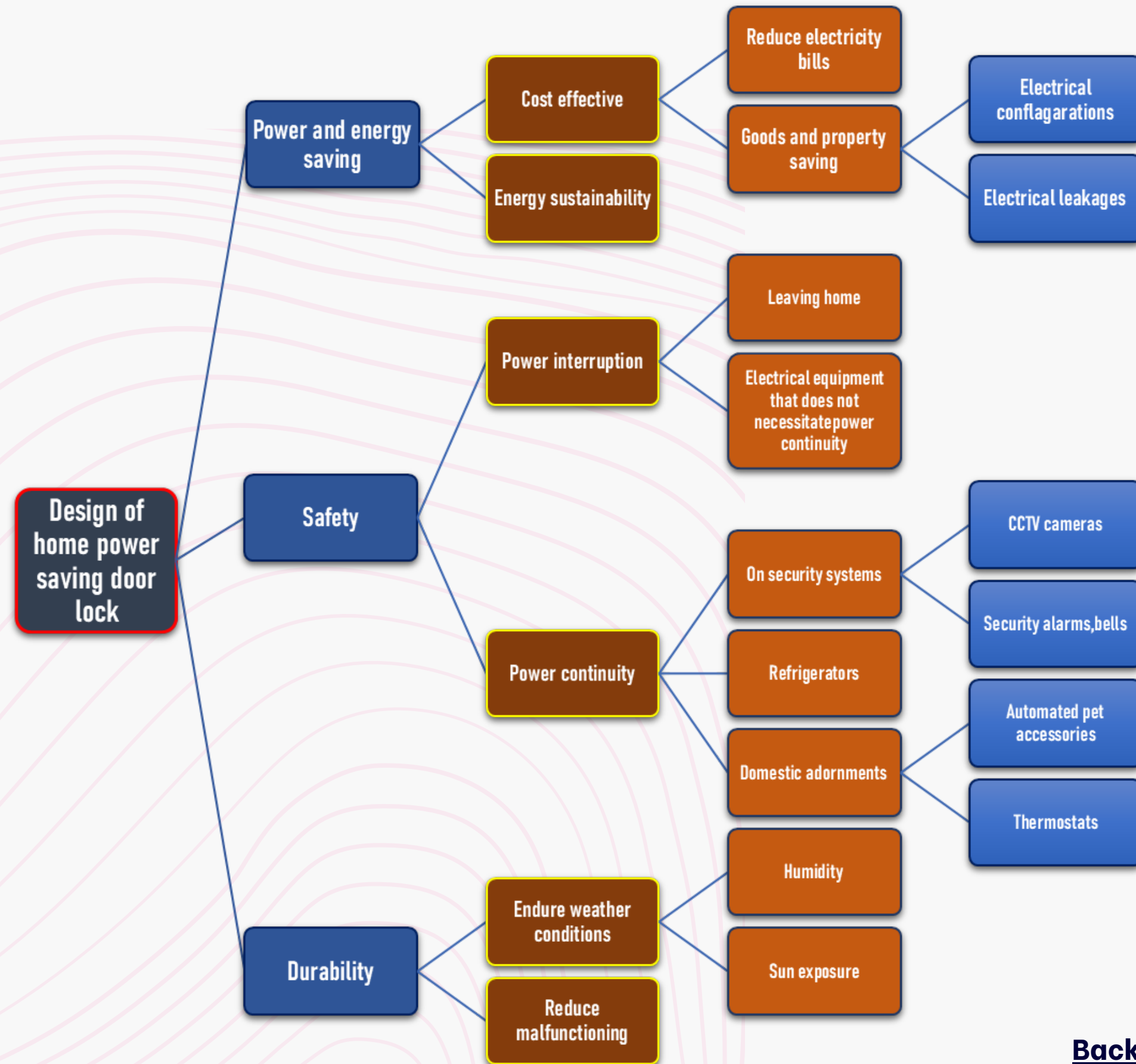
FUNCTIONAL ANALYSIS

MORPHOLOGICAL ANALYSIS

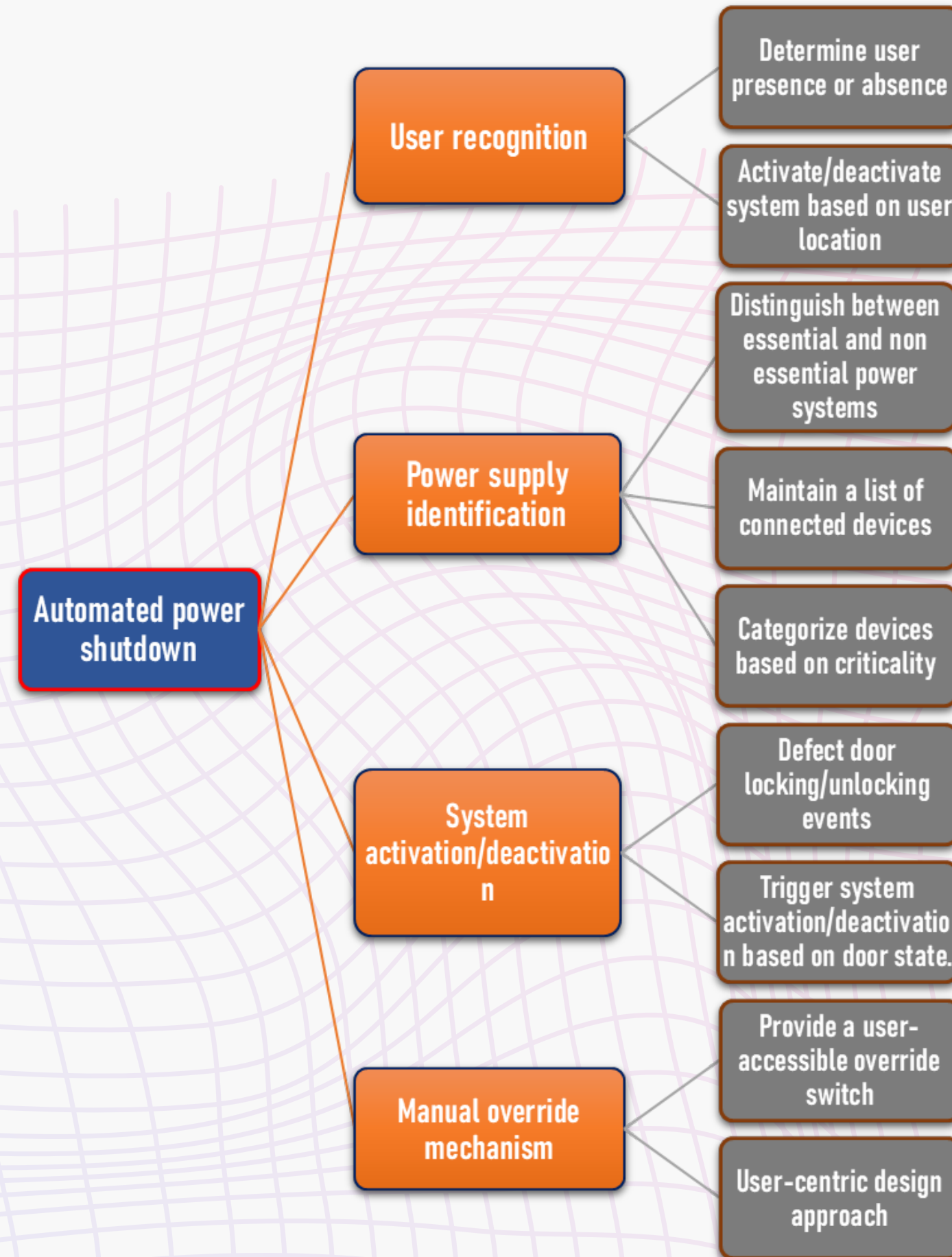
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Objective Tree Method



Functional Analysis



Morphological Analysis

Design 01 – A2B2C1D2E2

Design 02 – A3B3C2D3E1

Design 03 – A2B1C2D1E3

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Function to be performed	Solution 1	Solution 2	Solution 3
Deadbolt (A) 	Single deadbolt - From both inside and outside locking	Double deadbolts - 1 st deadbolt (from inside locking) - 2 nd deadbolt (from outside locking)	Double deadbolts - Inside deadbolt (Works from both inside and outside locking) - Outside deadbolt (Works only from outside locking)
Handle (B)	Wooden	Metal	Metal with rubber grip
Differential lock mechanism (C) 	Outside locking- key Inside locking- key	Outside locking- key Inside locking- adjustable hand latch	Outside locking- adjustable hand latch Inside locking- adjustable hand latch 
Door lock whole body (D)	Stainless steel	Brass	Copper
Outside deadbolt lock recognizer (E)	Switch	Sensor	Deadbolt circuit - Making closed outside deadbolt to complete the circuit.

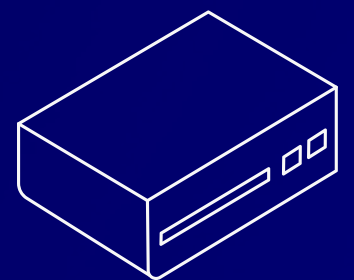
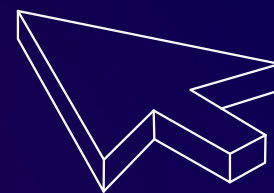
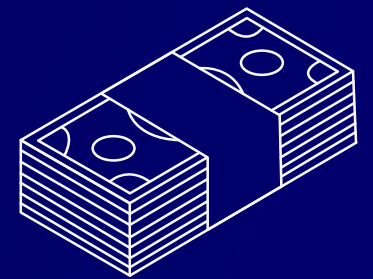
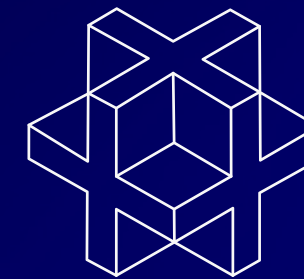
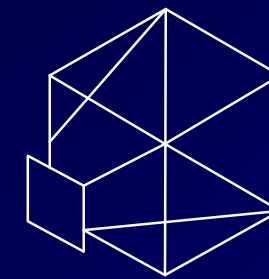
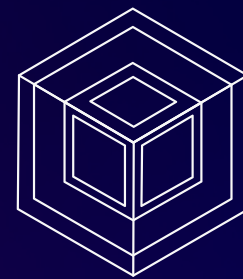
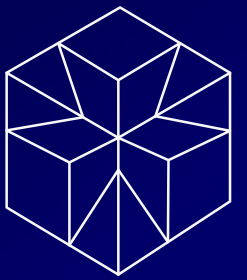
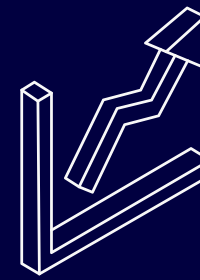
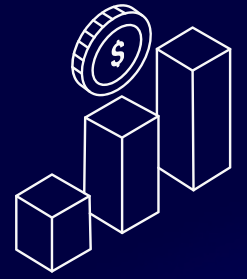
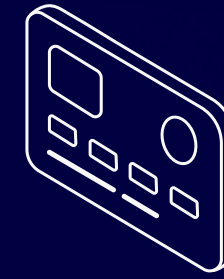
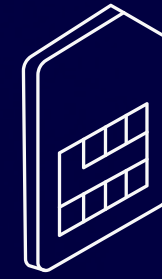
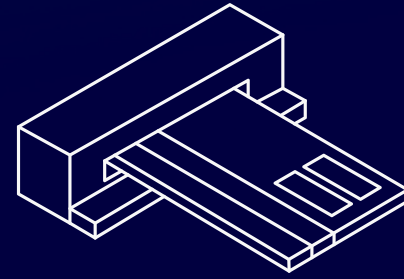
Weighted Decision Matrix

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Selection Criteria	Design 01		Design 02		Design 03		Weights
	R	Score	R	Score	R	Score	
Ease of manufacture	3	0.45	2	0.3	3	0.45	15%
Durability	3	0.6	4	0.8	1	0.2	20%
Protection by lock	3	0.75	4	1	3	0.75	25%
Low cost	2	0.3	2	0.3	3	0.45	15%
Human hazardless	2	0.3	3	0.45	2	0.3	15%
Handling ease	2	0.2	3	0.3	3	0.3	10%
Total Score	2.6		3.15		2.45		
Rank	2		1		3		
Continue?	No		Yes		No		

DESIGN



RESULTS & DISCUSSION

We made a differential lock that can lock the door from inside and outside separately by adding separated deadbolts for each lock.

No one locks the door from the outside if people did not leave the house.

By locking from the outside of the door, a signal is sent to the system indicating that there are no one in the house.

RESULTS & DISCUSSION

Those selections were made mainly according to following criteria.

- Durability
- Protection by lock
- Human hazardless

To achieve the maximum efficiency and benefit, the perfect design was selected through the solutions we had.

So, the power saving system will turn on when no one is at home.

CONCLUSION

- Survey shows that the energy wastage costs a lot and mostly happens when unwanted power supplies are ongoing while no one is at home.
- It also says that people like a home power saving door lock system as a solution for this.
- So, this door lock will save the money and also the energy.