ECE 411 Product Design Specification
Team 14

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1, First, choose something you want to decide on. I suggest something for your practicum project, like the microcontroller, or sensor, or maybe that new graphics card you've been wanting to buy! If you just can't come up with an idea to decide on, then choose something to purchase, like a new electric vehicle (5 pts).

We choose to compare electric cars (EVs) as our decision topic. This idea is consistent with our practicum project, which involves designing a sound system for electric automobiles. By examining several EV models, we may obtain a better grasp of the EV industry, design trends, and the technology that powers electric cars, particularly in areas relevant to our project's sound requirements and future integration needs. This comparison might help us improve our sound system design to meet standard EV criteria and customer expectations.

2, Make a Decision Matrix of this decision

Show the final matrices in the form of tables, and very briefly discuss each criteria calculation

Decision Matrix of this decision (Final)

		TESLA Model S Plaid	Porsche Taycan	BMW i7 M70	Rivian R3
Cost	5	3	3	1	4
Milage	5	4	3	2	4
Acceleration (0-60)	3	5	5	3	5
Software	4	4	4	3	4
Design	3	4	4	3	2
durability	3	3	4	4	3
Score		87	85	57	86

3, Now take that Decision Matrix from (2) above and use AHP instead using the same criteria and alternatives. Show your weights, comparison sub-tables, etc (5 pts).

Show the final matrices in the form of tables, and very briefly discuss each criteria calculation

Analytical Hierarchy Process (AHP) (Determine the criteria weightings)

	Cost	Mileage	Acceleration	Software	Design	Durability	Mean	Weight
Cost	1	7	7	7	5	3	4.155	0.48
Mileage	1/7	1	7	5	3	3	1.886	0.22
Acceleration (0-60)	1/7	1/7	1	5	7	3	1.135	0.13
Software	1/7	1/5	1/5	1	1	3	0.508	0.06
Design	1/5	1/3	1/7	1	1	1	0.46	0.05
Durability	1/3	1/3	1/3	1/3	1	1	0.481	0.06
							8.625	1.00

(AHP) (Rate alternatives relative to the Software criteria)

	TESLA Model S Plaid	Porsche Taycan	BMW i7 M70	Rivian R3	Software Rating
TESLA Model S Plaid	1.00	3.00	4.00	4.00	0.45
Porsche Taycan	0.60	1.00	3.00	3.00	0.29
BMW i7 M70	0.80	0.60	1.00	1.00	0.13
Rivian R3	0.80	0.60	1.00	1.00	0.13

(AHP) (Rate alternatives relative to the Design criteria)

	TESLA Model S Plaid	Porsche Taycan	BMW i7 M70	Rivian R3	Design Rating
TESLA Model S Plaid	1.0	1.0	4.0	5.0	0.4
Porsche Taycan	1.0	1.0	5.0	5.0	0.4
BMW i7 M70	0.1	0.1	1.0	1.0	0.1
Rivian R3	0.2	0.1	1.0	1.0	0.1

Analytical Hierarchy Process (AHP) (Final)

		TESLA Model S Plaid	Porsche Taycan	BMW i7 M70	Rivian R3
Cost	0.48	0.23	0.2	0.17	0.4
Mileage	0.22	0.31	0.16	0.15	0.38
Acceleration (0-60)	0.13	0.30	0.23	0.17	0.28
Software	0.06	0.45	0.29	0.13	0.13
Design	0.05	0.36	0.36	0.10	0.18
durability	0.06	0.21	0.29	0.29	0.21
Score		0.31	0.25	0.17	0.26

4, Did you get the same final result?

After comparing different EV models using both the Decision Matrix and Analytical Hierarchy Process (AHP) methods, we arrived at a consistent overall ranking. Both approaches ranked the Tesla Model S Plaid as the top choice and the BMW i7 M70 as the least favorable option. The Rivian R3 emerged as a strong second choice in both methods, while the Porsche Taycan had a slightly lower score.

Despite small changes in scores due to varied weighting and assessment techniques, the final rankings were mostly consistent with the Decision Matrix and AHP. This consistency across methods strengthens our belief in the Tesla Model S Plaid as the best choice for our criteria, ensuring that the selection is well-rounded and successfully addresses both practical and performance-based goals.