

Practicum Decision Matrix and AHP

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Question and Criteria

Our group was deciding on which **battery technology** to use for our handheld video game console. The three options were AA batteries, a 9V battery, and a LiPo battery.

We based this decision on the cost to manufacture, charge capacity, size, whether or not the battery was rechargeable, how easy they are to replace, and the nominal voltage.

We compared manufacture cost by finding rough estimates for the price of each battery when purchased in bulk.

For the charge capacity, we estimated how long the system would last with each battery relative to one another.

We ranked battery size by how much space they would take up, and ranked the thinner LiPo battery higher.

We gave AA batteries and 9V batteries a score of 2 for rechargeability since they are not usually rechargeable, but some can be found, while the LiPo scored 5.

The replacement score was based on how easy and convenient it would be for the user to replace the battery. AA and 9V batteries scored highly, since they are common and cheap, while the LiPo is much more expensive.

The nominal voltage rating was based on how easy it is to power a 3.3V system using the battery technology. AA batteries scored low, since at least 3 of them are needed in series to achieve this, and the 9V battery scored relatively low, since a large voltage drop is needed, which is inefficient when using a linear regulator.

Decision Matrix

With the decision matrix, we found that the LiPo battery was the best option

		AA Batteries (x3)	9 V	Li-po
Manufacture Cost	4	3	4	2
Charge Capacity	4	4	3	4
Size (Small)	3	3	3	5
Rechargeability	3	2	2	5
Replacement (Access)	2	5	5	1
Nominal Voltage	2	2	3	5
SCORE		57	59	66

AHP

The AHP method showed that the 9V battery is slightly better than the LiPo battery. This seems to be due to the high importance we gave to manufacturing cost, since the LiPo battery is much more expensive than the alternatives. Despite this, we are still inclined to choose the LiPo battery, which means that cost is less important to us than our weights show.

AHP Analysis	Weights	AA Batteries (x3)	9V Battery	LiPo Battery
Manufacture Cost	0.37	0.37	0.57	0.06
Charge Capacity	0.25	0.36	0.21	0.43
Size (Small)	0.22	0.13	0.25	0.63
Rechargeability	0.08	0.22	0.22	0.56
Replacement (Access)	0.04	0.45	0.45	0.09
Nominal Voltage	0.04	0.20	0.30	0.50
SCORE		0.30	0.37	0.34