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Design of a swarm of Unmanned Aerial Vehicles for the exploration of Mars

Document:

Budget

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BACHELOR FINAL THESIS

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Chapter 1

Budget

This bachelor's degree thesis didn't have any associated costs apart from the working hours, the computational power and the material used. Thus, the total estimated cost is associated with the required hours to complete the different tasks that conform to the project, which have been multiplied by the hourly salary average of an aerospace engineer graduate in Spain (12.5 €/h [1]), and the energy consumed.

Table 1.2, shown in the next page, summarizes the results.

Hence, the itemized budget has been calculated for different areas:

- **Research, report and computation costs:** they have been calculated multiplying the 12.5 €/h (hourly salary average of an aerospace engineer graduate in Spain) by the time (in hours) spent for each task.
- **Software licenses and material costs:** they are the sum of the price of each item.
- **Power consumed cost:** it is obtained from multiplying the energy consumption (equation 1.1) by the average price of a kWh in Spain¹ (see equation 1.2).

$$\frac{60 \text{ W} \cdot 505 \text{ h}}{1000} = 30.3 \text{ kWh} \quad (1.1)$$

where the 60 Watts are the power consumed by the computer and the 505 h are the total time spent to complete this bachelor's degree thesis (see table 1.1).

$$30.3 \text{ kWh} \cdot 0.3071 \text{ €/kWh} = 9.31 \text{ €} \quad (1.2)$$

Total time (h)	Total cost (€)
505	7512.50

Table 1.1: Total time spent to calculate the power consumed cost. *Source: own elaboration*

¹0.3071 €/kWh is the average price of a kWh in Spain[2].

Task	Time (h)	Cost (€)
Research		
TOTAL	250	3125
Report		
Project charter and introduction	20	250
State of the art	20	250
Theoretical background	15	187.50
Mission definition	23	287.50
Single UAV overview	60	750
The swarm of UAVs	30	375
Multiplatform architecture	15	187.50
Budget	4	50
Conclusions and future work	10	125
Appendix	8	100
TOTAL	205	2462.50
Computation		
Coding	50	625
TOTAL	50	625
Item	Consumption (kWh)	Cost (€)
Power consumed		
Energy	30.3	9.31
TOTAL	30.3	9.31
Item	Cost (€)	
Software licenses and material		
Matlab	0 (student license)	
Computer	1250	
Office supplies	50	
TOTAL	1300	

Table 1.2: Itemized budget. *Source: own elaboration*

Finally, the total time and costs are shown in table 1.3:

Total time (h)	Total cost (€)
505	7521.81

Table 1.3: Total time and cost of this bachelor's degree thesis. *Source: own elaboration*

References

1. GLASSDOOR. *Sueldo para Ingeniero Aeroespacial en España*. Available also from: https://www.glassdoor.es/Sueldos/ingeniero-aeroespacial-sueldo-SRCH_K00,22.htm. [Accessed: December 27, 2022].
2. DATOSMACRO.COM. *España - Precios de la electricidad de los hogares*. Available also from: <https://datosmacro.expansion.com/energia-y-medio-ambiente/electricidad-precio-hogares/espana>. [Accessed: December 27, 2022].