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Master Thesis

Budget

Study of stability control systems applied to a racing car

Author:
Albert Inglés Navarrete

Supervisor:
Dr. David Gonzàlez

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Declaration of Authorship

I, Albert Inglés Navarrete, declare that this thesis titled, 'Study of stability control systems applied to a racing car' and the work presented in it is my own. I confirm that this work submitted for assessment is my own and is expressed in my own words. Any uses made within it of the works of other authors in any form (e.g., ideas, equations, figures, text, tables, programs) are properly acknowledged at any point of their use. A list of the references employed is included.

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Chapter 1

Budget

1.1 Budget

In this section, the economical expenses which have been necessary to develop the project will be evaluated: the direct and indirect costs. The following criteria will be applied to distinguish the direct and indirect costs: the engineering process that must be made by a person is considered direct costs and the means to perform this engineering process are considered as indirect costs:

1.1.1 Direct Costs

At this point, and considering the standard salary of a aerospace engineer extracted from the [1] as 26323.57 €/*year* and with a total hours of 1792 h/*year* the direct costs estimated are:

TABLE 1.1: Direct Costs

Engineering			
Task	**Hours**	**€**/*h*	**€**
Research	100	14.69	1468.95
Software Development	200	14.69	2937.90
Report	100	14.69	1468.95
Total	**400**	**14.69**	**5875.80**

1.1.2 Indirect costs

The indirect costs including licensing, amortizations and electricity costs are described as:

TABLE 1.2: Indirect Costs

Software				
Program	**Years**		**€**/*Year*	**€**
MATLAB ©	0.5		1200	600
Facilities Amortization				
Computer	**Years**		**€**/(5 **Years**)	**€**
Mountain Iridium	0.5		2200	220
Energy Consumption				
Computer	**Hours**	**Consumption [W]**	**€**/*kWh* [2]	**€**
Mountain Iridium	500	60.00	0.13594	4.08
Total Indirect Costs				
Total			**1813.34 €**	

1.1.3 Total Costs

Obtaining a final cost of the study of:

TABLE 1.3: Total Expenses

	Amount [€]
Direct Costs	5875.80
Indirect Costs	1624.08
Total	**7499.88**

1.2 Environmental Study

The emitted CO_2 due to this study is considered to be only caused by the energy consumption due to the computers so using the relation between energy and kg_{CO_2} [3] the results are:

Mountain:

$$\frac{60.00W \cdot 500h}{1000} = 30kWh \tag{1.1}$$

Total CO_2 generated:

$$30kWh \cdot \frac{0.703kg_{CO_2}}{1kWh} = 21.09kg_{CO_2} \tag{1.2}$$

References

[1] BOE-A-2019-14977: XIX CONVENIO COLECTIVO NACIONAL DE EMPRESAS DE INGENIERÍA Y OFICINAS DE ESTUDIOS TÉCNICOS. *BOE*, Núm. 251 Sec. III:pag, 114772–114802, 2019-08-18.

[2] ENDESA. Precio de la electricidad en tiempo real, 2020. URL https://tarifaluzhora.es/?tarifa=normal{&}fecha=2021-01-05.

[3] US Enviromental Protection Agency. Greenhouse Equivalencies Calculator, 2020.