



MIDDLE EAST TECHNICAL UNIVERSITY

DEPARTMENT OF  
ELECTRICAL AND ELECTRONICS ENGINEERING

EE493 ENGINEERING DESIGN I

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## Car Chasing Robot Proposal Report

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**Supervisor:** Assoc. Prof. Emre Özkan

**ADDRESS**

**Project Start:** 4/10/2018

**Project End:** 26/5/2019

**Project Budget:** \$450

**Company Name :** Duayenler Ltd. Şti.

Members	Title	ID	Phone
Sarper Sertel	Electronics Engineer	2094449	0542 515 6039
Enes Taştan	Hardware Design Engineer	2068989	0543 683 4336
Erdem Tuna	Embedded Systems Engineer	2617419	0535 256 3320
Halil Temurtaş	Control Engineer	2094522	0531 632 2194
İlker Sağlık	Software Engineer	2094423	0541 722 9573

November 9, 2018

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# **1 notes**

- 1.1 problem statement, societal impact of the project,**
- 1.2 company organization (human resources, etc.),**
- 1.3 specific requirements and objectives of the project**
- 1.4 approach to the solution of the problem**
- 1.5 outline of the requirements for any standards that the product would need to comply with,**
- 1.6 deliverables and expected outcomes of the project,**
- 1.7 tentative cost-budget analysis,**
- 1.8 time plan (Gantt chart),**

## **2 Executive Summary**

## **3 Introduction**

## **4 Team Organization**

DUAYENLER Ltd. Şti. (DUAYENLER) was founded in September 2018 by five electrical and electronics engineering students from Middle East Technical University. The company structure is shown in *Figure 1*. The team is composed of variously skilled visionary members. The leader of the team is Halil Temurtaş, a control engineer. Being the team leader, Halil manages the organization of the members as well as drawing an outline for the future calendar. He is experienced in using microcontrollers, device testing and project scheduling. He will be working on the development of the subsystems computation, motion and driving in parallel with his experiences. Sarper Sertel, electronics engineer, has a wide understanding of microelectronics circuits and their design as well as analog lumped circuits. He is also interested in mechanical systems. He will be working on structure, driving and sensing subsystems. Enes Taştan, hardware design engineer, is interested in several topics such as electronics and mechanics. He can also design PCBs. He will be participating to development of driving, motion and structure



Figure 1: Company Tree of DUAYENLER.

subsystems. Erdem Tuna, embedded systems engineer, is experienced in use of micro-controllers with sensors and likes programming. He will be contributing in computation and sensing subsystems. Lastly İlker Sağlık, software engineer, is also interested in programming and microcontrollers. He will be working on sensing and driving subsystems.

## 5 Requirement Analysis

Reqs, soln puanlama

	Having Fun	Competition	Original Solution	Budget	Mechanical Challenges	Complexity	Marketability	Total	Weighted Objectives
Having Fun	0	0,5	0,75	0,8	0,9	0,6	0,8	4,35	0,2
Competition	0,5	0	0,7	0,7	0,5	0,75	0,8	3,95	0,2
Original Solution	0,25	0,3	0	0,6	0,7	0,55	0,8	3,2	0,16
Budget	0,2	0,3	0,4	0	0,2	0,3	0,8	2,2	0,1
Mechanical Challenges	0,1	0,3	0,3	0,8	0	0,3	0,8	2,6	0,12
Complexity	0,4	0,25	0,45	0,7	0,7	0	0,8	3,3	0,16
Marketability	0,2	0,2	0,2	0,2	0,2	0,2	0	1,2	0,06
								20,8	1

Figure 2: Pairwise Comparison Charts

	Having Fun (0.2)	Competition (0.2)	Original Solution (0.16)	Budget (0.1)	Mechanical Challenges (0.12)	Complexity (0.16)	Marketability (0.06)	Total
Balloon	8 1,6	10 2	6 0,96	4 0,4	0 0	2 0,32	6 0,36	5,28
Air Hockey	8 1,6	8 1,6	4 0,64	8 0,8	2 0,24	6 0,96	8 0,48	5,84
Chasing Cars	10 2	8 1,6	8 1,28	6 0,6	6 0,72	8 1,28	10 0,6	7,48
Mapping	4 0,8	4 0,8	8 1,28	2 0,2	8 0,96	0 0	6 0,36	4,04

Figure 3: Project Evaluation Chart

	Performance	Marketability	Environmental Effects	Feasibility	Total	Weighted Objectives
Performance	0	1	0,8	0,8	2,6	0,45
Marketability	0	0	0,4	0,35	0,75	0,12
Environmental Effects	0,2	0,6	0	0,5	1,3	0,23
Feasibility	0,2	0,35	0,5	0	1,05	0,2
					5,7	1

Figure 4: Pairwise Comparison Charts for Objectives

	Fast Operation	Robust	Weight Balance	Total	Weighted Objectives	Weighted Objectives
Fast Operation	0	0,55	0,4	0,95	0,32	0,144
Robust	0,45	0	0,5	0,95	0,32	0,144
Weight Balance	0,6	0,5	0	1,1	0,36	0,162
				3	1	0,45

Figure 5: Pairwise Comparison Charts for Sub-Objectives

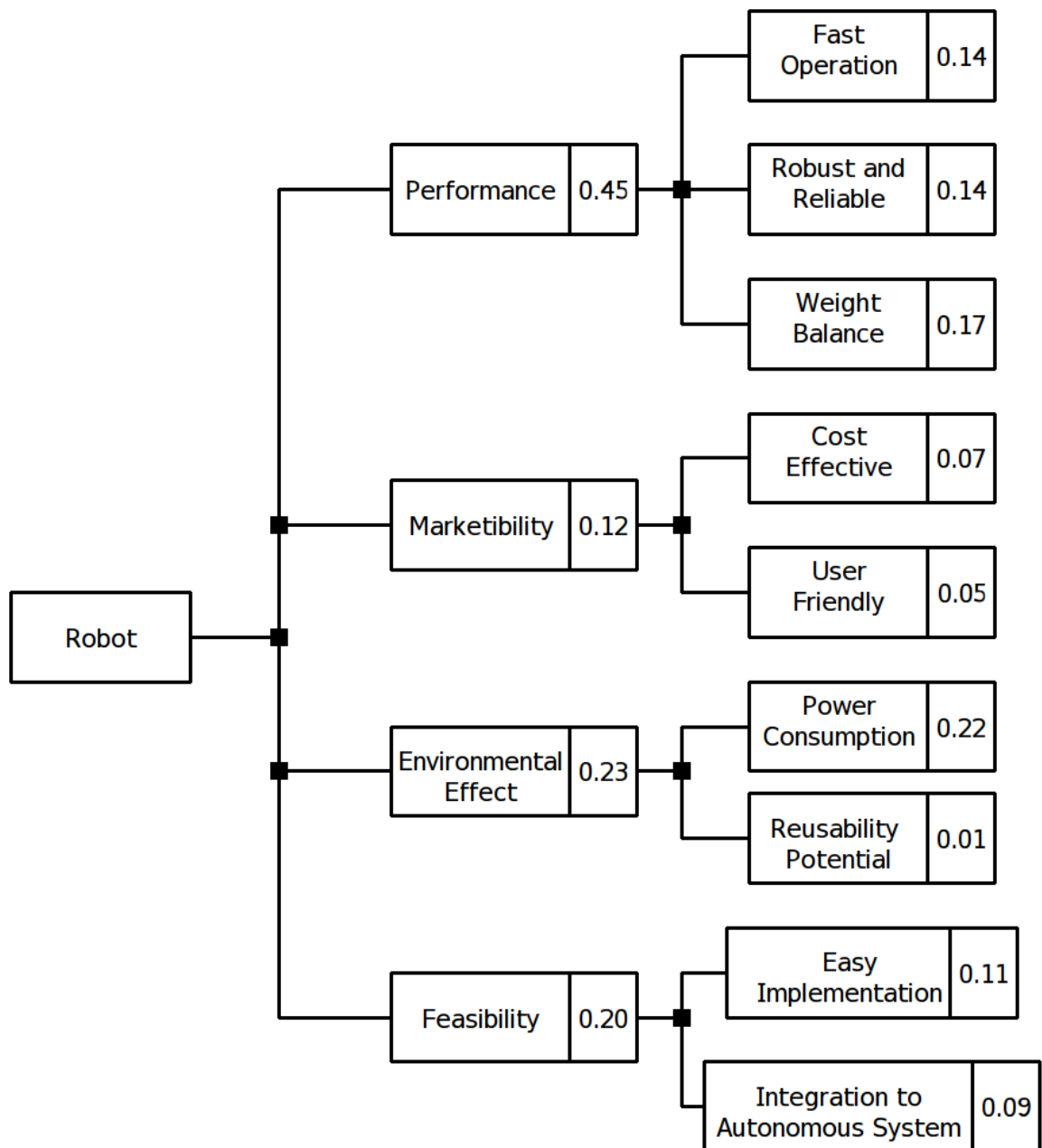


Figure 6: Weighted Objective Tree

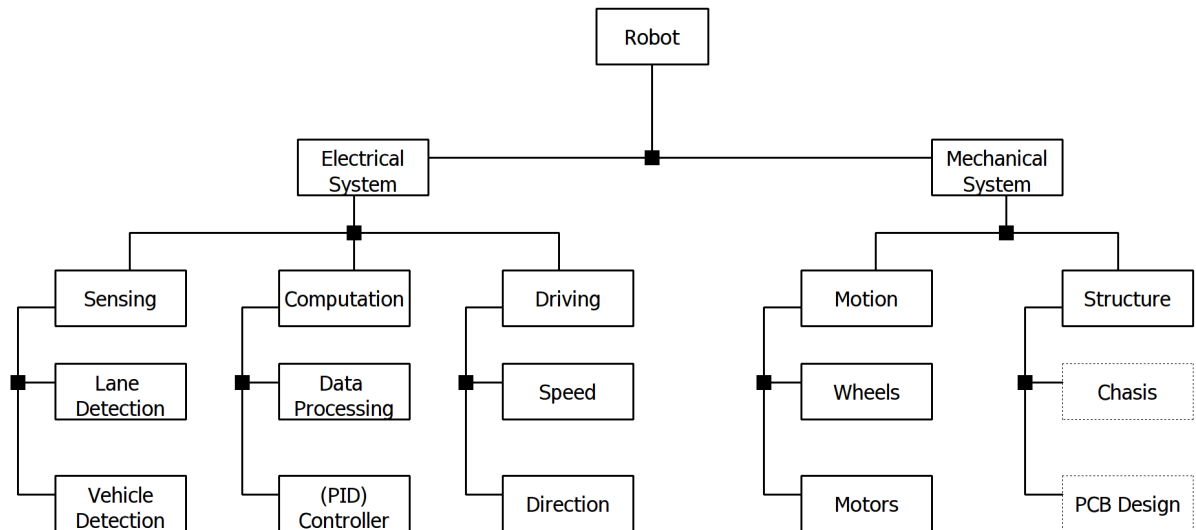


Figure 7: Weighted Objective Tree

## 6 Standards Section

## 7 Solution Procedure

## 8 Expected Deliverables

## 9 Conclusion

## A Gantt Chart

Is the problem sufficiently important to justify money, company time, and your effort?

Is the





		T0+	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
4	Critical Design Phase																													
4.1	First Semester																													
4.1.1	Electrical System Design																													
4.1.1.1	Sensing Unit Design																													
4.1.1.2	Computational Unit Design																													
4.1.1.3	Driving Unit Design																													
4.1.2	Mechanical System Design																													
4.1.2.1	Motion Unit Design																													
4.1.2.2	Structure Design																													
4.1.3	To be detailed																													
4.2	First Semester Outcomes																													
4.2.1	Standards Report																													
4.2.2	Module Test Demo																													
4.2.3	Conceptual Design Report																													
4.2.4	Presentations																													
4.3	Second Semester																													
4.3.1	To be detailed																													
4.4	Second Semester Outcomes																													
4.4.1	Critical Design Review Report																													
5	Test & Evaluation Phase																													
5.1	First Semester Activities																													
5.1.1	To be detailed																													
5.2	First Semester Outcomes																													
5.2.1	To be detailed																													
5.3	Second Semester Activities																													
5.3.1	To be detailed																													
5.4	Second Semester Outcomes																													
5.4.1	Critical Design Review Report																													
6	Finalization Phase																													
6.1	Activities																													
6.1.1	To be detailed																													
6.2	Outcomes																													
6.2.1	Finalized Product																													
6.2.2	Final Report																													
6.2.3	Final Demo																													
7	Project Ending																													