MIDDLE EAST TECHNICAL UNIVERSITY

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

EE493 ENGINEERING DESIGN I

Business Statement Report

Supervisor : Assoc. Prof. Emre Özkan (Section 6)
Company Name : Duayenler Ltd. Şti.
Members : Sarper Sertel, 2094449 (Contact Person)
Enes Taştan, 2068989
Erdem Tuna, 2617419
Halil Temurtaş, 2094522
İlker Sağlık, 2094423

October 19, 2018

Contents

1 Introduction

2 About the Company

2.1 Our Mission

Our mission is to design products for real life problems by creating innovative solutions.

2.2 Our Mission

Our vision is to be frontier in robotics by intelligently automating the future world.

3 About Us

Figure 1: Kişi1

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

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Figure 2: Kişi2

Figure 3: Kişi3

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Figure 4: Kişi4

Figure 5: Kişi5

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Justification of the composition of the team _____ TODO NOTE

4   Description of the Projects

The analysis of each projects including possible challenges and solutions are given in this section.

4.1   Devices Competing to Catch Falling Balloons

In this project, we are supposed to design and construct two robots that try to catch falling balloons before they touch the floor. However, we have some limitations with this design. Firstly, the sizes of the robots must not exceed the upper limit provided us. Secondly, robots are not allowed to touch, push or contact each other. Thirdly, the protection from the interference from robots' sensors is required.

There are two major problems related to this project. First problem is moving the robot to the direction of the balloon. To solve this, a built-in camera on the robots can be utilized. We can take a reference point on the camera, and try to make it aligned with the balloon. However, image processing is highly required. Second problem is the way of catching the balloons. Robot arms or vacuums can be utilized in this step. However, we think the vacuums would be much easier. In overall, image processing and algorithm to make robots tend the direction of balloons avoiding collusion are required.

4.2   Devices Trying to Score in Each Other's Goals

In this project, we need to design a device which can play basically air hokey by remote control (no Wi-Fi) in a hexagonal playground. This project is focusing on RF communication and real-time process. No naked eye and onboard camera requirement video transmission should have no lag and right angle. There are, also, some mechanic problems which are how to respond a ball and how to handle with the stuck ball. Our approach to camera angle is using a servo motor and adding a camera control button to controller, so in every condition of the device, player can observe field properly. For hitting the ball, our consideration has two part using momentum of the ball to respond during the game, so orientation problem can be solved. On the other hand, to solve stuck ball problem and the beginning of the game, we need to push the ball. Therefore, we can add impulsive component to one side. To handle with real-time process, we should have fast algorithm in communication and movement.

4.3   Vehicles Chasing Each Other Around a Closed Course with Varying Properties

In this project, we are required to build a vehicle that can travel around a closed elliptical route as fast as possible. Furthermore, it should stay on the elevated path. At first glance, the main requirement of the vehicle is to have a reliable and quick responsive

motion control system. To handle the turns on the path, a differential drive principle can be used as well as direction changing wheels. However, the latter one is hard to build and need to be tested if it is capable of handling the specified path. Another factor that needs to be put attention is the speed of the vehicle. Since it is a race between two vehicles, it is better to come up with the most practical and feasible solutions for the controls system so that the processing load is minimized. After all, the vehicles are required to complete the path in less than 20 seconds.

The winner is defined to be the vehicle that can approach to other one from the back less than 5 cm. Therefore, the vehicle should have a function that when the winning event occurs, it can stop the race by so called handshake protocol. The overlooking cameras are not allowed but it is not a feasible way either. It is because processing the image and sending the necessary informations to vehicle so that it performs accurately is too much process and would take longer compared to data coming from sensors onboard. Also, a suspension system might be needed to achieve stability against rough surfaces or disturbances. In addition, there needs to be protection system on the vehicle so that the collision with the other one never occurs.

4.4 Devices Trying to Extract the Plan of Their Surroundings

The project requires a mobile vehicle that can travel in a meaningful path such that the device neither crashes any of the obstacles nor the exterior walls but can map the whole playfield accurately. The main limiting factor in the solution is the use of same color for both the obstacles and the exterior wall. This limitation prevents the implementation of a simple color thresholding solution for the object detection with the help of a imaging system such as a camera. A possible way to handle the object detection problem would be to use "shadow games" so that light shades of the color indicate a possible object whereas the dark shades of the color might mean exterior wall. Certainly, mapping the playfield is important as much as object detection. The vehicle should be able to get the distance of it to its environment.

The overall solution requires a combination of many steps, mainly, image processing, direction automation with respect to surroundings, an algorithm to create map.

5 Conclusion

Appendices:

Time table for the tasks including the assignment of responsibilities until the submission of the proposal report

Enes Taştan

Gömü köyü, Cavcav Mah. No: 3
Amasra, Bartın
Türkiye
✆ *+90 543 683 43 36*
☎ *+90 378 315 34 76*
✉ enest191@gmail.com

▬▬ PERSONAL PROFILE

An aspirant and diligent physics undergraduate who currently makes double major with electrical and electronics engineering with the aim of integrating principles of science with practicality of engineering. Demonstrates high interest in experiments with resourceful and creative profile. Enjoys sharing academical knowledge with colleagues.

▬▬ EDUCATION

2016–2020 (expected)	**Electrical and Electronics Engineering (BSc)**, *Middle East Technical University (METU)*, Double major .
2014–2019 (expected)	**Physics (BSc)**, *Middle East Technical University (METU)*, Major.
2010–2014	**Bartın Hasan Sabri Çavuşoğlu Science High School**, *Bartın*.

▬▬ LANGUAGES

Turkish	Native
English	Advanced
Arabic	Beginner

▬▬ COMPUTER SKILLS

Office	Intermediate	Altium Designer	Beginner
Python	Intermediate	Java	Beginner
Matlab	Intermediate	LaTeX	Advanced
ROOT	Beginner	SolidWorks	Beginner

○ Able to solve an arbitrary encountered problem using appropriate language
○ Matlab and Python for mostly scientific computation purposes

▬▬ EXPERIENCES

Internship	Summer Practice at *Institute of Accelerator Technologies, TARLA Facility*

  ○ 20 days mandatory summer practice
  ○ gained PCB design and production skills
  ○ worked on linear power supply and multimeter design

MEMBERSHIPS
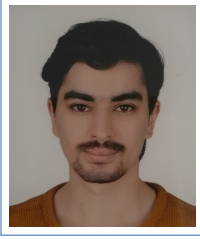
Physics
Society

Management board member, conducted LaTeX seminars

Machinary
Innovation
Society

Attandence to introductory courses and projects

ACHIEVEMENTS

TUBİTAK
2205

Bachelor Scholarship *given for those who register science departments with the degree within the first 5000 in university entrance exam in 2014*

REFERENCES

Available upon request

Halil Temurtas

Curriculum Vitae

Education

2014–Present	**BSc**, *Middle East Technical University*, Ankara, *CGPA – 3.05*. Electrics and Electronic Engineering
2010–2014	**High School**, *Ankara Ataturk Anadolu Lisesi*, Ankara, *GPA – 90.3/100*.

Projects

VLA	A Student Researcher at an Independent Research and Development Project for Development of Very Light Aircraft (VLA) by Middle East Technical University (METU) and Turkish Aircraft Industries Corporation (TAI)
EE213	Analog Air Conditioner System, 3rd Semester Laboratory Term Project
EE214	Flute Controlled Car, 4th Semester Laboratory Term Project
EE313	FMCW Based Distance Measuring System, 5th Semester Laboratory Term Project

Experience

Summer Practice

2017	**Summer Intern**, Turksat Uydu Haberlesme Kablo TV ve Isletme A.S., Ankara. 20 days mandatory summer practice. Worked on project management systems on a project about sun tracking solar panel system. ○ Between July and August 2017 Detailed achievements: ○ Raspberry Pi / Python ○ Arduino ○ Introduction to project management systems

Intern Engineer

2018 **Intern Engineer**, TURKISH AIRCRAFT INDUSTRIES CORPORATION (TAI) , Ankara.

One day per week engineering program from TAI for engineering students.
○ Between March and May 2018

Summer Practice

2018 **Summer Intern**, ASELSAN A.S., Ankara.

20 days mandatory summer practice. Observed and participated on environmental test of products at HBT,ASELSAN and conducted research work on components
○ Between July and August 2018

Computer skills

Basic PYTHON, VERILOG

Intermediate GIT MATLAB ,HTML, LATEX, MICROSOFT OFFICE, MICROSOFT WINDOWS, C

Languages

Turkish **Mothertongue**

English **Upper Intermediate**   *Conversationally fluent*

German **Basic**   *Basic words and phrases only*

Exams

YDS 2015 **95/100**

METU EPE **87.5/100**   *English Proficiency Exam done my METU*
2015

Interests

Taekwon-do **Green-Blue Belt**   *Metu Taekwon-do Club*

İlker Sağlık

Curriculum Vitae

📱 +90 (541) 722 9573
✉ ilkersaglik.ee@gmail.com
🖰 https://github.com/isaglik

Education

2014–2019	**BSc**, *Middle East Technical University*, Ankara, . Electrical and Electronics Engineering
2009–2013	**High School**, *Macit Zeren Fen Lisesi*, Amasya, .

Projects

EE213	*Analog Air Conditioner System, Laboratory Term Project*
EE214	*Fire Alarm System, Laboratory Term Project*
EE313	*FMCW Based Distance Measuring System, , Laboratory Term Project*

Experience

Summer Practice

2018	**Summer Intern**, *ASELSAN A.Ş.*, Ankara. 20 days mandatory summer practise.Observed and participted some works at REHİS, Gölbaşı between August and September 2018.

Languages

Turkish	Native
English	Advanced
German	Beginner

Computer skills

Basic	Git, Verilog, Arduino, Latex
Intermediate	Microsoft Office, Microsoft Windows, MATLAB, LTspice, C, C++

Interests

Hobby	Strength and durability training

SARPER SERTEL

Çankaya Mah. Kaktüs sok. Kayapark sitesi 10/7 (F blok) Eskişehir / Turkey

Üniversiteler Mahallesi, Dumlupınar Bulvarı No:1, 06800 Çankaya/Ankara

E mail: sarpersertel@gmail.com

e209444@metu.edu.tr

Mobile: +90 542 515 6039

Personal Profile

Goal oriented senior Electrical and Electronics Engineering student. Dedicated and fastidious group member or professional, organized group leader with great interpersonal skills. Demonstrates required performance even under highly stressful conditions. Reasonable Perfectionist.

Education

2014- present	B.S. Electrics and Electronics Engineering Middle East Technical University, Ankara, Turkey
2010-2014	Fatih Anatolian Highschool Eskişehir/Turkey

Experiences

August 2017 – September 2017	Intern 1'inci Hava Bakım Fabrika Müdürlüğü (First Air Maintenance Factory Management) Eskişehir/ Turkey Maintenance, repair, test and calibration of benches and electronic systems
June 2018 – July 2018	Intern ASELSAN A. Ş. Ankara/ Turkey Analog design

Language

Turkish (Native)

English (Fluent)

German (Beginner)

Computer Skills

LTspice

Vee Pro

Beginner: C, Matlab

Personal Interests

New technologies in Car and Military Industry

Hardware parts of mobile devices

Strength and durability training
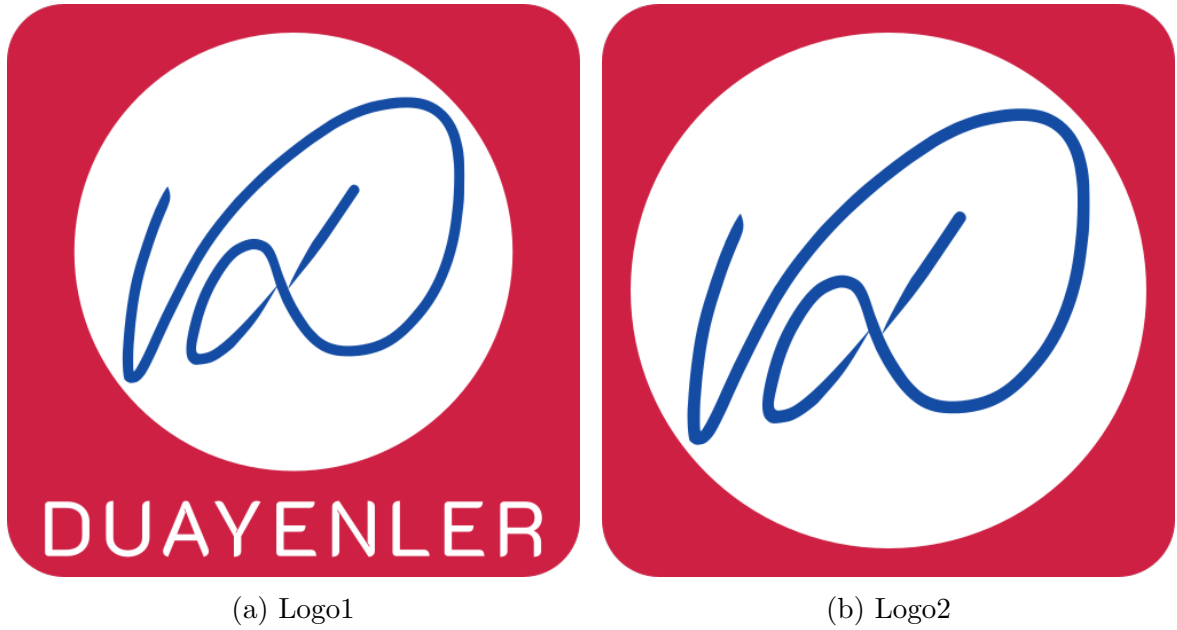
- Item

- Item

Figure 6: Logo

(a) Logo1   (b) Logo2

Figure 7: Small Logos

Table 1: table

A	B	C
1	2	3
2	3	4
3	4	5
4	5	6

A ⟍ a	Average deviation after subtracting out the frequency error	C
1	2	3
	3	4
3	4	
4	5	6

Table 2: table

14