MIDDLE EAST TECHNICAL UNIVERSITY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

EE 493-DESIGN STUDIO 1

BUSINESS STATEMENT REPORT

revolusys





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1.INTRODUCTION

Revolusys is an innovative high-tech company founded by five enthusiastic electrical engineers. Upon foundation, it has immediately received several project proposals. Each of these proposals bring unique challenges with them and they require a thorough understanding of engineering concepts and a deep knowledge of theory. However, before accepting any such offer, we believe it is crucial that the company must be investigated from each and every aspect and then based on this, the offers must be analyzed. Therefore, this report aims to explain the fundamental motivations behind the foundation of the company, describe its structural organization and articulate on how the team members complement each other by bringing expertise from various electrical engineering domains. Then based on these descriptions, the project proposals will be analyzed hoping to find the most suitable offer for the company.

2. MISSION AND VISION STATEMENTS OF THE COMPANY

Mission: Revolusys develops novel solutions to demanding engineering problems.

Vision: Revolusys aims to provide the most robust and functional products to its customers while respecting the environment and prioritizing engineering ethics.

3.HUMAN RESOURCES

In EE493 and EE494 engineering design courses require information from different fields of electrical and electronics engineering, various skills, proper planning and management of project process and teamwork. Here, in Revolusys Inc., we gathered as 5 senior engineering students to successfully come up with a solution to one of the projects offered this year.

Our members are from 5 different specialization areas: Electronics, Telecommunications, Computer, Control and Biomedical. That diversity will help us to handle different problems on different topics. Also, each group member has specific knowledge on some issues.

Onur Akdeniz and Ozan Berk Boyraz are conducting their education on Electronics & Biomedical Areas. They can design analog/ digital circuits for specific purposes. Doğukan Atik is from Telecommunication option and he is experienced on MATLAB, he can solve the signal processing issues. Ahmet Demirdaş is working with microcontrollers, he is good at coding. Mert Eyüboğlu is from Control option, he can solve the problems about moving parts of the system and stable operation of the system.

4.BRIEF DECRIPTIONS OF PROJECTS

- ***Smart Connected Cat Feeding & Monitoring System***

In this project, the customer requests us to build up an automated system that feeds cats safely, healthily and efficiently. To accomplish this task, the system should be able to distinguish between the cats and dogs. Furthermore, it should be able to identify different cats

and feed them accordingly. However, it should keep a record of its feeding history so that it can regulate the feeding regime of any cat. The customer further requests that the system should be portable and it should have a long battery life. Also, they want to monitor the device status via internet.

- ***Autonomous Valet Parking Service***

Autonomous Valet Parking Service system is solving the parking problem. Drivers generally have difficulties in finding a park place, entering a free lot and even exiting the car when it is parked. It happens most of the times in places like airports, shopping malls, etc. Valet serves the drivers as all-in-one system that can take the car from the driver at the entrance lot and place it to an empty lot on a 3x3 grid parking area.

In this project, we are asked to design the mechanism of a robot that can detect the free lots on the grids and carry the car to that lot and also bring the car back to the driver when it is asked by the driver to bring it back, it can follow the order and by making necessary car moving operations, bring the car back to the driver.

The required background for this project is including image processing, feedback and control system knowledge. We are also asked to create a mobile phone application so mobile application software knowledge will also be required.

- ***Where am I?***

In this project mainly two tasks are requested to be accomplished by us which are map extraction and localization. In the first step, which is map extraction, we need to come up with a vehicle that is able to extract the map of a game field which contains physical and magnetic landmarks. In order to achieve this we are allowed to track the position of our vehicle by a camera that is placed about 1m above the game field. The position information obtained by the camera then will be sent to the vehicle by means of wireless communication. With the gathered position data the vehicle must accomplish the required computations and extract the map of the field. In the second step, with the lack of camera information, the vehicle needs to find its position on the map that it has extracted and send its estimated position to a computer for visualization. It is also desired to compute the localization accuracy by comparing the computed location of the vehicle with the real location obtained by the camera.

- ***Gimme Fast***

In this project, problem is transferring data from one terminal to another terminal. While doing so, we are asked to utilize transportation and communication technologies.

In system, 2 terminal points should be able to transfer and receive packets with visible light communication (VLC). This visible light communication will be realized by low cost light emitting diodes (LEDs), photodiodes and light depended resisters (LDRs). 8 LEDs and 8 photodiodes/LDRs should be used for the whole system, at max. The data that will be transferred as packets is an arbitrary picture which will be taken by the camera at the source terminal and distance between 2 terminals should be 1.5 m. There will be a moving vehicle with transceiver on it and this distance will be passed with this moving vehicle. This vehicle should not approach to terminals more than 5 cm and microcontroller’s memory chunk which is used for packet transfer should be 10 kB at most.

Operation of system has a repeating pattern. As the source terminal transmits packets to the receiver of moving vehicle, vehicle will move to receiving terminal. Here, data packets will be transmitted from transceiver of vehicle to receiver of receiving terminal. After this transfer, vehicle will move back to source terminal and this cycle will be repeated until the data transfer is completed, i.e. picture is transferred to other terminal. In this project, it is required to have at least 5 full round so size of picture should be chosen accordingly. Also, all the transfer process is supposed to be complete in less than 2 minutes. At the end of this transfer, receiving terminal is supposed to display the picture.

5.CONCLUSION

As a newly established company, we are highly motivated and excited to complete our first project within EE493-494 Engineering Design Courses. In order to accomplish this task we all agree that we should start working in a well-organized way from today and sustain our motivation and enthusiasm till the end of the year.

We have examined each project and summarized them in this report. Now, we are aware of the requirements and challenges that each project contains. But in order to determine the most suitable project for our company, we are going to make some further research on each and every project and then chose the best one for our abilities.

All of us have gained the required theoretical knowledge throughout our education in this department and we believe that finishing one of these projects will have a huge contribution to us on our way of becoming engineers. Throughout this project we are going to learn how to approach engineering problems, use our theoretical knowledge to come up with innovative solutions and handle unexpected problems to achieve our goal. As the company members, we are aware of the fact that all these skills will help us a lot during our upcoming professional life as engineers. So, we are going to do our best to improve ourselves and gain the trust of our costumers as a new-born company.

6.APPENDICES

TIMETABLE

The timeline that is planned to be followed is given below.

 11 th of October: Submission of business statement report.

 12 th -13 th of October: Individual researches.

 14 th of October: Meeting.

o Brainstorming about projects and solutions.

o Writing weekly progress report.

 15 th of October: Submission of weekly progress report.

 16 th of October: Weekly meeting with DS coordinator. Weekly seminar.

 17 th -20 th of October: Individual researches.

 21 st of October: Meeting.

o Brainstorming about projects and solutions.

o Writing weekly progress report.

 22 nd of October: Submission of weekly progress report.

 23 rd of October: Weekly meeting with DS coordinator. Weekly seminar.

 24 th of October: Finalizing the decision on projects selection.

 25 th of October - 1 st of November: Writing proposal report.

 1 st of November: Submission of proposal report.

Curriculum Vitae

Personal

Name, Surname	Mert Eyüboğlu
Birth Date / Place	08.12.1997 / Ankara, Turkey
Adress	ALACAATLI MAH. 5030 SK. NO: 5/15 ÇANKAYA ANKARA / TURKEY
Phone	+905398663601
E-mail	mert.eyuboglu@metu.edu.tr

Education

B.Sc. in Electrical and Electronics Engineering (expected graduation in June 2020)
MIDDLE EAST TECHNICAL UNIVERSITY (METU)
Currently, I am a 4th year student, CGPA: 3.56 over 4.00
High School Diploma (Math and Science), 2015
ODTÜ-GVO Ankara High School

Experience

10.2018 – 02.2019
METU Project, EE313 ANALOG ELECTRONICS LABORATORY TERM PROJECT
Design and implementation of an optical wireless communication system: Photophone
20.07.2018 – 25.08.2018
Summer Internship, METEKSAN DEFENSE, Ankara
Design and implementation of a thermoelectric cooler based temperature control system for a laser driver
02.2018 – 05.2018
METU Project, EE214 ELECTRONIC CIRCUITS LABORATORY TERM PROJECT
Design and İmplementation of a fire detection system
10.2017 – 12.2017
METU Project, EE213 ELECTRONIC CIRCUITS LABORATORY TERM PROJECT
Design and implementation of a solar tracking system
06.2019 – 08.2019
Summer Internship, Max-Planck Institute for Intelligent Systems, Stuttgart/Germany
Imaging and localization of magnetic particles in MRI to be used as a position feedback in the control of microrobots using MRI fields

Computer Skills

Microsoft Office Programs**,** Java, MATLAB**,** LTSpice, PADS PCB Design Software

Languages

English	IELTS Score: 7.5/9
German	A2.1

Curriculum Vitae

Personal

Name, Surname	Onur Akdeniz
Birth Date / Place	22.01.1998 / Trabzon, Turkey
Adress	Middle East Technical University, 19.Dormitory Çankaya/Ankara
Phone	+905389867561
E-mail	onur.akdeniz@metu.edu.tr

Education

B.Sc. in Electrical and Electronics Engineering (expected graduation in June 2020)
MIDDLE EAST TECHNICAL UNIVERSITY (METU)
Currently, I am a 4th year student, CGPA: 3.92 over 4.00
Exempted from attending to Basic English Department.
B.Sc. in Physics(Double Major) (expected graduation in June 2021)
MIDDLE EAST TECHNICAL UNIVERSITY (METU)
CGPA: 4.00 over 4.00

High School Diploma , 2016
Trabzon Fen Lisesi
Graduated as 1st .

Experience

07.2018 – 08.2018
Summer Internship, Farplas Otomotiv AŞ, Kocaeli
Method and Automation Department, Observations on several control systems were made. Electrical parts of various control systems were designed and constructed

06.2019-07.2019
Summer Internship, ASELSAN AŞ, Ankara
Microelectronic Guidance and Electro-Optical Group (MGEO) / Avionic Hardware and Design Department / Analog Design Team,To solve a predefined problem, an electrical circuit is designed and realized using various methods.

Computer Skills

C,Python,MATLAB,Keycreator,Zeliosoft, Eplan, LTSpice,Quartus, PADS Designer, MS Office

Languages

English	Advanced
German	A1
French	A1

Curriculum Vitae

Personal

Name, Surname	Doğukan Atik
Birth Date / Place	07.04.1998 / Ankara, Turkey
Adress	Gazi Mahallesi, Şenol Caddesi,Akçebaşı Sok. 16/6 Yenimahalle/ ANKARA
Phone	+905464070498
E-mail	dogukanatik98@gmail.com

Education

B.Sc. in Electrical and Electronics Engineering (expected graduation in June 2020)
MIDDLE EAST TECHNICAL UNIVERSITY (METU)
Currently, I am a 4th year student, CGPA: 3.67 over 4.00
Exempted from attending to Basic English Department.

High School Diploma , 2016
Gazi Üniversitesi Vakfı Özel Anadolu Lisesi
Graduated as 2nd .

Experience

06.2018 – 07.2019
Summer Internship, METEKSAN DEFENSE, Ankara
RF & Microwave Engineering- Design of a low-pass filter with 1800 MHz cut-off frequency.

06.2019-07.2019
Summer Internship, ASELSAN AŞ, Ankara
Transportation Systems System Engineering- Development of a sensor fusion algorithm.

08.2019 – 09.2019
Summer Internship, Ortana Elektronik Yazılım, Ankara
Radar Signal Processing Group, Speed and Location Estimation with FSK and LFMCW techniques.

Computer Skills

Microsoft Office Programs**,** Verilog HDL, MATLAB**,** C

Languages

English	Advanced (METU EPE Score:89/100)
German	A2.1

Curriculum Vitae

Personal

Name, Surname	Ozan Berk Boyraz
Birth Date / Place	16.10.1997 / Tokat, Turkey
Adress	Middle East Technical University, 19.Dormitory Çankaya/Ankara
Phone	+905314598425
E-mail	berk.boyraz@metu.edu.tr

Education

B.Sc. in Electrical and Electronics Engineering (expected graduation in June 2020)
MIDDLE EAST TECHNICAL UNIVERSITY (METU)
Currently, I am a 4th year student, CGPA: 3.09 over 4.00
Exempted from attending to Basic English Department.
Minor in Physics (expected graduation in June 2020)
MIDDLE EAST TECHNICAL UNIVERSITY (METU)

High School Diploma , 2016
Kayseri Fen Lisesi

Experience

07.2018 – 08.2018
Summer Internship, Enerjisa Başkent EDAŞ, Ankara
Repair and Maintenance, Observed the work contucted by Repair& Maintenance team on power distribution systems.

06.2019-07.2019
Summer Internship, ASELSAN AŞ, Ankara
Microelectronic Guidance and Electro-Optical Group (MGEO) / Laser System Design, Conducted experiments on "Fibre Laser" and "Nd:YAG Laser". Helped the team in microcontroller selection.

Computer Skills

C, LTSpice, Keycreator, MATLAB, Quartus

Languages

English	Advanced
German	A2.1

Curriculum Vitae

Personal

Name, Surname	Ahmet Demirdaş
Birth Date / Place	22.08.1997 / Kayseri, Turkey
Adress	100. Yil Isci Bloklari Mah 1538 Sokak 231/5 Cankaya, Ankara / TURKEY
Phone	+905423693903
E-mail	ahmet.demirdas@metu.edu.tr

Education

B.Sc. in Electrical and Electronics Engineering (expected graduation in June 2020)
MIDDLE EAST TECHNICAL UNIVERSITY (METU)
Currently, I am a 4th year student, CGPA: 3.15 over 4.00
Exempted from attending to Basic English Department.

Experience

07.2018 – 08.2018
Summer Internship, Enerjisa Başkent EDAŞ, Ankara
RF Design Department

07.2019-08.2019
Summer Internship, Tualcom,Ankara

Computer Skills

C, Photoshop, Microsoft Office, Microsoft Excel, Eclipse, Atom, LT Spice, AUTO/CAD, Python, MATLAB, Verilog HDL, Basic knowledge of Linux, Windows XP, Vista, 7 and 10.

Languages

English	Advanced
German	A2.1
Spanish	Beginner