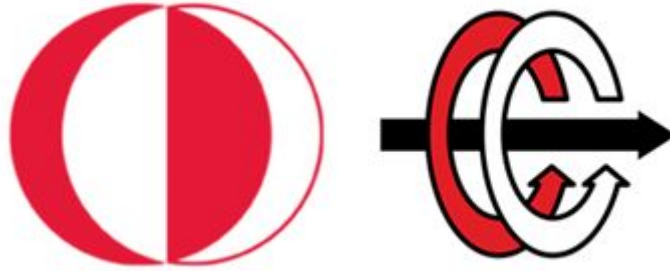


**MIDDLE EAST TECHNICAL UNIVERSITY
DEPARTMENT OF ELECTRICAL & ELECTRONICS
ENGINEERING**



**TROY TECH
BUSINESS STATEMENT REPORT**

Section : 7

Studio Coordinator: Mustafa Mert ANKARALI

Partners :

Hasan ÖZKARA - 2031888

Kağan ÖZASLAN - 2031854

Caner POTUR - 2031250

Mustafa Ercan OKATAN - 2031193

Mert KAYIŞ - 2030997

1. Introduction

The engineering design courses (EE493- EE494) are must courses which are planned for directing the fourth year students to create a proper working and unique project. EE 493 which is the first semester design course mainly focuses on contributing project management skills and forcing students to find wide range of solutions. Besides, EE 494 which is the second semester design course aims to turn theoretical progresses into practical result and establish a proper working design. In these courses, the design project is given a group of five students in order to create a teamwork environment. Thus, it makes students work in a professional way likely in real-world. During these processes , a mentor with professional background and experience is also assigned for supervising and coordinating the group by the department.

Troy Tech is established in order to find specific solutions by using theoretical background of its members for the design project. The company aims to share workload efficiently and progress like a professional company. Also, Troy Tech focuses on developing a robot with a good accuracy, fast and easy to control mechanism and power efficiency. Moreover, the cost efficiency is an important concept because of the limited budget.

The report contains mission and vision statements of our company, justification of the composition of our team, brief description for each of the 4 projects and conclusion. At the end of this report, we attached the CVs of the team members.

2. Mission and Vision

2.1 Mission: Our mission is to design and produce creative and reliable electronic Technologies and robotics meeting the desired specifications of customers under limited budget and time.

2.2 Vision: Our vision is to be a unique company consisting of highly motivated R&D engineers that create impressive robotic products with affordable and reasonable costs.

3. Human Resources

3.1. The Team

Table 1 – The Team

Chief Executive Officer	Hasan ÖZKARA
Chief Technology Officer	Caner POTUR
Chief Operating Officer	Mert KAYIŞ
Chief Marketing Officer	Ercan OKATAN
Chief Financial Officer	Kağan ÖZASLAN

3.2. Composition

All our company members are fourth year Electrical & Electronics Engineering students in Middle East Technical University. We are from three different specialization areas of our department. Mr. Özkara is from Control Area, Mr Özaslan and Mr. Potur are from Computer Area and Mr. Kayış and Mr. Okatan are from Microwaves and Antennas Area.

4. Describing the Projects

4.1 Devices competing to catch falling balloons

In this project, it is required to design a robot catching falling balloons. There will be a competition between two balloon catching robots. Five balloons will drop from air. The robot catching more balloons will win the game. The robots are under physical limitations(e.g. diameter 30 cm. and height 40 cm.). It is prohibited to contact the other robot. Otherwise this will result in invalid score. In addition, the robot should cover itself from the operation of other robot. The bonus of this project is to understand that the balloon touches the ground and be ready for the next balloon.

4.2 Devices trying to score in each other's goals

In this project, two robots driven by a member of two different design teams try to push a ball directly or indirectly to the opposite goal. The robot will be remote controlled device at least 30 meters. It is forbidden for operator to look directly to the playfield with naked eye. In other words, the operator can only see the field through the camera on the device. It is not allowed to use Wi-Fi or wired connection.

The Rules of the Game:

- The robots can not move into opponents half field.
- Robots can hit, push or dribble the ball.
- The ball cannot be grasped, scooped or carried.
- The ball should be passed through the opposing half-field in 20 seconds.
- The game starts with robots placed in their half-field and ball is at the center of the field.
- The game ends when a player scores more than two goals from its opponent.

The properties of playfield:

- A simple hexagon constructed from 6 identical walls, each of them are 70-75 cm.
- Goals should be at least twice as wide as their robots horizontal sizes.
- The ball is of diameter 30-45 mm.

4.3 Vehicles chasing each other around a closed course with varying properties

In this project, It is to be constructed an autonomous robot, trying to catch and 'tag' each other on a closed path with varying width. The race path is the combination of two ellipses sharing the same center point and it is higher than the ground level between 1-2 cm. The robots should not fall off from the path or touch the ground. The game is finished when the robots are close each other 5 cm and the robot at behind at that moment wins the game.

The Rules of the Game:

- The path has no marks or signs but the colour of it can be different from the floor.
- The game starts robots with robots placed arbitrary but opposite points.
- The robots should be able to go in both directions.
- The robots should finish the path with small disturbances in 20 seconds
- It is not allowed to view the playfield by using an overlooking camera.

4.4 Devices trying to extract the plan of their surroundings

In this project, we are asked to design and produce a robotic device competing with another device sharing the same goal which is to extract the plan of the surrounding consisting of randomly placed objects such as cubes, cylinders and so on. Also, we should display this plan on a monitor. The robot will move on the floor between the objects or around the objects. The field is limited by walls whose length is 50cm and also it has the same height as the objects inside the field. The specifications of the randomly placed objects are listed below:

- Cylinders of 10 cm diameter,
- Cylinders of 5 cm diameter,
- Square prisms with 7 cm edge length,
- Prisms with an equilateral triangular base of 8 cm edge length.

In this project, there are some constraints which are listed below:

- A camera is used and no additional sensor is allowed.
- The communication is only between robot and computer.
- The objects and the walls are of the same colour.
- Tele-operation is not allowed.

5. Conclusion

To sum up, in this report we've mentioned our mission and vision and composition of our team. We've discussed all project with their requirements. Their easy and hard sides and also our capabilities respectively will originate our decision mechanism to decide which project we are going to work on.

After all, we are 5 senior students and we are keen to do our best for this project because we see this lecture in the perspective that we will always remember our department EE and METU with this design project even years and years later. That's because, in other words, we want to make a good golden shot for the sake of those years we spent in METU EE.

APPENDICES

APPENDIX A - TIME TABLE

Table 2 – Time Table

October 15 - 19	Discussion on all projects will be done in detail. Each project will be voted by each member according to different criterias. Than, the most voted project will be chosen.
October 22 - 26	After we will agree on the project, proposal report preparation will start. Title Page, table of Contents, executive Summary and introduction parts of the proposal report will be prepared.
Oct 29 - Nov 02	Project canvas will be prepared. Divide the solution steps into the areas such as coding, communication, mechanical requirements, financial etc.
November 05 - 09	Proposal report preparation will be done consisting of previous week works and also elaborated other requirements.

APPENDIX B - Curriculum Vitae of Members

B.1. Hasan Özkara CV :

PERSONAL

Name, SURNAME: **Hasan ÖZKARA**
Date / Place of Birth: 18.04.1994 / Kocasinan, Turkey
Address: Yesilevler Mah. 916. sokak 4/9
E-mail: hasan.ozkara05@gmail.com

Phone: +90 5394548538

EDUCATION

2013-present **Bachelor of Science in Electrical and Electronic Engineering,**
Middle East Technical University, Ankara, Turkey
Currently 4th grade - (2.58: / 4.0)

2009-2013 **High School Diploma,**
Ankara Atatürk Anadolu Lisesi, Ankara, Turkey

WORK EXPERIENCE / INTERNSHIPS

ASELSAN A.Ş. (ANKARA, Turkey 06.2018 – 07.2018)

- Printed Circuit Board Assembly (PCBA) Design Engineering Internship
- Worked on Voice Operated Switch (VOX) system
- Experienced in a project about designing own VOX

TAI (ANKARA, Turkey 07.2016 – 09.2016)

- Co-op Electronics Engineering Internship
- Worked on attitude and heading reference systems (AHRS)
- Participated in a project about establishing own AHRS

EXPERTISE & SKILLS

Language

Turkish - Native
English - Advanced
German - Beginner

Digital Competence

Software
- MATLAB
- AutoCAD
- MS Office
- LtSpice
- Agilent VEE

- Altium Design
- Quartus
- Key Creator

Programming Language

-C Language

PROJECTS

Voice Operated Switch (ASELSAN,2018)

Digital Oscilloscope by FPGA written in Verilog (METU, 2017)

Wireless Heating Control System (METU, 2017)

Attitude and Heading Reference Systems (TAI,2016)

Remote Controlled Vehicle (METU, 2016)

Analog Parking Lot Access Control System (METU, 2015)

B.2. Kağan Özaslan CV :

PERSONAL

Name, SURNAME: **Kağan Özaslan**
Date / Place of Birth: 07.07.1995 / Bursa, Turkey
Address: İşçi Blokları Mah. 1427. Cad. No:21/6
Çankaya/ANKARA
E-mail: knozaslan@gmail.com
kagan.ozaslan@metu.edu.tr
Phone: +90 531 293 52 77
Personal page: <https://www.linkedin.com/in/ozaslan>

EDUCATION

2013-present **Bachelor of Science in Electrical and Electronic Engineering,**
Middle East Technical University, Ankara, Turkey
Currently 4th grade - (CGPA: 3.20 / 4.0)

2009-2013 **High School Diploma,**
Bursa Science High School, Bursa, Turkey

WORK EXPERIENCE / INTERNSHIPS

Red Pine Software (İzmir, Turkey 07.2018 – 09.2018)

- Embedded Software Engineering Long Term Intern – Embedded software development for ADAS (Advanced Driving Assistance Systems).

Vemus Industrial Electronics (Bursa, Turkey 08.2017 – 09.2017)

- Embedded System Engineering Intern – Microcontroller(PIC) programming in C language on MPLAB IDE and PCB design.

Robert BOSCH GmbH (Bursa, Turkey 07.2016 – 08.2016)

- Electrical Engineering Intern – Maintenance planning of production lines and investigating manufacturing methods.

EXPERTISE & SKILLS

Language

English - Advanced
Chinese - Beginner

Digital Competence

Programming Languages:

-C language
-Assembly

Softwares:

-Keil uVision
-MPLAB IDE
-LTSpice
-MATLAB
-Proteus ISIS

Hardware:

- TM4C123 MCU
- ARM Cortex M4
- TDA2x SoC
- PIC

PROJECTS

Camera Based Surround View System and Object Detection Project (Red Pine Software, 2018)

- Domestic ADAS project for TUBITAK on TI TDA2x SoC in C language. Controlling environmental cameras (5 pcs) on the car and configure them to use for driving assistance on driving modes.

Voice Recorder and Player with ARM Cortex M4 uProcessor (Grd:10/10, METU, 2018)

- Term project of 'Microprocessors Course' done with TM4C123 MCU in Assembly on Keil uVision IDE.

Various PIC uC projects on MPLAB IDE and PCB design on DipTrace (Vemus Electronics, 2017)

- Electronic 12 key-lock keypad control, P temperature controlled oven, shift register and MUX implementation with PIC for various projects.

"EXPO360 Online Fair Platform" (METU BIZ, 2017)

- Being a finalist in the "Glokal Start-Up Days Entrepreneurship Competition" as the founder of project

Coin Counter with Image Processing by FPGA written in Verilog (METU, 2017)

Wireless Heating Control System (METU, 2017)

Remote Controlled Vehicle (METU, 2016)

Analog Parking Lot Access Control System (METU, 2015)

SOCIAL ACTIVITIES and COURSES

METU Marine and Sailing Club

Sailor (2014 - present)

- Two Golden Cups in Marmaris CampusCup and Urla Universities Sailing Races.

METU Confucius Institute

Participant at Chinese Bridge Summer Camp: Xiamen University (China, 2017, 50-hrs)

- Understanding Chinese language and culture and having a perspective of living in China.

BEST (Board of European Student of Technology)

Participant at Nano Technology Investigations: University of Aveiro (Portugal, 2015, 32-hrs)

- Concepts and practical aspects related with Nanotechnology and Nanoscience.

Participant at Renewable Energy Investments: University of Liege (Belgium, 2014, 30-hrs)

- The smart grid, global grid and new business opportunities in renewable energy.

B.3. Caner Potur CV :

PERSONAL

Name, SURNAME: **Caner POTUR**
Date / Place of Birth: 25 June 1995 / Kırıkkale, Turkey
Address: Kızılırmak Mah. sitesi 1431. Cad. 31/23
Ankara / TURKEY
E-mail: canerpotur@gmail.com
caner.potur@metu.edu.tr
Phone: +90 539 587 32 67
Personal page: github.com/canerpotur

EDUCATION

2013-present **Bachelor of Science in Electrical and Electronic Engineering,**
Middle East Technical University, Ankara, Turkey
Currently 4th grade - (CGPA: 3.08 / 4.0)

2009-2013 **High School Diploma,**
Ankara Gazi Anatolian High School, Bursa, Turkey

WORK EXPERIENCE / INTERNSHIPS

ASELSAN A.Ş. (Ankara, Turkey 07.2018 – 08/2018)

- Intern at Software Verification Team – Developing avionic software verification tools

ROKETSAN A.Ş. (Ankara, Turkey 06.2018 – 07.2018)

- Intern at Weapon Systems Team – Creating hydraulic control unit simulation

Ekin Technology (Ankara, Turkey 07.2017 – 08.2017)

- Intern at R&D Center – Vehicle speed detection project using image processing technology

Vaillant Group - Türk DemirDöküm Fabrikaları A.Ş. (Bursa, Turkey 08.2016 – 09.2016)

- Intern at Electronic Competence Center – Creating thermosyphon simulation using microprocessors

EXPERTISE & SKILLS

Language

English - Advanced
Italian - Intermediate

Digital Competence

Software

- Microsoft Visual Studio
- MATLAB
- Code::Blocks
- Code Composer Studio
- MS Office
- LtSpice
- Agilent VEE
- MPLAB X
- Proteus
- Quartus
- Key Creator

Programming Language

- C++
- C#
- C
- Verilog

PROJECTS

ARINC-429 Listener(ASELSAN, 2018)

Hydraulic Control Unit Simulation(ROKETSAN, 2018)

Analog Security Alarm System (METU, 2018)

Vehicle Speed Detection Project(Ekin Technology, 2017)

Coin Counter with Image Processing by FPGA written in Verilog (METU, 2017)

Wireless Heating Control System (METU, 2017)

Thermosyphon Simulation (DemirDöküm, 2016)

Analog Parking Lot Access Control System (METU, 2016)

SOCIAL ACTIVITIES and COURSES

AEGEE

Participant at AEGEE-Warszawa: Explore your soul on the Slavicshore(2015)

Metu Business Club

Participant (2014 - 2015)

Metu Scouting Society

Participant (2013 - 2014)

B.4. Mustafa Ercan OKATAN CV :

PERSONAL

Name, SURNAME: **Mustafa Ercan OKATAN**
Date / Place of Birth: 04.05.1995 / ANKARA,Turkey
Address: İstiklal cad. Park Çiftlik Konutları Bk4/12
Yenimahalle/ANKARA TURKEY
E-mail: mustafaercanokatan@gmail.com
ercan.okatan@metu.edu.tr
Phone: +90 5064961595

EDUCATION

2013-present **Bachelor of Science in Electrical and Electronic Engineering,**
Middle East Technical University, Ankara, Turkey
Currently 4th grade - (CGPA: 2.52 / 4.0)

2009-2013 **High School Diploma,**
Ankara Atatürk Anadolu Lisesi, Ankara, Turkey

WORK EXPERIENCE / INTERNSHIPS

ASELSAN A.Ş. (ANKARA, Turkey 08.2018 – 09.2018)

- Test analysis engineer intern

ÖZGEN Elektrik Solar (ANKARA, Turkey 07.2017 – 09.2017)

- Design engineer intern.

EXPERTISE & SKILLS

Language

Turkish - Native
English - Advanced
Spanish - Beginner

Digital Competence,

C language
LTSpice
MATLAB
Agilent VEE
AutoCAD
Quartus
Key Creator
MS Office

PROJECTS

Digital Oscilloscope by FPGA written in Verilog (METU, 2017)

Wireless Heating Control System (METU, 2017)

Remote Controlled Vehicle (METU, 2016)

Analog Parking Lot Access Control System (METU, 2015)

B.5. Mert Kayış CV :

PERSONAL

Name, SURNAME: **Mert KAYIŞ**
Date / Place of Birth: 04.08.1995 / ÇANKIRI, Turkey
Address: Gazi Mahallesi Afitap Sokak 11/7
Yenimahalle/ANKARA TURKEY
E-mail: mrtkys@gmail.com
mert.kayis@metu.edu.tr
Phone: +90 506 841 2234
Personal page: <https://www.linkedin.com/in/mertkayis/>

EDUCATION

2013-present **Bachelor of Science in Electrical and Electronic Engineering,**
Middle East Technical University, Ankara, Turkey
Currently 4th grade - (CGPA: 3.10 / 4.0)

2009-2013 **High School Diploma,**
Ankara Atatürk Anadolu Lisesi, Ankara, Turkey

WORK EXPERIENCE / INTERNSHIPS

ASELSAN A.Ş. (ANKARA, Turkey 08.2018 – 09.2018)

- RF Circuit Design Engineering Internship in Radar Receiver/Transmitter Technologies Department (Gölbaşı REHIS)
- Experience related to RF circuitry and the design steps of Radar Receiver unit PCB is gained.

GESS/OES Ortadoğu Elektronik San. Ve Tic. A.Ş. (ANKARA, Turkey 08.2017 – 09.2017)

- Test and Quality Control Engineering Internship
- Manufacturing and testing processes of Power Systems such as Inverter, Uninterruptible Power Supply, Rectifier, DC-DC Converter are observed.

EXPERTISE & SKILLS

Language

Turkish - Native
English - Advanced
German - Beginner

Digital Competence,

C language
LTSpice
MATLAB
Agilent VEE
Quartus
Key Creator
MS Office

PROJECTS

Digital Oscilloscope by FPGA written in Verilog HDL (METU, 2018)
Wireless Heating Control System (METU, 2017)
Note Controlled Vehicle (METU,2017)
Remote Controlled Vehicle (METU, 2016)
Analog Parking Lot Access Control System (METU, 2015)