ÇANKAYA UNIVERSITY
FACULTY OF ENGINEERING
COMPUTER ENGINEERING DEPARMENT

CENG 200

SUMMER INTERNSHIP REPORT

Özgün DOĞAN
201911024

Performed at
SAVRONİK

25.07.2022 – 19.08.2022

Contents

Abstract

I completed my intern at Savronik in the department of digital transformation. Firstly, I have done research about sensors about what is sensors, how it works, how can we get information from living life with sensors and market shares of specific sensors. Moreover, I have done a 2D animation with a Microsoft window to show how tractor that will operate with sensors that I mentioned does the given task when project complete. I coded given task using Qt framework with C++. I have learned that Qt is generally used for making windows applications and it is an alternative of .NET. It was easy to understand for me because it uses C++. Furthermore, Qt has so many useful libraries. Thanks to those libraries I have done my task successfully.

1. Introduction

Savronik was established in 1986 to meet the product and system needs of the defense industry and they are making various projects in many areas such as agriculture and railway systems. Moreover, I have chosen this firm to examine the mechanism of a defense industry, especially parts related to computer engineering and shape my future career.

I have done and report research about sensors at the beginning of my intern. Furthermore, I have been commissioned to do an animation with using Qt framework. My motivation was to animate a tractor while creating a user interface with using C++. I studied Qt in one week then I worked onto given project about 2 weeks and created an animation and UI using effective libraries of C++ integrating with Qt.

2. Company Information

Savronik is one of the companies involved in many Turkish defense industry corporations that are interested in security simulations, railway signalizations, agriculture and other needs of our country. Additionally, they have goals that fixing and enhancing the existing issues continuing in our country such as smart agriculture vehicles, smart railway signalization. Savronik's aim is that examining the living life through sensors and use this knowledge to improve living cities' standards while staying within the bounds of environmental awareness [1].

Hasan OKSAK who works as Technology Director from digital transformation group was my intern supervisor. He graduated from Eskişehir Osmangazi University in the department of Electrical and Electronics Engineering in 2002. His e-mail is hasan.oksak@savronik.com.tr. I worked with one team member and one supervisor in my project. My team member was an intern from my university. Doğa Melis ERKE who is studying at Çankaya University in the department of Computer Engineering was my teammate.

3. Work Done

Apparently, sensors were very important to this company. They assigned to me a sensor research report in order to understand what sensor is, what Savronik does with them and learn where they use these sensors. I and another intern team member of mine learned important subjects that we need to mention in our research report and surely, I will mention them and share a link including original report itself in next paragraphs. Not only I did the research in entire internship weeks, but also, they wanted me to make an application through Qt framework. Qt provides many opportunities thanks to its libraries. Moreover, Qt is coded with C++ Because of this I was able to use my school experiments in the project. If I need to elaborate that works done by me,

Firstly, in first week passed with orientation and with research report. Ali Rıza ATASOY who is an engineer that works there in a long time talked about projects of Savronik and almost all those projects are including sensors. They said the report [2] is important for this. He asked us to prepare a report including several topics. The report includes general information about sensors, type of sensors, market shares of sensors and specific sensors that is mostly used by specific countries. The last two topics that I mentioned (market shares and countries that uses sensors most) are the topics that Mr. Atasoy especially asked us to pay attention [3]. We added these topics with general information. Furthermore, while we were continuing to report, our supervisor was trying to assign a suitable project.

Secondly, after first week our supervisor asked us to learn Qt framework in preparation for the project. Qt [4] is used for making user interfaces and cross-platform applications that operate on Windows, Linux, macOS, Android. Second week of my internship passed with learning Qt from videos and documentations. Moreover, Qt can be coded with C++ and There are so many C++ libraries that can be used with Qt projects. Thanks to first and second year education of mine, I was able to understand and quickly apply things that I learned from course which was new for me. I must say that we have solved each problem with reading documentation. Nearly every solution was hiding in these documentations. Although reading all those documents were boring, I realized that it was necessary for solving engineering problems. I mostly benefited from the topics of the object-oriented programming course. While my co-worker studied on different topics, I also tried to create some graphical user interface such as toolbar or statusbar and we tried to build each button or algorithm from the ground up. It was totally a teamwork for me.

Thirdly, in third week of my internship our supervisor gave us the project that we have been preparing for a week. Name of the project was EZ-GUIDE® 250 [5]. Aim of the task was innovation

of agriculture. Tractor does the job with smart movement system and system adapts to environment. As an example, if there is a tree on tractor's established way, the smart system provides smart movement by passing tree's around. Similarly, smart system provides a memory for that and auto-created way points are not forgotten by the smart system. As for the project, our supervisor gave us a part from that project I mentioned and also asked me to work together on given project with the other intern who is Doğa Melis ERKE. We worked on same project. However, the project has variety and there were so many works to do at the beginning. Even though we worked same project, parts of the project that we worked was differ. If I need to explain the project in more detail, wanted part of the project was including user interface and tractor animation. Project needed to be coded with C++. I must say that creating a user interface was the most enjoying part for me. Each icon on the interface had a different process in the original plan but given plan only provides simulation, they were not do any work to the desired plan. Qt is a user-friendly program such that while I was assigning tasks to each icon on the interface, only work I must do was selecting icons and coding what will be happen or what will the icon in question do. Besides, Qt was providing quick code segments such as creating push button member function into appropriate class. Thanks to these segments we can handle our work correctly. Left and right side of the application window was needing toolbars. We added these toolbars (side bars, right or left) and then added functional icons on them. Duty of each icon was shown in the status bar (bottom bar). On the other hand, we were continuing to develop animation part of the project.

Finally, last day of third week of my internship I and my colleague had a meeting with supervisor. He drew us a final outline and at the end of meeting he asked for a meeting report from us[6]. Final week we started animation. The rich library Qt have I mentioned had a great role to this part. Qt had a library called "QPropertyAnimation" which was a class as well. There was enough to use function to set parameters as start point, end point and time that object needs to finish animation. It may seem easy, but we met this class between many documents of Qt. Furthermore, the weight and height of the land that represent as rectangle were variables and the way tractor will take must have been set by ratio of land's width over equipment width.

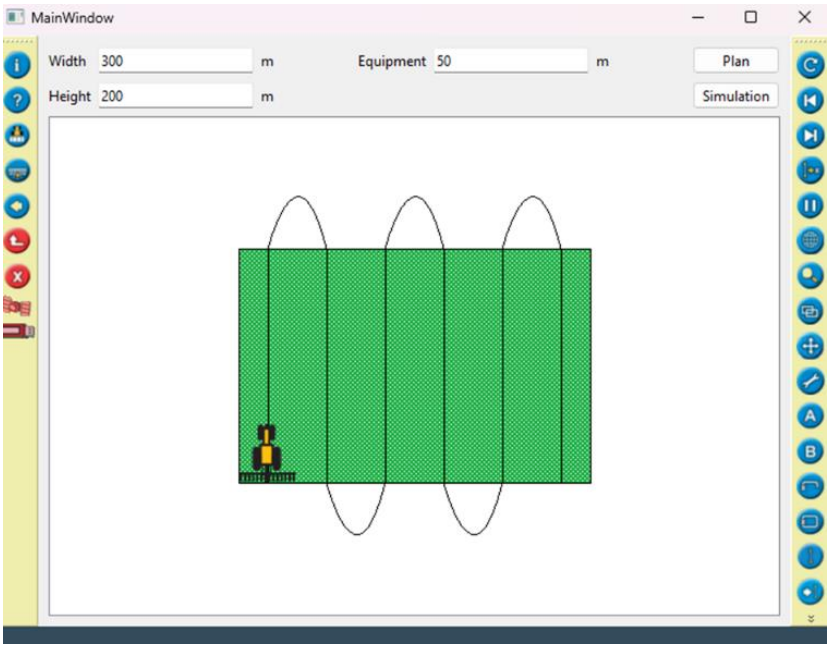

Figure 1 Example with 300 width and 50 equipment width.

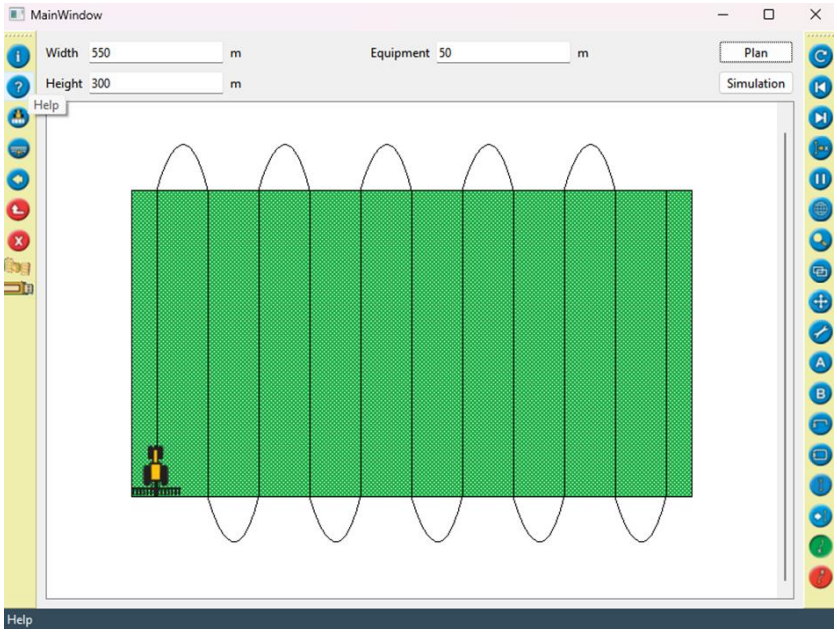

Figure 2 Example with 550 width and 50 equipment width.

All these parameters needed mathematical calculations. After fixing the problem, creating land part of the project finished. Animation was another fun part of the project. Firstly, we have needed to create a proper tractor icon. After done the icon, we defined start and end point mathematically. Of course, there was a bug fixing issue and we developed approximately 4 days for the project. Eventually, last day of my internship we have completed the task and submit the work.

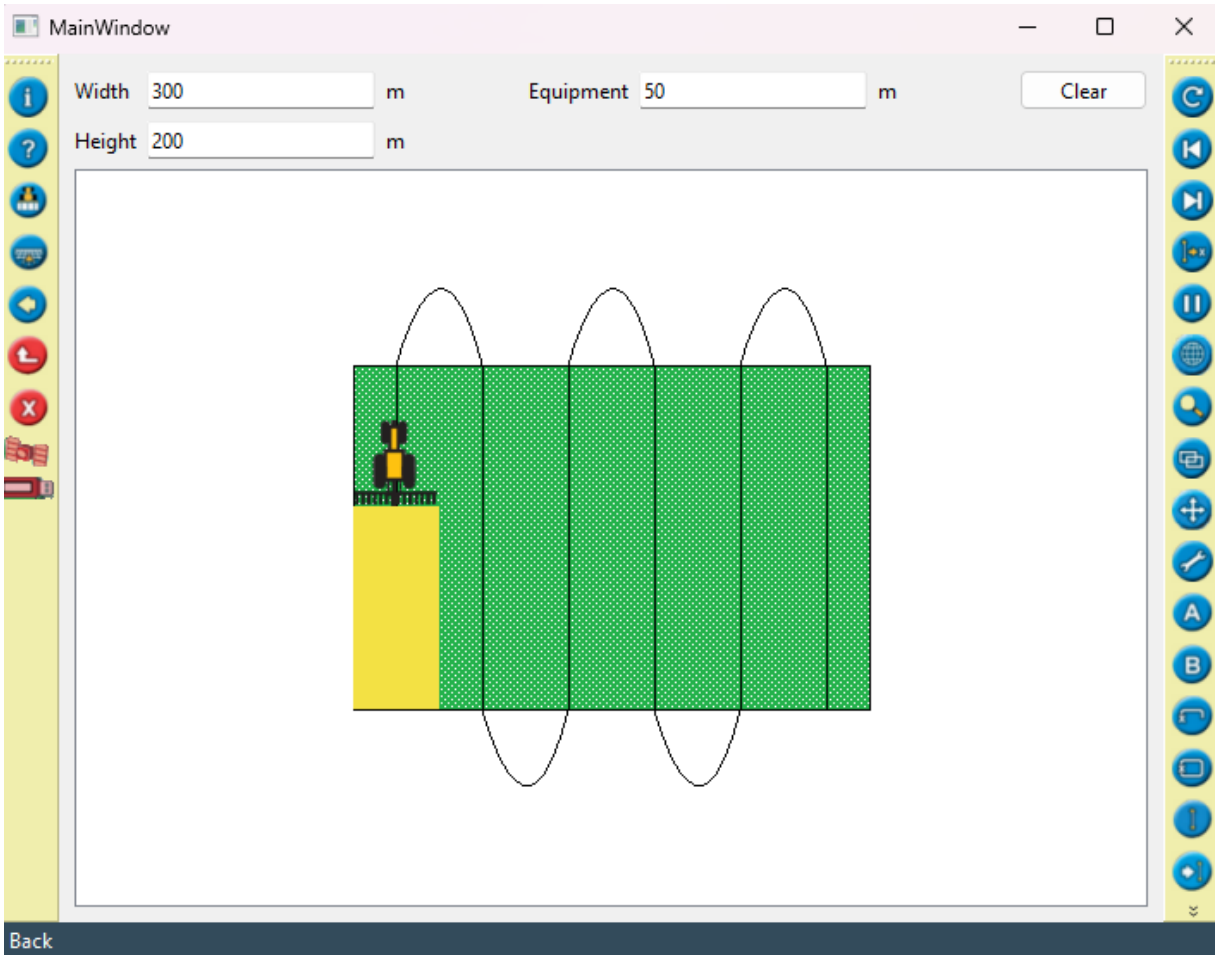

Figure 3 Program does the work.

4. Conclusion

Creating a working windows application was a new and enjoyable experience for me. On the top of it, Qt is a rising software in vary domains such as in smart manufacturing, in smart computers of vehicles, in smart TVs etc. I feel lucky to work with Hasan OKSAK because the person who advised us to learn and work with Qt was him. I think we need to follow innovations that happens around the world. Furthermore, workers of the Savronik that I met were very friendly and helpful people. They offered help many times. I have experienced not only working in a cooperation but also lunches that we had with the employees and their experiments that they shared us were very essential. Because of this I think communication skills is the most important for a company. Additionally, Defense industry was a good experience for me. However, I need to see more different work types of software before deciding my career.

5. References

[1] Savronik, “About Us”, 2022. Available: https://www.savronik.com.tr/en/about-us/.

[2] Doğan Ö., Erke D. M., “Sensors”, 2022. [Online]. Available: https://docs.google.com/document/d/1fIRNbJQXfcOnijHxqZEBEgwXLzBJd-k0/edit?usp=sharing&ouid=100811212275861059062&rtpof=true&sd=true.

[3] Mordor Intelligence, "Market Overview", 2022. [Online]. Available: https://www.mordorintelligence.com/industry-reports/global-sensors-market?gclid=Cj0KCQjwio6XBhCMARIsAC0u9aFdca55T6HSrIT_XLwAiK__h_8x3h2l7Jwz8kgKIdUJgXfZiUhDt-IaAqtjEALw_wcB.

[4] Qt Group, "About Us". [Online]. Available: https://www.qt.io/company.

[5] Trimble Navigation Limited, “Ez-Guide 250 Lightbar Guidance System Quick Reference Card”, Version 2.00, Rev A, 2009. [Online]. Available: https://drive.google.com/file/d/1Fl-sD3aNgIHjON_4O_W9zBW-iEE39aMy/view?usp=sharing.

[6] Doğan Ö., Erke D. M., “Internship Evaluation Meeting”, 2022. [Online]. Available: https://docs.google.com/document/d/1nxKeKAWb1Q7ZjEHn2LL34JS6u72XJXul/edit?usp=sharing&ouid=100811212275861059062&rtpof=true&sd=true.