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|  | **Hacettepe University**  Computer Engineering Department  **BBM479/480 End of Project Report** |

**Project Details**

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| **Title** | Life Guide Project |
| **Supervisor** | Ayça Kolukısa Tarhan |

**Group Members**

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**Abstract of the Project ( / 10 Points)**

Explain the whole project shortly including the introduction of the field, the problem statement, your proposed solution and the methods you applied, your results and their discussion, expected impact and possible future directions. The abstract should be between 250-500 words.

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| The Life Guide project was created to follow the development of children with Cerebral Palsy and to facilitate their lives. Cerebral palsy is basically a problem that affects muscle tone, movement, and a person's motor skills. It inhibits the body's ability to act in a coordinated and purposeful way. The development of children with this disease should be done more carefully and under the control of a doctor than a child who is not sick. To solve this problem, I thought of making a website that all children and families can access from any platform. In this way, they can access our website, whether from a phone, tablet pc or computer. This website consists of a blog page that everyone can access, an exercise page that hosts the exercises for the user, a profile page where the user can update their information, and a messaging page where they can chat live with doctors. As the project is open to development, new features may be added in the future. On the blog page, users and their parents can get information about the disease and gain awareness about the disease. It contains all general information about the disease, treatment methods, how to behave in which age range. In my project, I recommend and follow the exercises that are suitable for the current disease level for children. These exercises are selected according to the disease degree obtained as a result of the first registration and a number of annual tests. The user can watch these exercise videos and repeat them in a coordinated manner. By providing live support by doctors on the live messaging page, solutions are produced for children who have instant problems without going to the hospital. I designed this part to send only messages, but in the future it can be changed to send documents or photos, and even evolve into a structure that allows video conferences.  There are very few platforms that provide a clear solution to this problem and it is limited. This situation increases the importance and necessity of the project. As all people, we should gain awareness about this disease and approach our friends, who are not in the least in the society, more accurately and consciously. |

**Introduction, Problem Definition & Literature Review ( / 20 Points)**

Introduce the field of your project, define your problem (as clearly as possible), review the literature (cite the papers) by explaining the proposed solutions to this problem together with limitations of these problems, lastly write your hypothesis (or research question) and summarize your proposed solution in a paragraph. Please use a scientific language (you may assume the style from the studies you cited in your literature review). You may borrow parts from your previous reports but update them with the information you obtained during the course of the project. This section should be between 750-1500 words.

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| The Life Guide project was created to follow the development of children with Cerebral Palsy and to facilitate their lives. Problem How can we make life easier for children with Cerebral Palsy? In children with this disease, the body's ability to act in a coordinated and purposeful way is inhibited. In order for these children not to feel different from their friends, they need to be psychologically and physically different from them. In order to achieve this, children need to physically perform activities that they can do in daily life without any obstacles. This is the starting point of my project.  I obtained the medical information required for my project thanks to Kübra Seyhan Bıyık, Research Assistant at Hacettepe University, Department of Physiotherapy and Rehabilitation. I reviewed and read all the documents he gave and I built the general structure of my project on these documents. These documents included general information about the disease, treatment methods and questionnaires for various age groups. I prepared the blog page that I mentioned in the first section for informative documents sent by Ms. Kübra. While creating my blog page, I tried to create a structure that children and families can easily understand. Ms. Kübra wrote al lot of papers about Cerebral Palsy. Here is the website of Ms. Kübra : <https://avesis.hacettepe.edu.tr/kubra.seyhan/publications>  As a solution to the problem, I designed a website that can be accessed from any platform. Of course, having such an application on an online platform brings some problems. At the beginning of this problem, with the increase in the number of users, the number of doctors who can solve instant questions and problems of children is low. Doctors are required to be online 24/7 on this platform as they work in the same hospital. In this case, the mail situation can be handled, but this does not meet the instant messaging requirement. Therefore, in real life, this project should be funded or promoted by volunteer doctors. In addition, the exercise videos should be of sufficient quality and at a level to meet the needs. Since it is an online platform, we do not know at what level of consciousness the patients do these movements. At this point, it can be ensured that the exercises are performed live in front of the doctor with the video conference system. This situation can be difficult to implement due to the limited number of doctors I mentioned before. |

**Methodology ( / 25 Points)**

Explain the methodology you followed throughout the project in technical terms including datasets, data pre-processing and featurization (if relevant), computational models/algorithms you used or developed, system training/testing (if relevant), principles of model evaluation (not the results). Using equations, flow charts, etc. are encouraged. Use sub-headings for each topic. Please use a scientific language. You may borrow parts from your previous reports but update them with the information you obtained during the course of the project. This section should be between 1000-1500 words (add pages if necessary).

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| I took care to use the latest technologies that I can use in the Life Guide project I developed. I used Identity Server library as well as C# .Net Core technology for the backend part. Thanks to the Identity Server library, I developed user, user role operations, authorization and authentication operations more securely. I used 1 layer architecture as the code architecture. In the future, this architecture can be converted to N-layer architecture. I used Angular which is a Javscript library on the frontend. When we look at the current usage, it competes with React among the most up-to-date frontend technologies. Angular library has been a very effective tool for me thanks to its own features and the power of Javascript. I used PostgreSQL on the database side. PostgreSQL is a relational database. I used the PgAdmin 4 application to see the database models in a graphical frontend. The reason I chose PostgreSQL was primarily because it was free. Then it was its compatibility with C# and its easy-to-understand front face.  Previously, I had little experience in C# and Angular. That's why I chose these tools to develop my project. There are many resources on the internet. When you encounter any problem, you can most likely find a solution in Stackoverflow website(<https://stackoverflow.com/>).  Flow Charts:  Login:    Figure Flow Chart Login  Here, the user enters his mail and password in the form and says login. The accuracy of the information entered by the user is checked on the server side. If there is a conflict, it is indicated to the user on the frontend. If there is no conflict, the last entered First Form information of the user is checked. If enough time has passed, it directs the user to the First Form page to update their information. Thus, the user's information is kept up to date. The parameter here is to ask the user how long it takes to update their information. If this period is too long, the exercises recommended to the user may not match the exercises that the user needs according to his current situation. If this period is too short, it may create a negative opinion as the user is asked to fill out this form too often. Therefore, this period should be determined by doctors and specialists. If the user's information is up to date, he is directed to the Dashboard page.  Signup:    Figure Flow Chart Signup  Here, the user enters his e-mail and password in the form and says to register. On the server side, it is checked whether the mail entered by the user has been used before. If it has been used before, the user is informed. If it is not used, the user completes the registration and is directed to the First Form page, and the user's personal and physical characteristics are obtained. Unless the user fills out this form, the content cannot be accessed. It can only access the blog page.  First Form:    Figure Flow Chart First Form  This part appears in front of the user after the user has registered or has not updated their information for a long time. This part consists of 4 different stages. In the first stage, information such as the user's name, surname, age, gender is obtained. In the second step, the user's contact information is obtained. In the third stage, the user is expected to write an informative introduction about himself to the doctors. In the last stage, the 4th stage, the user answers a multiple-choice question stating 5 different physical states. Here, if the user is younger than a certain age, he should make this choice with his family. As a result of this selection, the user can reach the Exercises page by submitting the form. According to the physical condition chosen by the user in the last step, an exercise video is displayed. For this reason, the user must fill out this form in the most correct way.  Dashboard:    This section is an overview page where the user can learn about himself. Whatever statistics are needed on this page, data and tables can be updated accordingly. On this page, the user can see his data in line graph, bar graph or directly numerically. The purpose of this page is to evaluate the user in terms of their general condition and to form an opinion for the user. |

**Results & Discussion ( / 30 Points)**

Explain your results in detail including system/model train/validation/optimization analysis, performance evaluation and comparison with the state-of-the-art (if relevant), ablation study (if relevant), a use-case analysis or the demo of the product (if relevant), and additional points related to your project. Also include the discussion of each piece of result (i.e., what would be the reason behind obtaining this outcome, what is the meaning of this result, etc.). Include figures and tables to summarize quantitative results. Use sub-headings for each topic. This section should be between 1000-2000 words (add pages if necessary).

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| Blog:  This section consists entirely of static texts. Its general purpose is to raise awareness and inform all people, whether they are sick or not. Users do not need to register in this section. With the linking technique, users can instantly access and learn the section or title they want. I tried to make the design simple and legible. I chose the basic fonts so that the font is still legible. I analyzed the documents that Ms. Kübra sent me, divided them into titles and transferred them to this digital environment.  Some screenshots for this page:    Figure 4 Blog page    Figure 5 Blog page pagination  Login:  In this section, instead of checking a simple email password, I set up the token system that the user will use in every transaction by using JWT (Json Web Token), which is available in the market as a secure technology. When the user logs in, he can access only the authorized sections with this token that he will obtain from the server.  Some screenshots for this page:    Figure 6 login page  Flow diagram:    Figure 7 Flow Diagram of Login  Here user enters email and password. In server side, it looks into DB and if any data matches with this credentials returns true else false.  Signup:  In this section, the user enters his email and password and clicks the register button. If there is no user registered with the same email before in the system, the user is directed to the login page to complete the registration process and get tokens.  Some screenshots for this page:    Figure 8 Signup Page  Flow diagram:    Figure 9 Flow Diagram of Signup  First Form:  The user encounters this section if he is logging into the system for the first time or if a certain period of time has passed after filling out this form and needs to be updated. In this section, the user fills in the personal and physical characteristics of the form. The age and degree of illness of the user are obtained through this form and recorded in the system.  Some screenshots for this page:    Figure 10 First Form page 1    Figure 11 First Form page 2    Figure 12 First Form page 3    Figure 13 First Form page 4  Here the user chooses the most suitable situation for himself  Flow diagram:    Figure 14 Flow Diagram of First Form  Exercises:  In this section, the user sees the exercises in line with the information obtained according to the information filled in on the first form page, such as age and disease degree. The user may or may not like the exercises he sees. It can change the status of the video to see if it has finished.  Some screenshots for this page:    Figure 15 Exersizes Page  Chat:  In this section, the user can ask a problem he or she has about the exercises or a question on his mind to a doctor who is online at that time via live chat. On the left side of this page, we will be able to see the doctors in the system and whether they are online or offline. On the right side, we will be able to message the selected doctor. This process is currently under construction. I completed it as a design in the frontend, but it is not functionally complete.  Some screenshots for this page:    Figure 16 Chat Page  Profile:  In this section, the user can update some of the information she filled in on the First Form page.  Some screenshots for this page:    Figure 17 Profile Page  Dashboard:  This page is an overview page where the user can learn about himself. Whatever statistics are needed on this page, data and tables can be updated accordingly. On this page, the user can see his data in line graph, bar graph or directly numerically. The purpose of this page is to evaluate the user in terms of their general condition and to form an opinion for the user.  Some screenshots for this page: |

**The Impact and Future Directions ( / 15 Points)**

Explain the potential (or current if exist) impacts of your outcome in terms of how the methods and results will be used in real life, how it will change an existing process, or where it will be published, etc. Also, explain what would be the next step if the project is continued in the future, what kind of qualitative and/or quantitative updates can be made, shorty, where this project can go from here? This section should be between 250-500 words.

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| The Life Guide project I made can be published as a website. All people can come to my site and benefit from the blog, which is open to everyone. Children with Cerebral Palsy or their families must register to access more content. When registering, they have to fill out a form I made to find out the physical characteristics of the user and the degree of his illness. They cannot access the content without completing this form. Afterwards, the user is greeted with exercises that he can do. There is also a page on the site where they can communicate live with doctors.  The project is very open to expansion. Then, perhaps in the future, artificial intelligence and machine learning can be integrated into the application and recommended exercises can be automated. There is currently a page that only allows text messaging. Later, this page can be changed to a page that allows video conferencing or sending videos, photos and documents.  Since the website is a website that a child will use throughout his or her childhood, he needs to periodically update the form he filled in when he first registered. If it is not updated, the exercises that come across may not match the child's current disease degree. Therefore, it needs to update its information periodically. Thanks to the like and dislike buttons for the exercises, users can get feedback about the exercise and information about which exercise will be more beneficial.  If enough doctors can be included in the system, children's exercises can be followed in one-on-one sessions. However, this may not seem very possible financially due to the shortage of doctors.  Even though the number of hospitals is increasing today, this system is very useful because there is no need to go to the hospital to treat your child and follow his development. At home, in the park or at school, he can log into his account from any platform and do his exercises whenever he wants.  I implemented this project in mix of Turkish and English language. There can be language selection on the navbar and users can select their own language. |