



Bilkent University

Department of Computer Engineering

Senior Design Project

Prexcel

Project Specifications Report

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1. Introduction	2
1.1. Description	2
1.1.1 Presentation Analysis & Detailed Feedback	3
1.1.2 Live Feedback	4
1.1.3 Tutorial	4
1.1.4 User Accounts and Progress Tracking	4
1.2. Constraints	5
1.2.1. Economic Constraints	5
1.2.2. Environmental Constraints	5
1.2.3. Social Constraints	5
1.2.4. Political Constraints	6
1.2.5. Ethical Constraints	6
1.2.6. Health Constraints	6
1.2.7. Manufacturability Constraints	6
1.2.8. Sustainability Constraints	7
2. Requirements	9
2.1. Functional Requirements	9
2.2. Non-functional requirements	9
2.2.1. Usability	9
2.2.2. Reliability	10
2.2.3. Performance	10
2.2.4. Supportability	10
2.2.5. Security	10
2.2.6. Scalability	11
3. References	12

1. Introduction

As the business and educational world continues to digitalize, presentations, which is an essential part of these both worlds, have slipped into the online world as well. Prexcel is a desktop app that aims to help users make better presentations and improve their online presentation skills.

The rest of this report contains a more detailed description of Prexcel in Section 1.1, Then, various constraints of the project are listed in their respective subsections of Section 1.2. Professional and ethical issues related to the project are discussed in section 1.3. Finally, the functional and non-functional requirements of the project are discussed under Section 2.

1.1. Description

The main purpose of Prexcel is to be a multifunctional presentation assistant with a special focus on online presentations.

The core functionality of the Prexcel is to analyse users' presentations and give feedback to the users based on this analysis on how to improve the presentation. The presentations to be analysed can be uploaded as a video in the format of .mp4, .mov or .mkv, or they can be taken via the Prexcel app itself, live. If the presentation video is recorded live, users also have the option to take live feedback. Even though the app is mainly designed to help users improve their presentations beforehand, the live feedback functionality could be used during the presentation in order to get live feedback which may help the user present better.

1.1.1 Presentation Analysis & Detailed Feedback

Either through live recording or external uploading of a video, once a video is submitted to the app, the video is analysed, and detailed feedback is given based on a visual and speech analysis.

Firstly, Prexcel recognizes the speech and converts it to a text. From the text, it detects and highlights the filler words in the text, and if the filler words constitute above a certain percentage of the text, it warns the user. Furthermore, if the user has extended gaps in his/her speech, or “umms” for extended periods of time, the analysis also keeps track of these and the time wasted due to these as well.

Visually, the presenters’ body language and facial orientation is analysed. When presenting users, the users’ hands must not be blocking their face, their face should be facing the screen for the most part. If the user's hand blocks their face, or if the user looks away from the screen for an extended period of time (for example longer than 10 seconds), this is noted in the analysis and is included in the detailed report.

One of the aims of the app is to provide users with mathematical and statistical data as much as possible at the end reports. The report gives feedback in the form of “The user did not look directly at the screen for 35% percent of the time.” Or for the speech analysis, “The user used filler words for 8% of the speech.”, or for example “The presentation could have been shortened by 2 minutes if the user did not have excessive gaps in his/her speech.”.

1.1.2 Live Feedback

Prexcel also gives live feedback when the user is recording their presentations using the recording functionality. This live feedback includes warning the user if he or she is talking too fast or too slow, the volume of the voice is too high or too low, and most importantly it recommends words when the user gets stuck on a certain word. The word recommendation is done based on the flow of the sentence. This feedback is very helpful for maintaining the integrity and the flow of the presentation.

1.1.3 Tutorial

The app also contains a tutorial page and functionality, which includes information about making good presentations as well as the app's criteria for evaluating presentations so that grades given to the users for their presentations are unambiguous and users know what they are being judged on when they get their final grade. The tutorial also includes a chatbot, so that instead of searching for particular information on the tutorial page, which can be tedious, users can just ask the chatbot and get answers.

1.1.4 User Accounts and Progress Tracking

Finally, the users can create accounts and use the app with their accounts. They can delete their account at any time and their personal information (such as visual and auditory information processed and analysed) is never stored, only their encrypted passwords and emails are stored. Using their accounts, users can see their past presentation grades and they can track their improvement.

1.2. Constraints

1.2.1. Economic Constraints

- There will be the cost of the database servers for the user accounts.
- The frameworks and libraries are open source, hence they have no cost.
- Since the frameworks and libraries are open source, the application will not be used in a commercial way.
- The application can be used free of charge.

1.2.2. Environmental Constraints

- The application and any supporting hardware will not be utilising any form of “server farm” that negatively impacts the environment, as the database used in Prexcel will be very lightweight when it comes to the amount of data kept per user.

1.2.3. Social Constraints

- There will not be a way for the users to communicate with one another, however, considering the nature of the activity; Prexcel enhances the way users socialize with each other when giving presentations.

1.2.4. Political Constraints

- Due to the nature of the application, it can not, and will not discriminate regarding the content or the affiliation of the presentation. Prexcel is wholly removed from the political and social consequences of the speaker's intentions and political standing and only exists to assist in the method with which the presentation is given, which will be explained within the terms and agreements of the application.

1.2.5. Ethical Constraints

- The application uses the microphone and camera of the user in order to record live presentations. Hence, the application will ask for the user's permission in order to receive input from such hardware components.
- According to the General Data Protection Regulations (GDPR) [1] and Kişisel Verileri Koruma Kanunu (KVKK) [2], the application is not allowed to alter or redistribute the recordings of presentations, hence it is going to destroy all the copies of the recordings that the users willingly record.

1.2.6. Health Constraints

- Considering the current circumstances that the users of this application are in, namely, the pandemic, practicing and mastering giving online presentations are a significant benefit to users' health.

1.2.7. Manufacturability Constraints

- Prexcel will be developed as a desktop application.

- GitHub will be used for version control and to ensure consistent development among the developers.
- DeepSpeech [3] will be used for speech recognition.
- OpenCV [4] will be used for facial recognition.
- Electron [5] framework will be used to construct the user interface of the application.
- As a database system, MySQL will be used.

1.2.8. Sustainability Constraints

- Prexcel will be utilizing Facial, Speech Recognition algorithms; it will not be using any other Application Programming Interfaces. The system does not need external data in order to sustain its functionality.

1.3. Professional and Ethical Issues

There are various professional and ethical issues surrounding the development and deployment of Prexcel.

A major part of these issues stem from the fact that the core functionality of the software involves processing, and consequently, even though temporarily, storing the user's personal visual and auditory data. This is subject to a wide range of laws and regulations in different countries, most notably, *Kişisel Verileri Koruma Kanunu (KVKK)* [2] in Turkey and *General Data Protection Regulations (GDPR)* [1] in the European Union.

Most of the regulations in KVKK and GDPR do not apply to Prexcel, because these regulations mostly focus on long term storage of personal data and users' rights regarding this

data, such as their right to know precisely what personal information of theirs is stored, or the users right to demand the removal of any personal information from the app's database [1, 2]. The only long-term information to be kept by the Prexcel databases will be users account information which includes their encrypted passwords and emails, which they can delete at any time. Other than that, Prexcel needs to present its user with an *End User License Agreement (EULA)* at account creation that clearly states what is being done with the users' personal information and that this information is being disposed of after the processing immediately.

This issue also extends to the use of third-party libraries as well, because the processing of someone's personal information using non-open-source third-party libraries might violate these regulations, as such libraries might process or store some parts of the data in ways that violate these regulations. In the end, to avoid violating the said regulations, the processing of users personal data must be done with code written by the project team and open source libraries only.

The final major professional issue regarding Prexcel is its licencing. In order to implement image processing, machine learning and speech recognition algorithms, we intend to make use of various third-party libraries. The libraries considered for being used in the development Prexcel have their own licensing terms and conditions, some of which dictate to what extent a software developed using them could be used. Depending on which libraries might end up being used in the final product, this might limit Prexcel's commercial uses, as many of the said libraries stipulate that any other software developed using them must be open source and/or the software must not be used to generate profit.

2. Requirements

2.1. Functional Requirements

- The user should be able to upload the video recordings of their presentations.
- The user should be able to upload the audio recordings of their speeches.
- The user should be able to record their presentation while giving it.
- The user should be able to receive live feedback based on their live presentations.
- The user should be able to receive a system-generated report containing data about their speech or presentation.
- The user should be able to view and download their reports on the system.
- The user should be able to create accounts using their email addresses and a password.
- The user should be able to sign in to its account with its login information.

2.2. Non-functional requirements

2.2.1. Usability

- The user interface should be simple to use and user-friendly.
- The application should be usable by anyone who has an English level above A1.

2.2.2. Reliability

- The application should continue to function even if the voice input cannot be transcribed or some issue prevents the use of instant feedback from working within the appropriate time frame.
- A catastrophic failure of the application should not cause a loss of data for the user, nor should it require any low-level manipulation from the user's side other than restarting the application itself.

2.2.3. Performance

- The real-time response delay for live feedback should not exceed 3 seconds after detection.

2.2.4. Supportability

- Prexcel must support Windows, Linux, and Mac desktop operating systems.
- Any recording hardware (Microphone and camera etc.) that the users utilise should be supported by the application, assuming that the hardware components are compatible with the system on which the application is running on.

2.2.5. Security

- Users' processed data should be deleted right away after its usage.
- Users' password must be encrypted when it is stored in the database.

2.2.6. Scalability

- The application should work even when the user count exceeds projected counts, and the user experience should not suffer due to this fact.

3. References

[1] The European Parliament and the Council of the European Union, “General Data Protection Regulation”, Apr. 27, 2016, <https://gdpr-info.eu/>, [Accessed: Oct. 9, 2021].

[2] T.C. Cumhurbaşkanlığı Mevzuat Bilgi Sistemi, “Kişisel Verilerin Korunması Kanunu(KVKK)”, Apr. 7, 2016, <https://www.mevzuat.gov.tr/MevzuatMetin/1.5.6698.pdf>, [Accessed: Oct. 9, 2021].

[3] DeepSpeech, <https://deepspeech.readthedocs.io/en/r0.9/#>, [Accessed: Oct. 8, 2021].

[4] OpenCV, <https://opencv.org>, [Accessed: Oct. 8, 2021].

[5] Electron, <https://www.electronjs.org>, [Accessed: Oct. 10, 2021].