



Group Members:

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Main Idea:

This project report aims to document the development and implementation of a **Graphical User Interface (GUI) DIGITAL PIANO** using the C++ programming language. The objective of this project was to create an interactive program that allows users to play the piano manually and also provides the option to play a selection of predefined songs. Additionally, we explored the possibility of incorporating additional features such as note display menus with dynamic visual shifts and effects.

The primary motivation behind this project was to gain hands-on experience in GUI programming and explore the realm of digital music applications. We recognized the demand for a user-friendly digital piano simulator that offers an intuitive interface for both novice and experienced musicians to practice and enjoy playing the piano virtually.

One of the key challenges we encountered was accurately reproducing the audio output of the piano notes. To overcome this, we implemented a mechanism to extract audio files corresponding to each piano note and ensured precise synchronization of the notes with user interaction.

Moreover, we aimed to provide a guided learning experience for users by incorporating a selection of predefined songs. Through the program's guidance, users can play these songs, learning and honing their piano-playing skills. The implementation involved designing an algorithm to highlight the next note that needs to be played, visually indicating the corresponding key/button to press. The buttons would light up, serving as a visual cue for the user.

Overall, this project represents an opportunity for us to explore GUI programming, audio processing, and user interaction in the context of a digital piano simulator. By presenting our findings, challenges, and accomplishments in this project report, we hope to contribute to the body of knowledge surrounding the development of digital music applications and inspire further innovation in this domain.

Roll & Contribution:

■ Rania Ghazanfar:

- Project Proposal Development
- Generating and Developing the Project Program's backbone i.e GUI Interface which allows us to implement the Digital Piano characteristics into Graphical Illustration.
- Provision of 'Logical Analytics' for Digital Piano Training session application
- Designed the PIANO FORM on which all the Piano functionalities are implemented.
- Development of the third song i.e fur Elise in the training session application of the Digital Piano program.
- Program Code Analytics and Generation
- Project Debugging
- Project Report Development.

■ Shayan Noorullah:

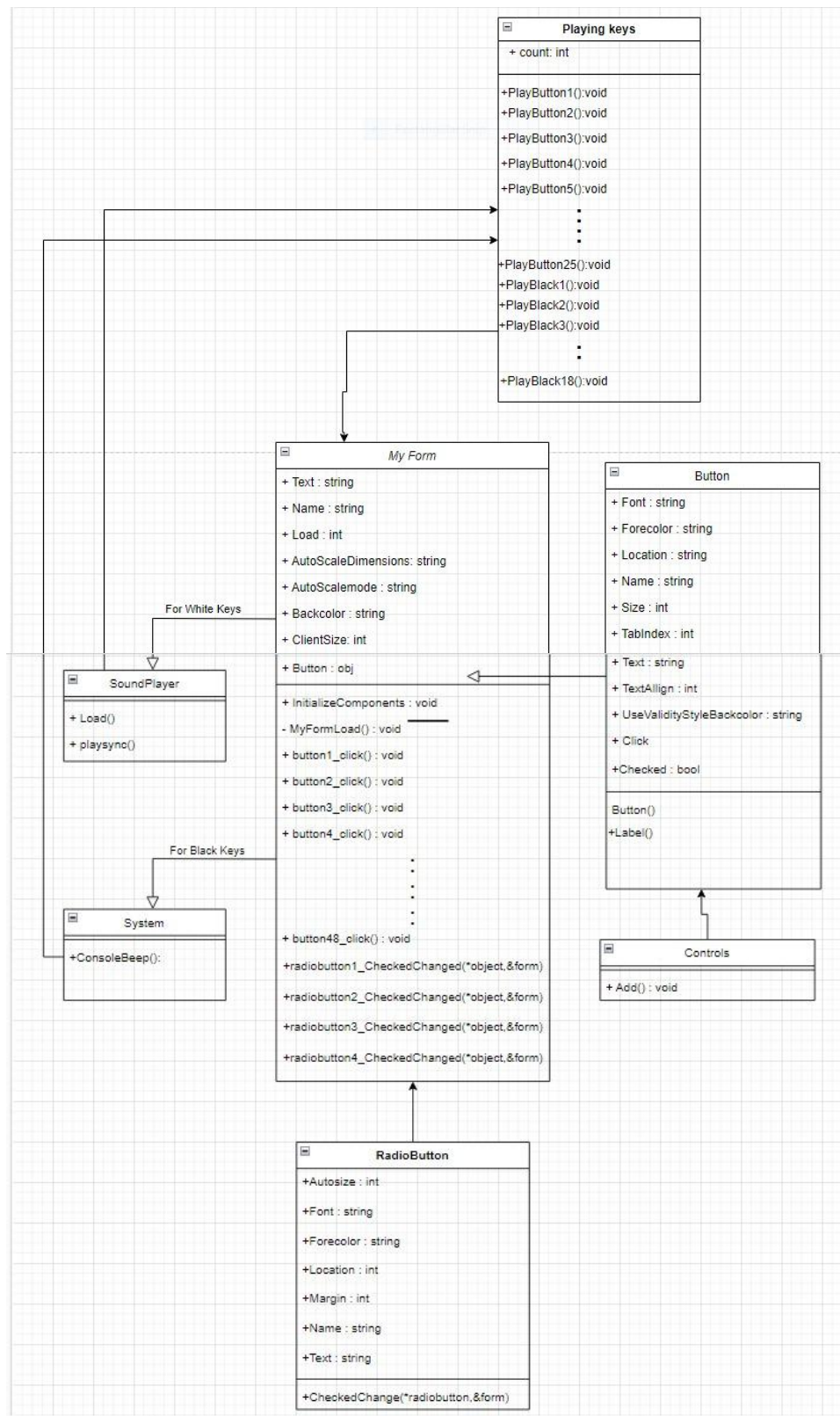
- Project Class Diagram Development
- Provision of 'Logical Analytics' for requirements and development of projects.
- Provision of audio files for the Digital Piano, reproducing and editing it to match the time factor.
- Provision and implementation of the frequency beeps in the Piano major keys.
- Development of the first song i.e Happy Birthday in the training session application of the Digital Piano program.
- Program Code Analytics and Generation
- Project Report Development

■ Marium Arif:

- Project Proposal and Class Diagram Development
- Provision of 'Logical Analytics' for Digital Piano Training session application
- Generating and developing the Playing Keys class.
- Implementation of the Playing Keys class and its functionalities according to the desired requirements in the project proposal.
- Development of the second song i.e Baa Baa Black Sheep in the training session application of the Digital Piano program.
- Project Debugging
- Project Report Development.

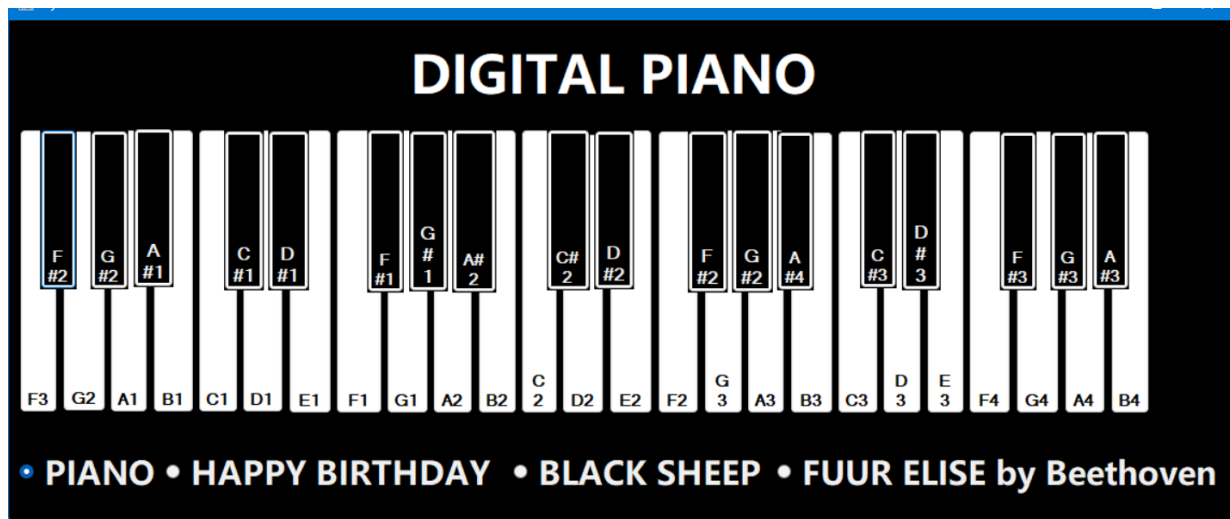
Project Implementation and Outcome Illustrations:

Class Diagram:

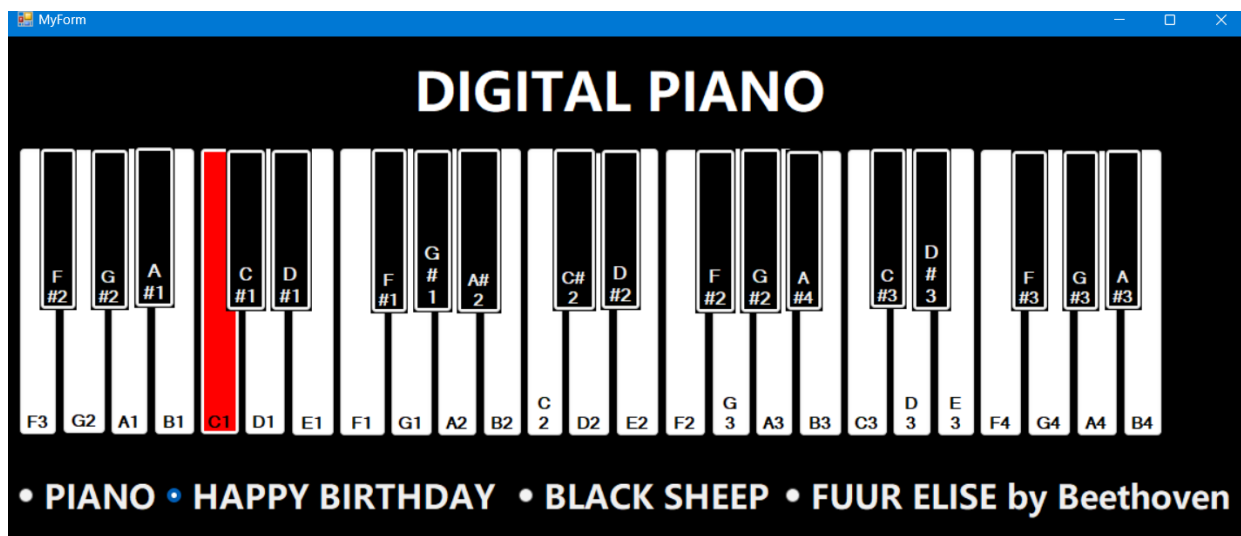


Implementation Outcome:

Form Design:



Implementation of Songs Training Section:



NOTE: Other implementation snippets and videos are stored in the given drive link.

Problem Encountered:

There were many challenges which were faced during the development of the GUI Interface and the source code of the project. Some of the prominent problems were:

- Generating GUI interface.
- Manipulating GUI functions according to each different song.
- Making personalized classes in the GUI interface.
- Finding and implementing proper music notes.
- Illuminating the first keys and then changing them.
- Make sure the illumination is reset after clicking on other songs simultaneously.

For Complete Program Running Videos and Snippets:

Drive link:

https://drive.google.com/drive/folders/1ilMsqudR22Brud_lbK7tkrMkRjmUez6Y?usp=sharing