

Florida International University
School of Computing and Information Sciences

Software Engineering Focus

Final Deliverable

Project Title:
ComboCounter Heavy Bag Ver. 3.0

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Introduction

ComboCounter is designed to be a workout application which is connected to a “smart” punching bag. The goal is to connect socially with others while achieving real goals and improving stamina, strength and form!

Current System (Ver. 2.0)

(As stated by previous developers)***

To add more customization and simplify using this application. The user interface was tweaked to give a sleek look and emphasize what the user would want to focus on. Additionally, with more modes and ways to compete with others, there are far more ways to enjoy one’s exercising experience. Inspiration was taken from the initial rough drafts accompanied by our design ideas to bring about a great user experience with audio and visual cues and detailed information.

Purpose of New System (Ver 3.0)

To add improvements upon the foundation of the previous version. The database has been restructured to be more efficient and new columns were added to implement new features. Additionally, improvements were made to the overall user experience such that the application can be more responsive to user interaction while being tailored to the users preferences.

Improvement Details

- Improved functionality & UI/UX:
 - Dynamic Themes
 - Added fonts to the UI to avoid using the default Windows fonts
 - Added visual feedback to the workout applications
 - Standardized UI elements throughout the program
 - Standard coloring of elements
 - Removed low quality elements
 - Elements are now centered

- Added Icons to better describe feature to user
- Database Improvements:
 - Database code was spread out throughout the application but is now contained in one class
 - Restructured Database to implement new features
 - User can now interact with database to make changes to User Account
 - Added a system to track workout sessions and keep track of the history of workouts
 - Added User Settings to allow the user some level of customization of the program
- Bug fixes:
 - Fixed bug creating multiple instances of pages
 - User was originally unable to exit or quit application
 - Fixed a bug where the program would incorrectly calculate the time if the start button was pressed multiple times
 - Some applications would create multiple timers causing race conditions which would make the time shown to be inaccurate
 - Double Clicking would cause strange behavior, resulting in loss of data
 - Changed the paths for sound effects to be relative instead of absolute to make it less user specific
 - Moved commonly used functions to a static tools class to remove code duplication

User Stories

Implemented User Stories

<u>Name</u>	<u>User Story</u>	<u>Description/ Acceptance Criteria</u>
ComboCounter Heavy Bag 1	As a developer I want to setup the Virtual Machine provided to us by the University for use on the project	The code provided to us runs correctly on the virtual machine
ComboCounter Heavy Bag 2	As a developer I want understand c# and how visual studio interacts with User Interface	The developer has a working knowledge of C# and can efficiently navigate Visual Studio
ComboCounter Heavy Bag 3	As a developer I want to setup Visual Studio to be able to work with the technologies used in the project	Visual Studio is set up to work correctly with .NET Framework and C#
ComboCounter Heavy Bag 4	As a developer I want to understand how the current system works and where there are areas of improvement	The developer understands how the program is formed and how each piece interacts with each other

ComboCounter Heavy Bag 5	As a developer I would like to make sure the text on screen is readable and UI elements are centered	The text on screen conforms to disability guidelines for readability and the elements which are supposed to be centered are in the middle of the page
ComboCounter Heavy Bag 6	As a user I would like to hover over menu options to give a brief description of what they do	There is a brief description of the action of buttons when the user hovers over them
ComboCounter Heavy Bag 7	As a developer I would like to access the database from all classes using a single object	All the database code is contained in a single class and other classes reference that one object to gain access to the database
ComboCounter Heavy Bag 8	As a user I would like to visualizations of sessions post workout	The page which shows the history displays charts or other visualizations of the data collected from previous workout sessions
ComboCounter Heavy Bag 9	As a user I would like to see a confirmation dialog before exiting the program	Page displays a confirmation option before exiting

ComboCounter Heavy Bag 10	As a user I would like the see the history of my last sessions	There is a page which shows the history of workout sessions from the user
ComboCounter Heavy Bag 11	As a developer I would like to load fonts that are not default fonts	A mechanism is put in place to be able to load fonts which are not installed in the system
ComboCounter Heavy Bag 12	As a user I would like to be able to change through preset themes	Interface allows user to change overall themes dynamically to suit preference
ComboCounter Heavy Bag 13	As a developer I would like to have a class to store all necessary font elements	There is a class which contains the fonts which were loaded for easy access by other classes
ComboCounter Heavy Bag 14	As a Developer I would like to use custom versions of the Windows Forms to be able to access our own theme and font information	There are custom versions of things like buttons and labels which inherit from the original controls which use the theme and font information we provide

ComboCounter Heavy Bag 15	As a Developer I would like the page to only comprise of one window with different pages	The application no longer opens multiple windows while running the program and all the pages are contained in the same window
ComboCounter Heavy Bag 16	As a Developer I would like the interface to adjust depending on the size of the window	The size of the user interface adjusts if the user has a smaller screen
ComboCounter Heavy Bag 17	As a Developer I would like to design a couple of preset color schemes for the application for users to choose from	There are 2 or more pre set themes for the user to choose from that style the application
ComboCounter Heavy Bag 18	As a Developer I would like to ensure sure all UI elements are uniform and consistent	Overall fonts, colors and other theme elements are uniform
ComboCounter Heavy Bag 19	As a User I would like to be able to calibrate Sensor in a more intuitive way	Sensor scaling is more fluid by changing in larger increments

ComboCounter Heavy Bag 20	As a User I would like be able to choose themes and color scheme	User has an option to choose between preset themes
ComboCounter Heavy Bag 21	As a Developer I would like to center UI elements	Forms are centered based upon size of the screen
ComboCounter Heavy Bag 22	As a Developer I would like to remove duplicate options	Each icon and option has a unique feature
ComboCounter Heavy Bag 23	As a Developer I would like to make all Forms transparent to make Theme Mangagement easier	Each page's background is transparent
ComboCounter Heavy Bag 24	As a Developer I would like to clean up old old code to make it more readable	Old code is removed and refactored to reduce clutter

ComboCounter Heavy Bag 25	As a Developer I would like to document and comment new code	New code is documented
ComboCounter Heavy Bag 26	As a user I would like to see visual feedback from the application when the bag is struck to make sure my hits are registered	User can see a visual display of force when bag is hit
ComboCounter Heavy Bag 27	As a user I would like the see the history of my last sessions	User can see data based upon previous sessions
ComboCounter Heavy Bag 28	As a user I would like to see visualizations of sessions post workout	User can see a visual representation of performance after workout is completed
ComboCounter Heavy Bag 29	As a developer I would like to store information of workouts in database	Database stores data from workout

ComboCounter Heavy Bag 30	As a developer I would like to restructure database to implement new features	Database is restructured to hold new data
ComboCounter Heavy Bag 31	As a developer I would like to add a class for to define weight division	Weight division is automatically calculated based upon users sex and weight
ComboCounter Heavy Bag 32	As a developer I would like to interact with the database to make global changes	There is a single class that interacts with the database
ComboCounter Heavy Bag 33	As a user I would like to have a user settings page to control and save preferences to my profile	User preferences can be chosen and saved
ComboCounter Heavy Bag 34	As a developer I would like to have user changes be implemented	The changes made in the user settings page are reflected in the database and are shows when the user reopens the application

ComboCounter Heavy Bag 35	As a user I would like to have a clock on the homescreen so I can keep track of the time	There is a clock displayed on the home screen
ComboCounter Heavy Bag 36	As user I would like to be able to toggle sounds	The User Settings page has a toggle to be able to turn on and off sounds and the settings is taken into account
ComboCounter Heavy Bag 37	As a developer I would like to address UI issues in the User Account page	The User Account page will allow you to return to the view page
ComboCounter Heavy Bag 38	As a developer I would like the user's settings to be taken account of during the course of the application	The user settings are applied throughout the application wherever appropriate
ComboCounter Heavy Bag 39	As a developer I would like to use a dictionary to change the way pages are stored for easier implementation	The pages that are brought into the main page are stored in a dictionary

ComboCounter Heavy Bag 40	As a user I would like to choose between 12 hr and 24 hour format view for clock on Home Screen	The user settings page has an option for changing the format of the clock on the home page
ComboCounter Heavy Bag 41	As a developer I would like for the visual feedback to be extended to the other pages	The visual feedback control is on more than just the punch count and the combo score page
ComboCounter Heavy Bag 42	As a user I would like to change my user account information and move it	The changes made in the User Account page are reflected in the database
ComboCounter Heavy Bag 43	As a user I would like to be able to see the application I used in the history section	The history page has an option to view the application used
ComboCounter Heavy Bag 44	As a developer I would like to add the original theme	The original theme from the previous team is restored in the theme selection

ComboCounter Heavy Bag 45	As a user I would like to restructure UserManager to work better with database	User Manager can clean input
ComboCounter Heavy Bag 51	As a developer I would like to have a Sequence Diagram detailing the process of selecting a theme	There is a sequence diagram showing the process of selecting a theme
ComboCounter Heavy Bag 52	As a developer I would like to have a Sequence Diagram detailing the process of viewing a user's history	There is a sequence diagram showing the process of viewing a user's history
ComboCounter Heavy Bag 53	As a developer I would like to have a Class Diagram for the parts of the application that I developed	Each developer has a class diagram showing the parts of the application they worked on
ComboCounter Heavy Bag 54	As a developer I would like to analyze the program for design patterns	The design patterns exhibited in the application are written out

ComboCounter Heavy Bag 55	As a developer I would like to leave a wishlist for the next people who take this project	A wishlist containing places where the application could improve are written into this document for the next team
ComboCounter Heavy Bag 56	As a developer I would like to have a User Manual that shows how to run the program and how to maintain it	A user manual describing how to install and run the program is written and included into this document
ComboCounter Heavy Bag 57	As a developer I would like to have test cases to test new features of the application	There are a set of test cases for new features of the application written and included in this document
ComboCounter Heavy Bag 58	As a developer I would like to have a package diagram showing the subsystem decomposition	There is a package diagram showing the subsystem decomposition included in this document
ComboCounter Heavy Bag 59	As a developer I would like to make a video introducing the product	There is a video which introduces the product and its purpose

ComboCounter Heavy Bag 60	As a developer I would like to have a video showing the developer setup process and the information needed for maintenance	There is a video showing the dev environment setup process and the how to maintain the product in the future
ComboCounter Heavy Bag 61	As a developer I would like to have a video showing a potential user how to use the system	There is a video showing a potential user how to use the program
ComboCounter Heavy Bag 62	As a developer I would like to have a have video detailing the presentation and introduction	Video covers introduction to ComboCounter and presentation
ComboCounter Heavy Bag 63	As a developer I would like to have a video discussing the shortcomings of the project along with the wishlist	Video covers shortcomings of the project and presents a wishlist for future developers
ComboCounter Heavy Bag 64	As a developer I would like to create a poster unique to each individual user	Poster is created highlighting contributions of each student

ComboCounter Heavy Bag 65	As a developer I would like to create a powerpoint presentation summarizing the development process	PowerPoint presentation highlights development process across sprints
ComboCounter Heavy Bag 66	As a developer I would like to work on final document	Final document details development over the semester
ComboCounter Heavy Bag 67	As a developer I would like to verify all meeting documentation is readable and ready for submission	Ensure meeting minutes document is complete and ready for submission

Pending User Stories

ComboCounter Heavy Bag 46	As a user I would to view more than two players at once	Game modes can feature more than 2 players at once
ComboCounter Heavy Bag 47	As a developer I would like to redevelop how force is calculated	Formula that calculated is revised to adjust scaling for handicap

ComboCounter Heavy Bag 48	As a user I would like to view history by which application/session/game used	User can view history based upon selected
ComboCounter Heavy Bag 49	As a user I would like to see total output for more spans of time i.e (month, year)	User has different option of viewing history
ComboCounter Heavy Bag 50	As a user I would like a endurance mode that will ring at set force threshold	New user mode that would end once force threshold was hit

Project Plan

This section describes the planning that went into the project. This project was implemented with agile development techniques in mind. Software and hardware chosen for this project are listed below

Hardware and software resources

List of all hardware and software resources that were used in project:

Hardware	Personal Machine	Virtual Machine (Windows)
Processor	AMD FX-6100 @ 4.0Ghz	QEMU Virtual CPU Version 1.53 @ 2.00 GHz
Capacity	1.0 TB	N/A
Memory	8.00 GB	8.00 GB

Software

- Visual Studio 2017/2019
- SQL Workbench 8.0 CE
- MySQL Community Server 8.0.20
- GitHub
- StarUML
- draw.io

Project Schedule

Project Goals: Improve User Interface and functionality as well adding new features such as User Settings and Theme that can be changed dynamic and will be unique to each user. To implement new features, databases will need to be updated.

Project Scope: Application is meant to work with a punching bag hardware component. However, due to the current COVID-19 pandemic, it was decided that it would be safer to focus solely on the software component of this project.

Sprints Plan

Sprint 1

Sprint Goals:

- Become Familiar with C#
 - Setup VMs to run project
 - Learn Visual Studio
 - Plan Sprints points/ allocations
 - Look for improvements to current code
-
- **User Story 1**
 - As a developer I want to setup the Virtual Machine provided to us by the University for use on the project
 - **User Story 2**
 - As a developer I want understand c# and how visual studio interacts with User Interface
 - **User Story 3**
 - As a developer I want to setup Visual Studio to be able to work with the technologies used in the project
 - **User Story 4**
 - As a developer I want to understand how the current system works and where there are areas of improvement

Velocity - 10

Sprint 2

Sprint Goals:

- Modernize UI
- Create Database Object to optimize SQL database
- Visualizations for users

User Stories

- **User Story 5**
 - As a developer I would like to make sure the text on screen is readable and UI elements are centered
- **User Story 6**

- As a user I would like to hover over menu options to give a brief description of what they do
- **User Story 7**
 - As a developer I would like to access the database from all classes using a single object
- **User Story 8**
 - As a user I would like to visualizations of sessions post workout
- **User Story 9**
 - As a user I would like to see a confirmation dialog before exiting the program
- **User Story 10**
 - As a user I would like the see the history of my last sessions
- **User Story 11**
 - As a developer I would like to load fonts that are not default fonts
- **User Story 12**
 - As a user I would like to be able to change through preset themes
- **User Story 13**
 - As a developer I would like to have a class to store all necessary font elements

Velocity - 28

Sprint 3

Sprint Goals:

- Revise code architecture for optimization
- Revise SQL table to meet new requirements
- Begin implementing themes
- Fix bug creating multiple instances of pages

User Stories

- **User Story 14**
 - As a Developer I would like to use custom versions of the Windows Forms to be able to access our own theme and font information
- **User Story 15**
 - As a Developer I would like the page to only comprise of one window with different pages
- **User Story 16**
 - As a Developer I would like the interface to adjust depending on the size of the window

- **User Story 17**
As a Developer I would like to design a couple of preset color schemes for the application for users to choose from
- **User Story 18**
As a Developer I would like to ensure sure all UI elements are uniform and consistent
- **User Story 19**
As a User I would like to be able to calibrate Sensor in a more intuitive way
- **User Story 20**
As a User I would like be able to choose themes and color scheme
- **User Story 21**
As a Developer I would like to center UI elements
- **User Story 22**
As a Developer I would like to remove duplicate options
- **User Story 23**
As a Developer I would like to make all Forms transparent to make Theme Mangagement easier
- **User Story 24**
As a Developer I would like to clean up old old code to make it more readable
- **User Story 25**
As a Developer I would like to document and comment new code

Velocity - 31

Sprint 4

Sprint Goals:

- Revise code architecture for optimization
- Visual Feedback for hits to bag
- Displaying & statistical data
 - See what data he wants for the history
 - History into the database
 - Add in feature to change user information
 - Add column for weight class (If not already there)
- Restructure database to allow for information to be accessed
- Add Clock on homescreen
 - Change between 12hr and 24
- Add a settings page
 - Change and store theme choices
 - Toggle user feedback

- Add current punch force in total force
- Option to change if time competition

User Stories

- **User Story 26**
As a user I would like to see visual feedback from the application when the bag is struck to make sure my hits are registered
- **User Story 27**
As a user I would like to see the history of my last sessions
- **User Story 28**
As a user I would like to see visualizations of sessions post workout
- **User Story 29**
As a developer I would like to store information of workouts in database
- **User Story 30**
As a developer I would like to restructure database to implement new features
- **User Story 31**
As a developer I would like to add a class for to define weight division
- **User Story 32**
As a developer I would like to interact with the database to make global changes
- **User Story 33**
As a user I would like to have a user settings page to control and save preferences to my profile
- **User Story 34**
As a developer I would like to have user changes be implemented
- **User Story 35**
As a user I would like to have a clock on the homescreen so I can keep track of the time
- **User Story 36**
As user I would like to be able to toggle sounds
- **User Story 37**
As a developer I would like to address UI issues in the User Account page
- **User Story 38**
As a developer I would like the user's settings to be taken account of during the course of the application
- **User Story 39**
As a developer I would like to use a dictionary to change the way pages are stored for easier implementation

Sprint 5

- **User Story 40**
 - As a user I would like to choose between 12 hr and 24 hour format view for clock on Home Screen
- **User Story 41**
 - As a developer I would like for the visual feedback to be extended to the other pages
- **User Story 42**
 - As a user I would like to change my user account information and move it
- **User Story 43**
 - As a user I would like to be able to see the application I used in the history section
- **User Story 44**
 - As a developer I would like to add the original theme
- **User Story 46**
 - As a developer I would like to restructure UserManager to better work with database
- **User Story 51**
 - As a developer I would like to have a Sequence Diagram detailing the process of selecting a theme
- **User Story 52**
 - As a developer I would like to have a Sequence Diagram detailing the process of viewing a user's history
- **User Story 53**
 - As a developer I would like to have a Class Diagram for the parts of the application that I developed
- **User Story 54**
 - As a developer I would like to analyze the program for design patterns
- **User Story 55**
 - As a developer I would like to leave a wishlist for the next people who take this project
- **User Story 56**
 - As a developer I would like to have a User Manual that shows how to run the program and how to maintain it
- **User Story 57**
 - As a developer I would like to have test cases to test new features of the application

- **User Story 58**
 - As a developer I would like to have a package diagram showing the subsystem decomposition

Sprint 6

- **User Story 59**
 - As a developer I would like to make a video introducing the product
- **User Story 60**
 - As a developer I would like to have a video showing the developer setup process and the information needed for maintenance
- **User Story 61**
 - As a developer I would like to have a video showing a potential user how to use the system
- **User Story 62**
 - As a developer I would like to have a have video detailing the presentation and introduction
- **User Story 63**
 - As a developer I would like to have a video discussing the shortcomings of the project along with the wishlist
- **User Story 64**
 - As a developer I would like to create a poster unique to each individual user
- **User Story 65**
 - As a developer I would like to create a powerpoint presentation summarizing the development process
- **User Story 66**
 - As a developer I would like to work on final document
- **User Story 67**
 - As a developer I would like to verify all meeting documentation is readable and ready for submission

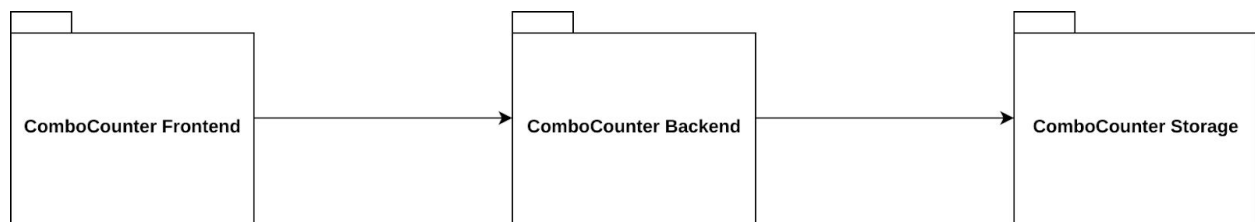
System Design

This section contains information on the design decisions that went into this project. The architecture patterns are outlined and explained. The entire system is shown in a package diagram and the subsystems are explained. Finally, the design patterns used in the project are discussed.

Architectural Patterns

ComboCounter implements a 3-tier system consisting of frontend, backend and database as well as a hardware arduino component.

System and Subsystem Decomposition



Frontend

The front end was presented by Windows Forms manager which allowed for native design of most of the UI. Additional APIs were developed to foster custom form elements that could be uniform throughout the program. Forcing forms to only have one instance solved memory issues down the road while allowing for dynamic user themes to exist.

Backend

Implementation of handlers allowed for a streamlined exchange of data, ensuring consistent calls and clean code.

*Listed classes below were added in this version***

- **ClassDefiner.cs** - Calculates user weight division/class automatically based upon user input
- **DBConnection.cs** - Manages database logic. All functions with SQL syntax would be called here through the User Manager

- **FontManager.cs** - Manages font elements to ensure consistency throughout for version 3.0)
- **History.cs** - Manages a list of sessions so that they are accessible throughout the application
- **Session.cs** - Container to store a workout session
- **ThemeConstants.cs** - Contains individual color elements unique to theme
- **ThemeManager.cs** - Manages Overall themes and how they are implemented
- **Tools.cs** - Contains static helper methods to avoid code duplication
- **User.cs** - User object
- **UserManager.cs** - Handles communication to database

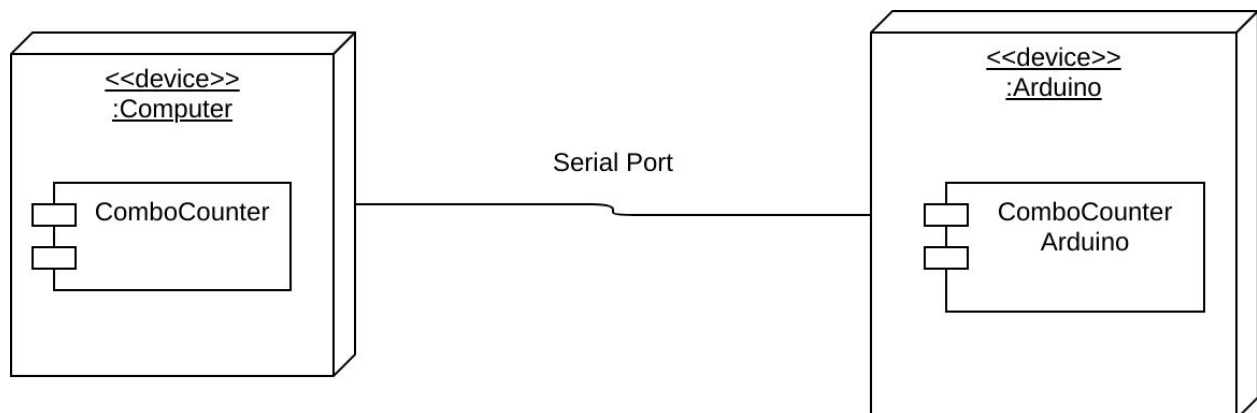
Database

Communication to the database was called from a single class that would be handled by a manager (UserManager.cs). Changes in user settings, themes and user account info could be handled dynamically and consistently.

Hardware

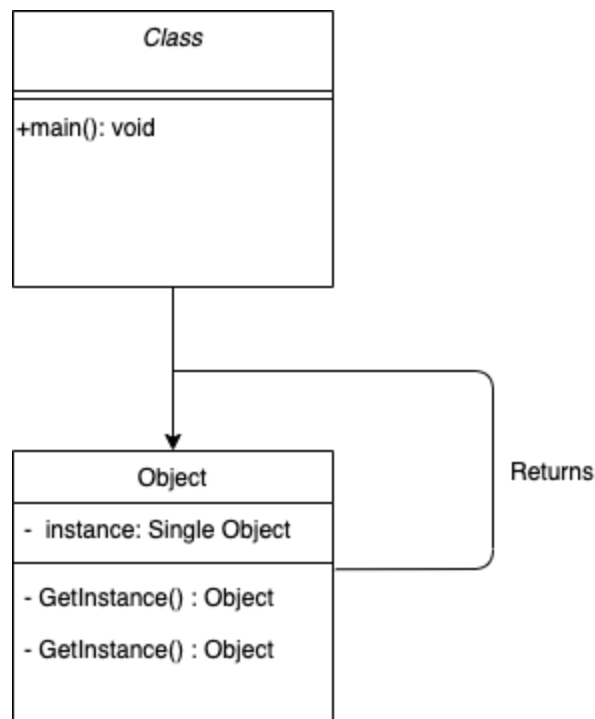
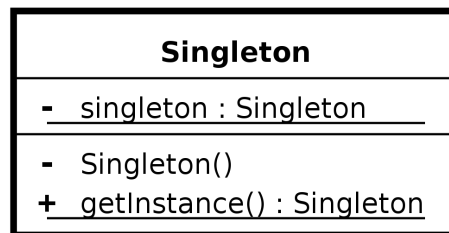
ComboCounter is designed to work with a hardware component, an arduino controller. Equipped with sensors, this component would directly interact with user(s) to measure performance. Due to the COVID-19 pandemic, the hardware component was not accessible for the development of the new version.

Deployment Diagram



Design Patterns

The FontManager is a Singleton class. There is only one instance of the FontManager class and it is directly managed by the class. The same thing for the DBConnection class, it is a Singleton class. The Tools class is an example of a Servant as it only has static methods and no objects. The History class is a modified Singleton since the History class does not maintain an object of itself but rather a List of Session objects. The DBConnection class is a mediator between the MySqlConnection and the rest of the application. The DBConnection manages the communication between the other objects and the MySqlConnection to decouple it from the other classes.



System Validation

Application was tested manually as more features were added or old features were changed. This was done with test scenarios of test cases to determine that the application was behaving according to the requirements of the product owner.

Test Case Id	unitTest_ComboCounter_01
Purpose	CC User Danny Wants to change his theme to dark mode
Pre-conditions	Danny is on the UserSettings page and his theme is not dark
Input	Danny clicks on the “Dark Mode Theme” Button
Expected Output	The application changes themes to the dark mode, Danny’s theme selection is updated in the database
Status	Pass

Test Case Id	unitTest_ComboCounter_02
Purpose	CC User Calvin wants to view his previous workouts
Pre-conditions	Danny is on the main page, has a valid account, has previous workouts in the database
Input	Danny clicks on the History icon on the top bar
Expected Output	The application navigates to the history page and Danny’s previous workouts are shown with the correct data
Status	Pass

Test Case Id	unitTest_ComboCounter_03
Purpose	CC User Danny wants to change his first name to Daniel
Pre-conditions	Danny is on the User Account page, has a valid account
Input	Danny presses the edit button, inputs ‘Daniel’ into the First Name field, and presses the submit button

Expected Output	Danny's first name is updated in the database to be Daniel
Status	Pass

Test Case Id	unitTest_ComboCounter_04
Purpose	CC User Calvin wants to terminate instance
Pre-conditions	Calvin is on any page of a running instance
Input	Calvin presses the exit button
Expected Output	Program is terminated
Status	Pass

Test Case Id	unitTest_ComboCounter_05
Purpose	CC User wants to mute audio feedback
Pre-conditions	User hears audio feedback during workouts
Input	User navigates to User settings page and unchecks box to mute the desired sounds
Expected Output	Corresponding checkbox shows reflects change boxProgram does not output any audio during workout session
Status	Pass

Test Case Id	unitTest_ComboCounter_06
Purpose	CC Developer want to ensure there is only one instance of each page
Pre-conditions	ComboCounter must be running
Input	Any Icon is pressed multiple time in sequence (<i>user settings icon is selected for the purpose of this test</i>)
Expected Output	Task Manager shows a single instance of selected page
Status	Pass

Glossary

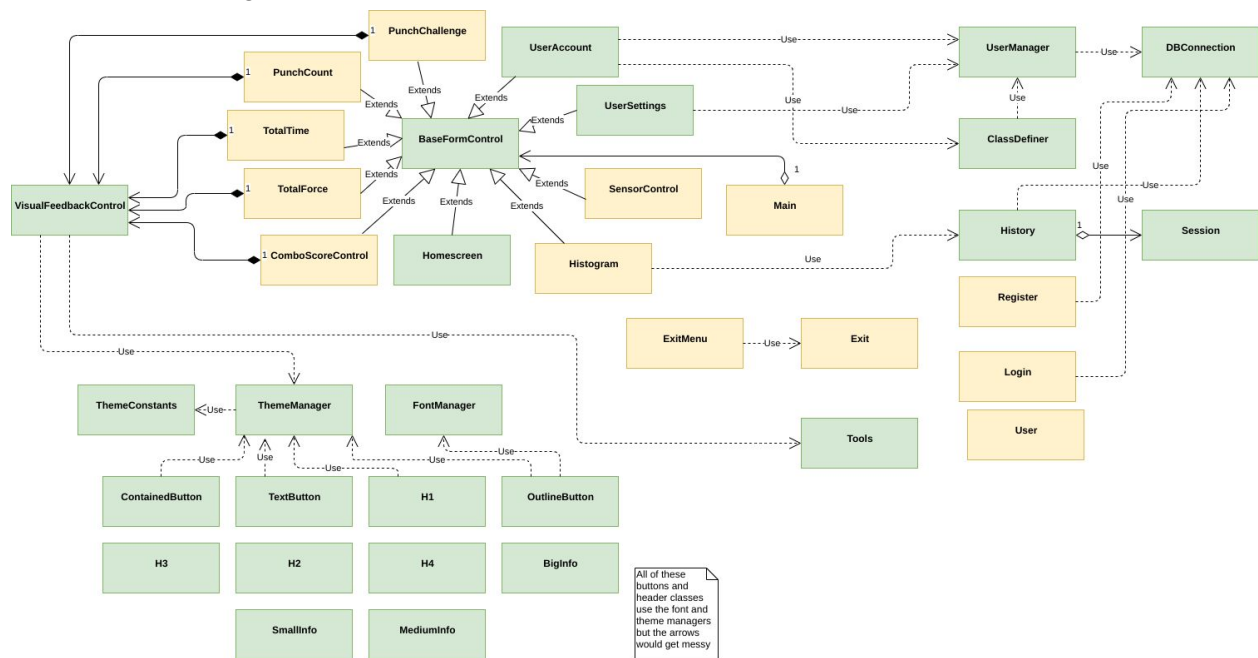
Arduino	Programmable microcontroller
C#	Object-oriented programming language designed by Microsoft
GUI	Graphical User Interface
.NET Framework	Software framework developed by Microsoft for use with the C# language
SQL	A language used to communicate with database
UI	User Interface
UML	Unified Modelling Language - a language to formally describe a software problem
UX	User Experience
Windows Forms	An open-source library for building GUI applications written in C# by Microsoft for use with their .NET Framework

Appendix

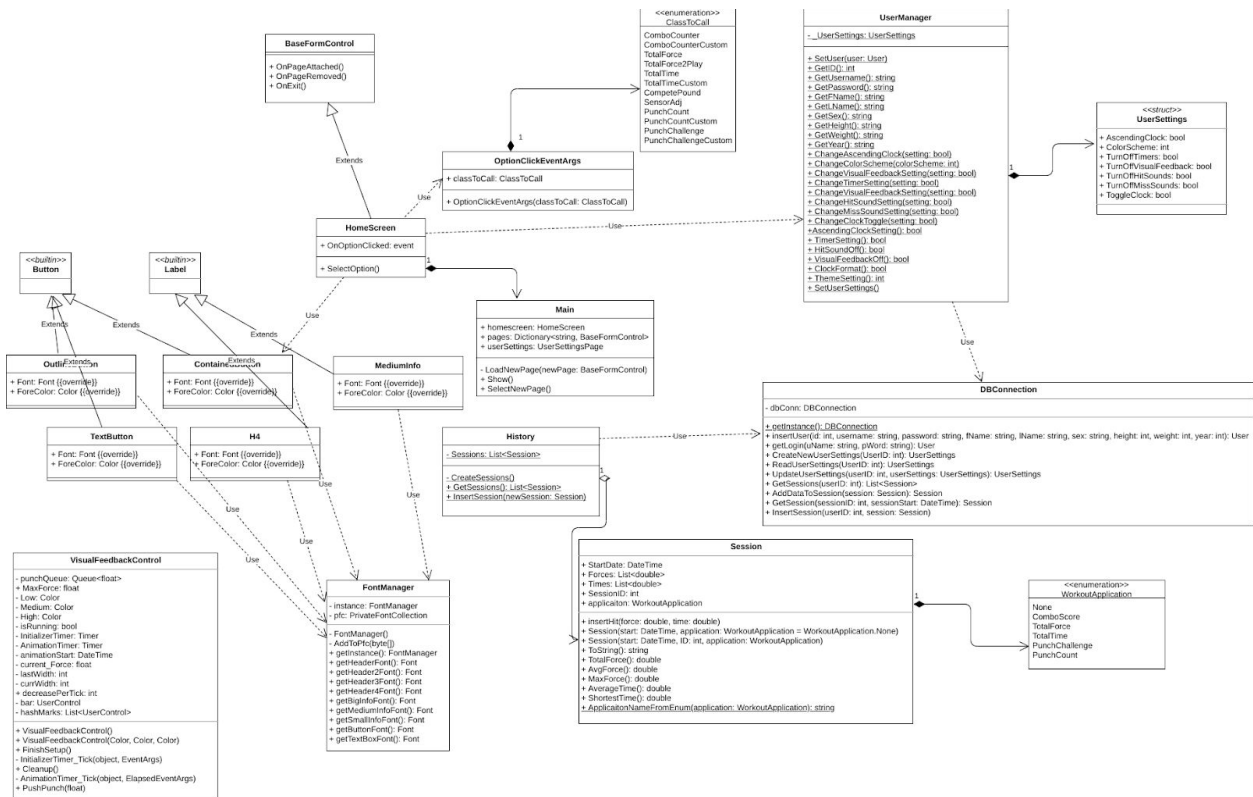
Appendix A - UML Diagrams

Static UML Diagrams

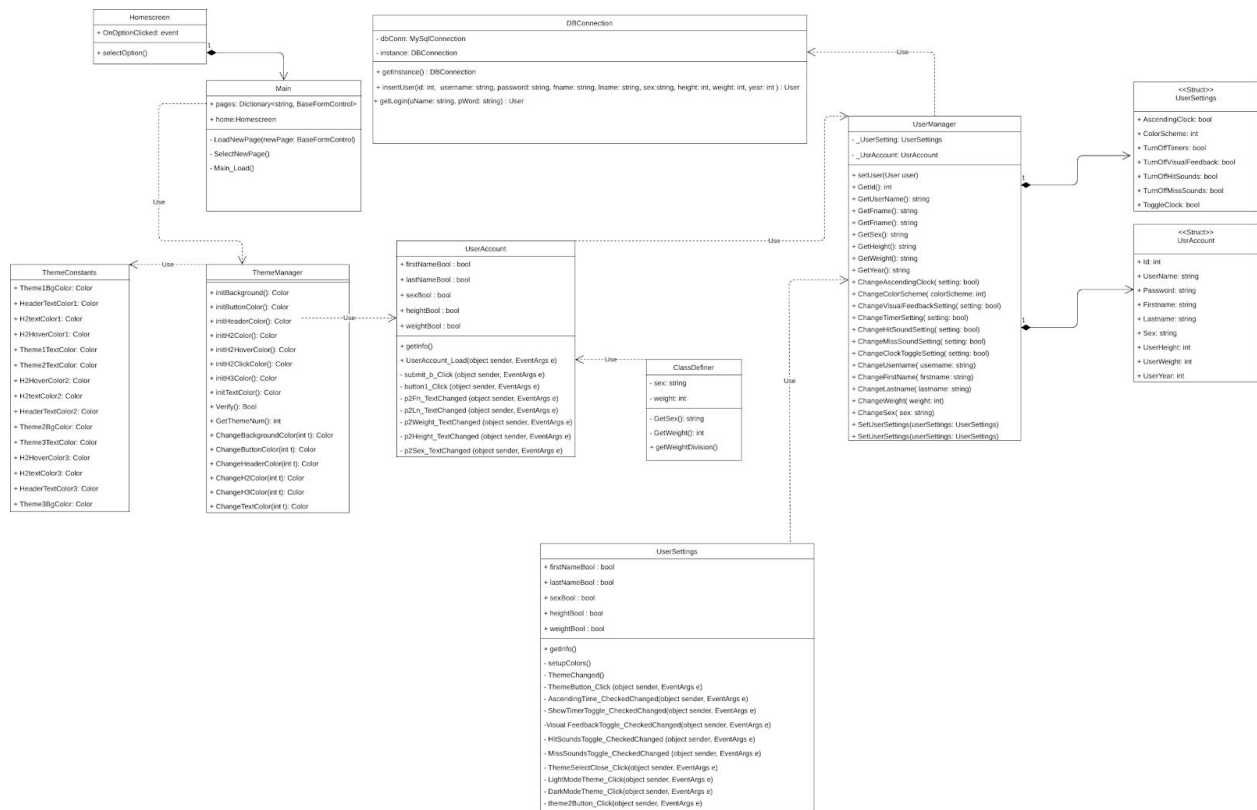
Minimal Class Diagram



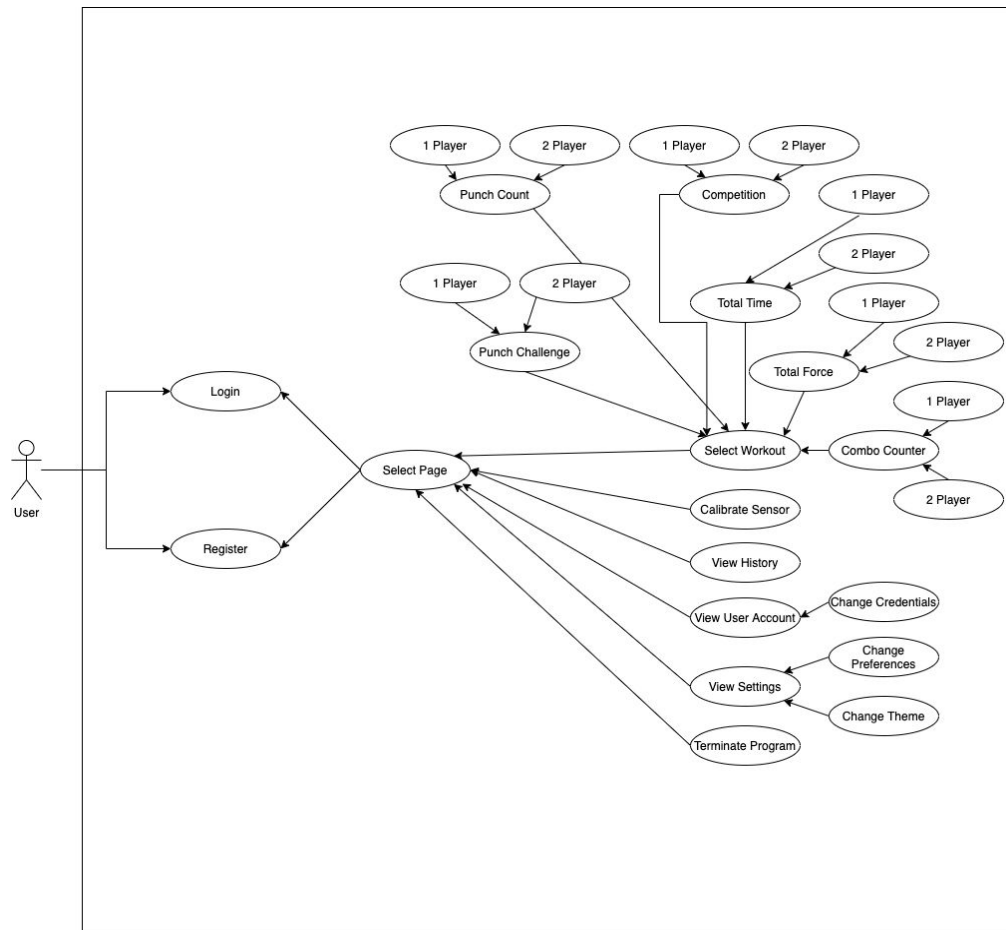
Class Diagram (Daniel Mato)



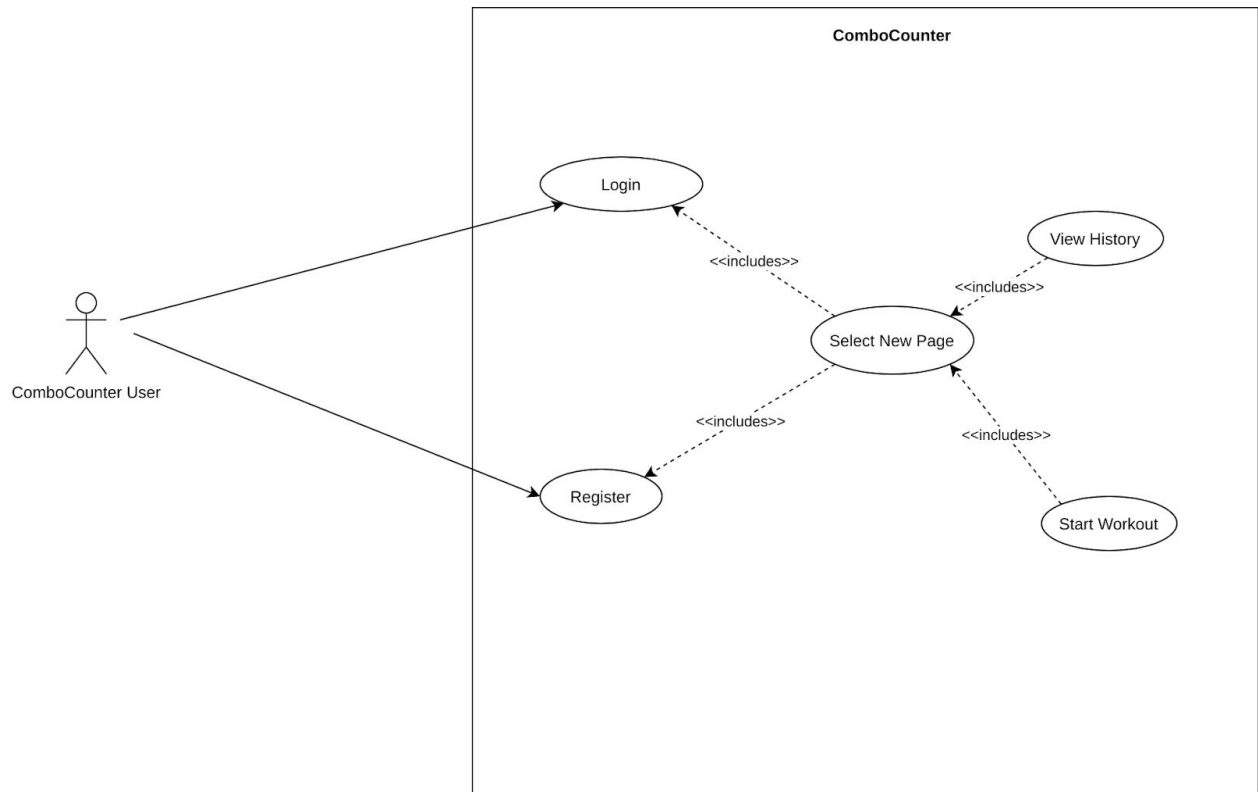
Class Diagram (Calvin Mark)



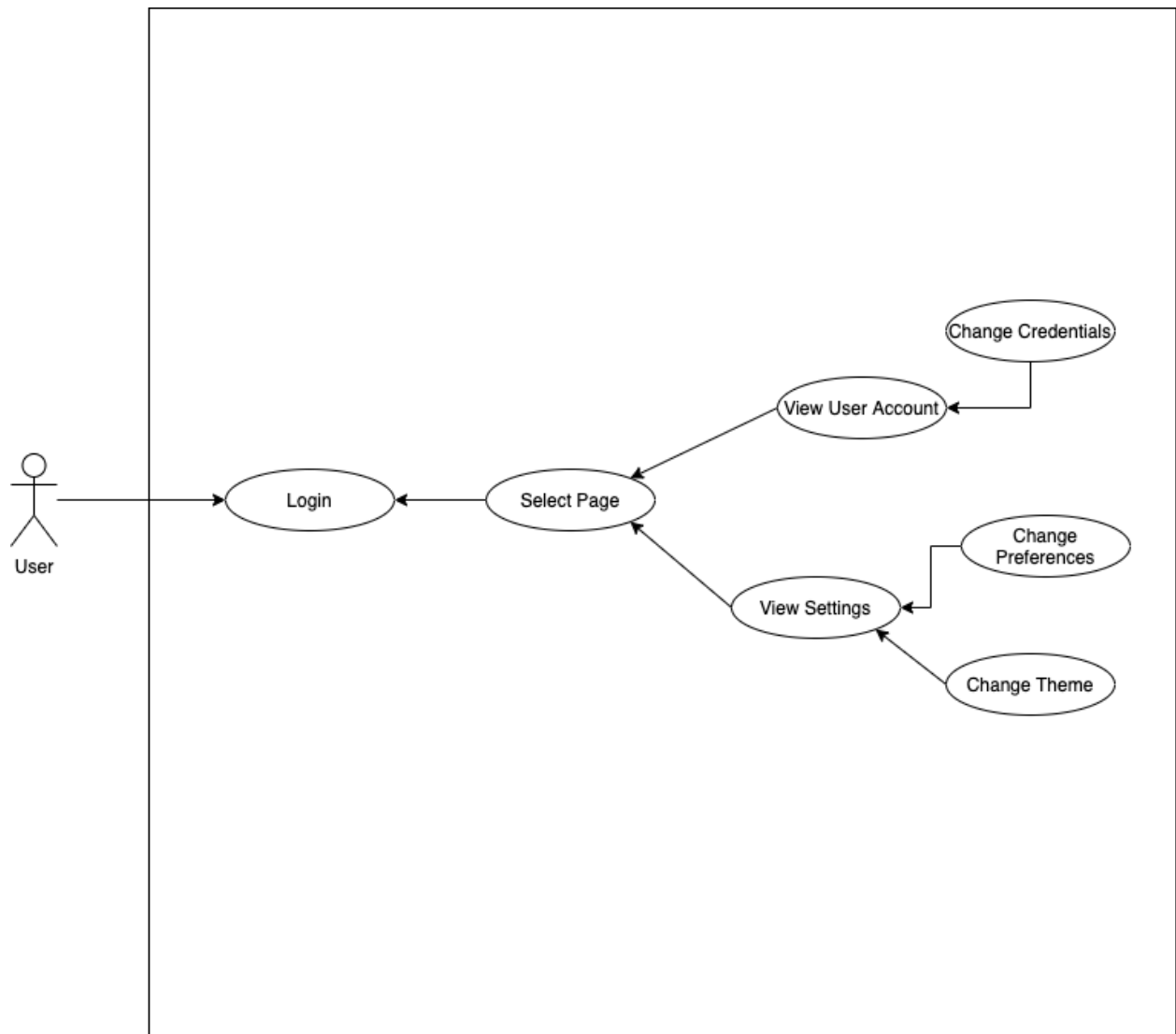
General Use Case Diagram



Use Case Diagram (Daniel Mato)

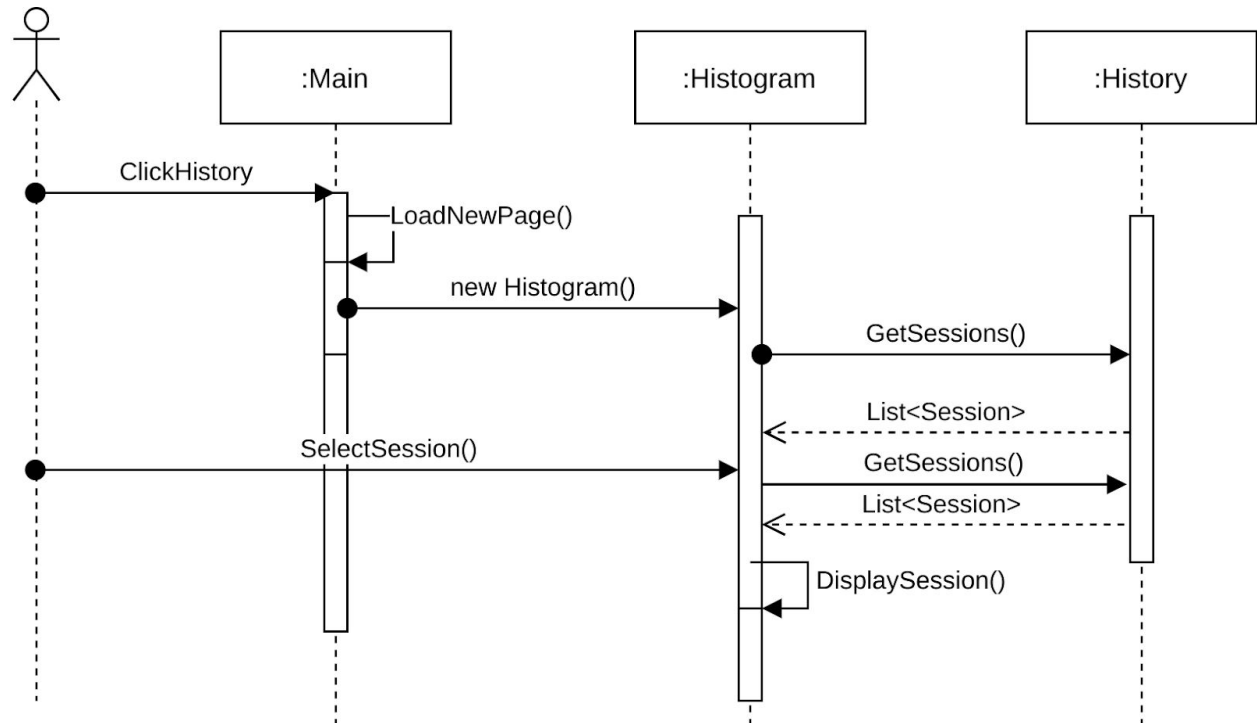


Use Case Diagram (Cal)

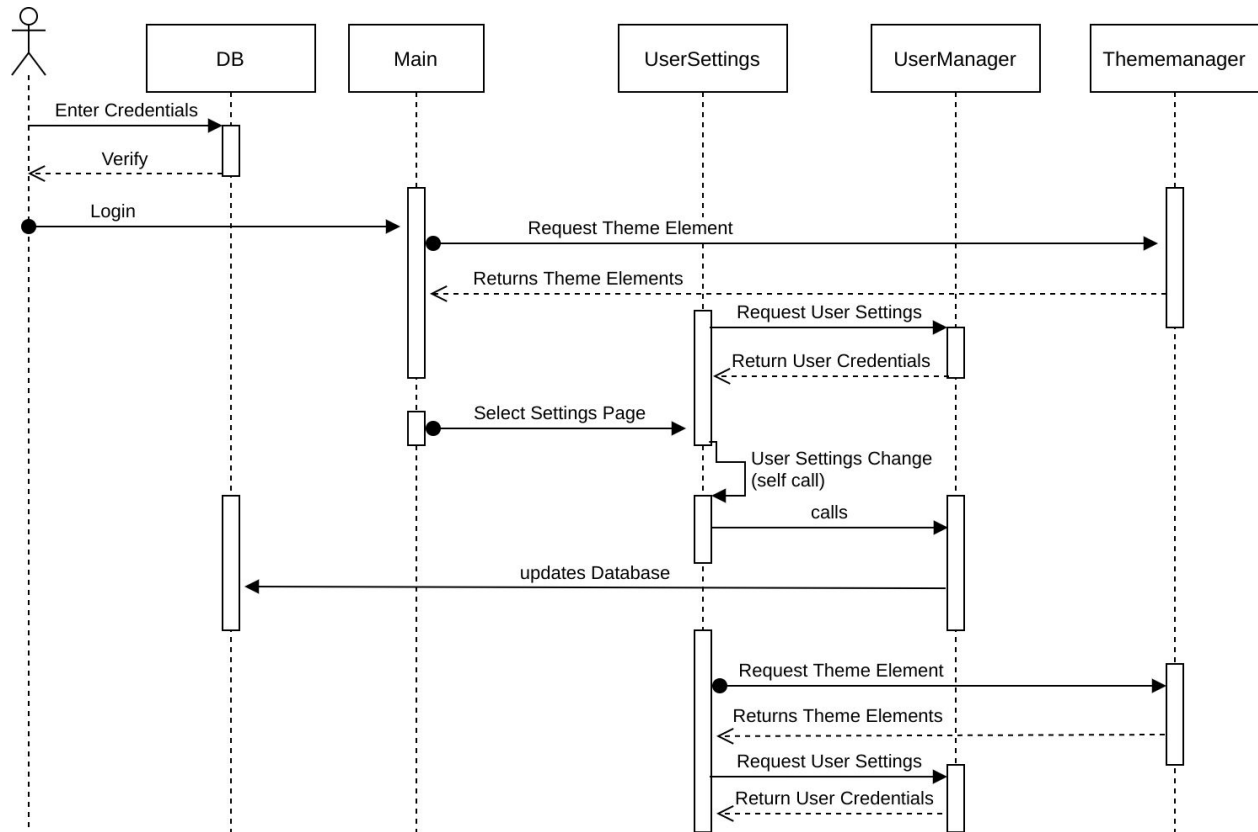


Dynamic UML Diagrams

View Workout History Sequence Diagram (Daniel Mato)

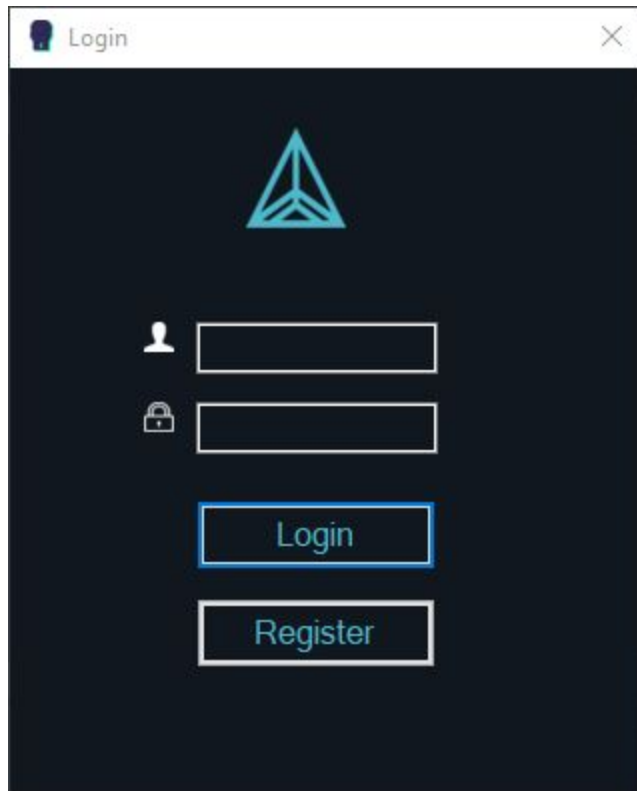


Change Theme Setting (Calvin Mark)



Appendix B - User Interface Design

Login Screen



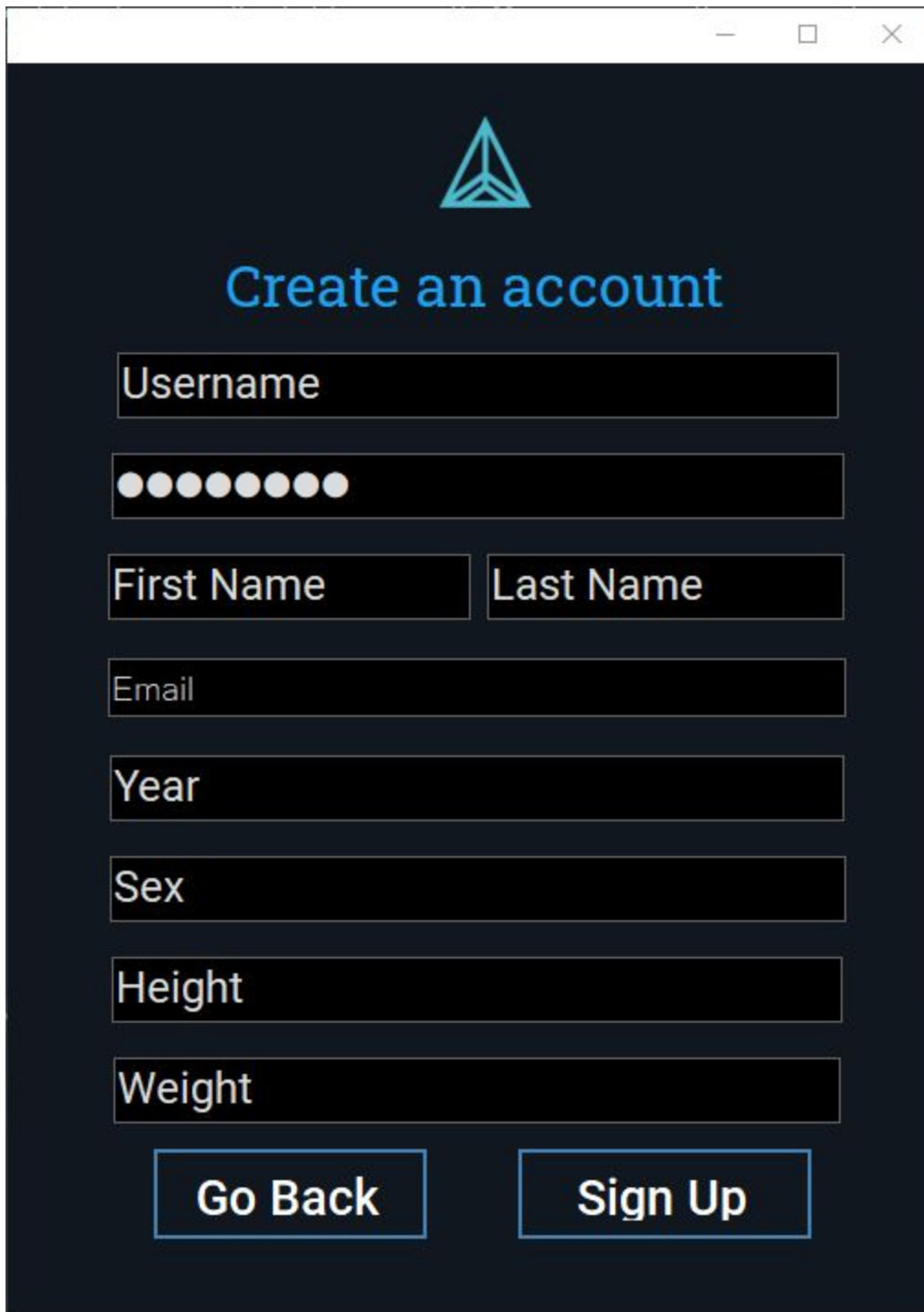
The image shows a login screen within a window titled "Login". The window has a light gray title bar with a close button (X) in the top right corner. The main content area has a dark blue background. At the top center is a light blue logo consisting of three triangles forming a larger triangle. Below the logo are two input fields: the first is preceded by a white user icon, and the second is preceded by a white padlock icon. Below these fields are two buttons: "Login" and "Register". The "Login" button has a blue border, while the "Register" button has a white border. All text is in a sans-serif font.

Login

Login

Register

Register Screen



— □ ×



Create an account

Username

●●●●●●●●

First Name Last Name

Email

Year

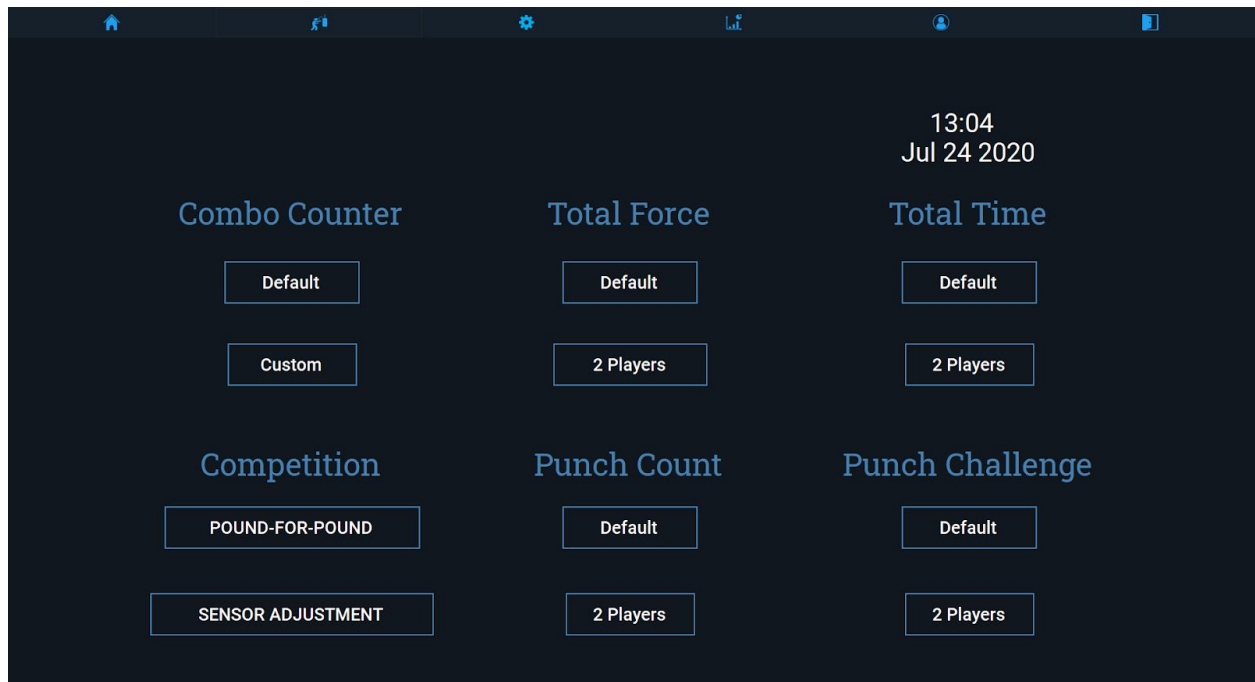
Sex

Height

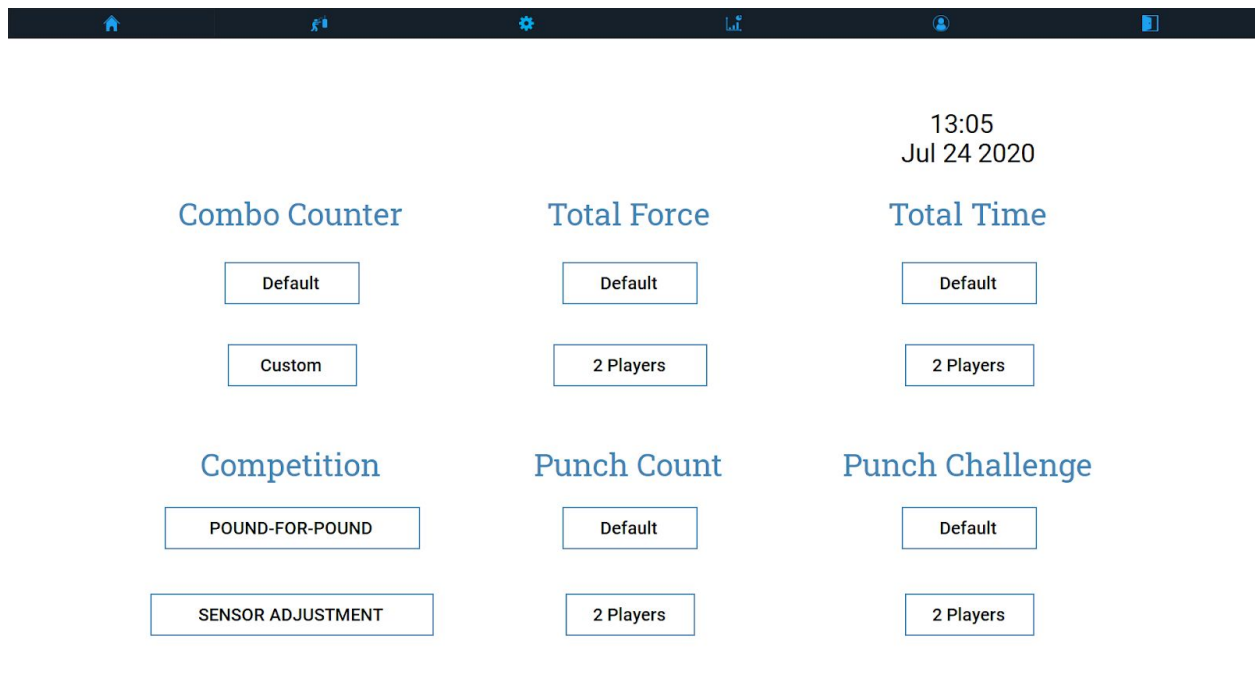
Weight

Go Back Sign Up

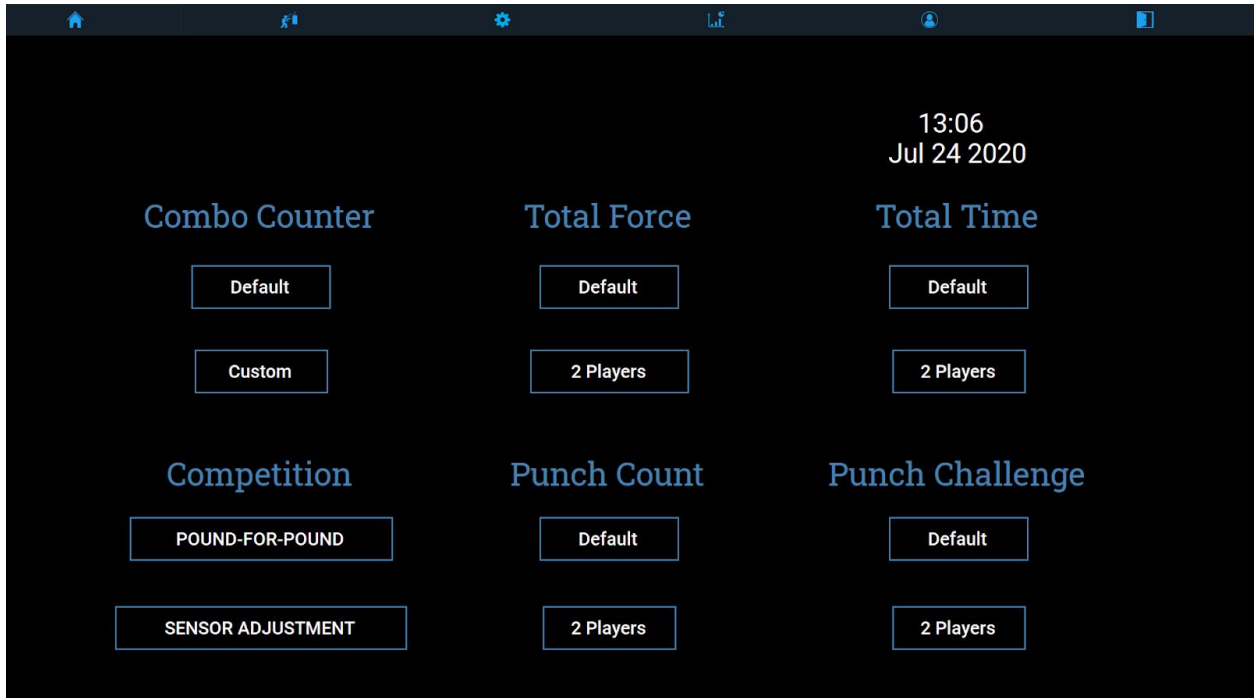
Home Screen (Original Theme)



Home Screen (White Theme)



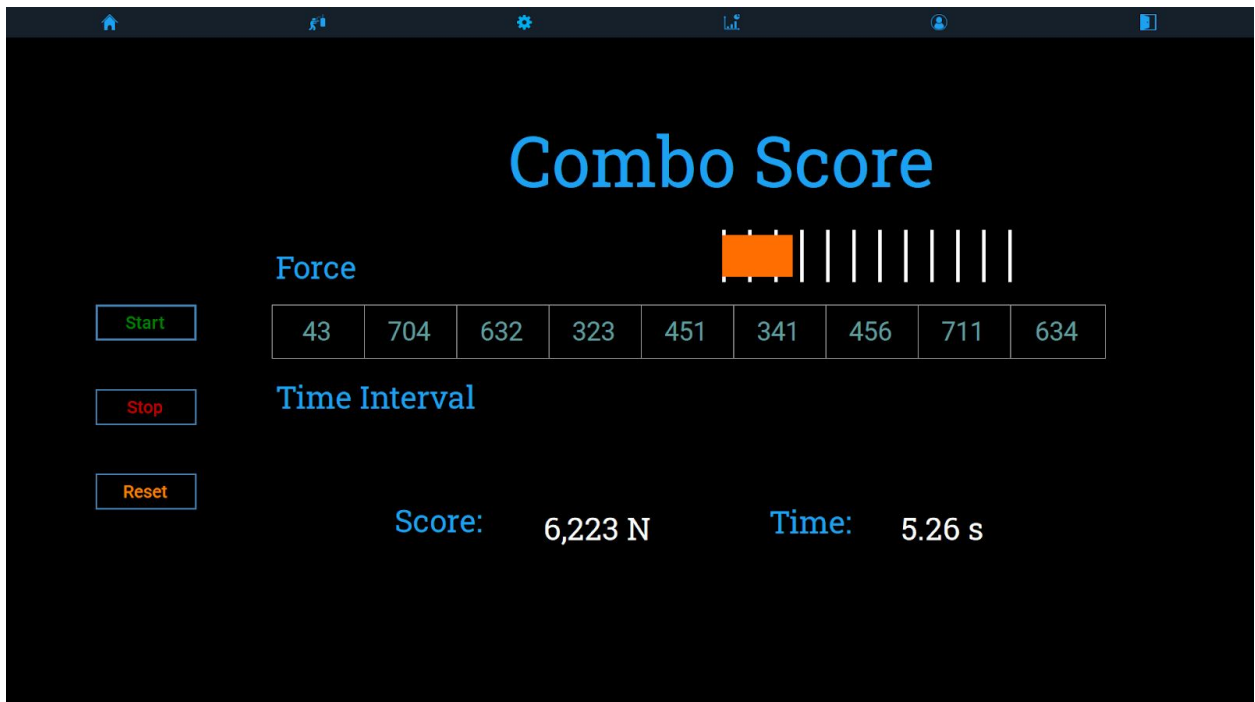
Home Screen (Black Theme)



Home screen interface with a black theme. The top status bar shows icons for home, signal, settings, Wi-Fi, battery, and user. The main content area displays the time and date (13:06, Jul 24 2020) in the top right. Below this, there are six sections arranged in a 2x3 grid, each with a title and two buttons:

- Combo Counter**: Default, Custom
- Total Force**: Default, 2 Players
- Total Time**: Default, 2 Players
- Competition**: POUND-FOR-POUND, SENSOR ADJUSTMENT
- Punch Count**: Default, 2 Players
- Punch Challenge**: Default, 2 Players

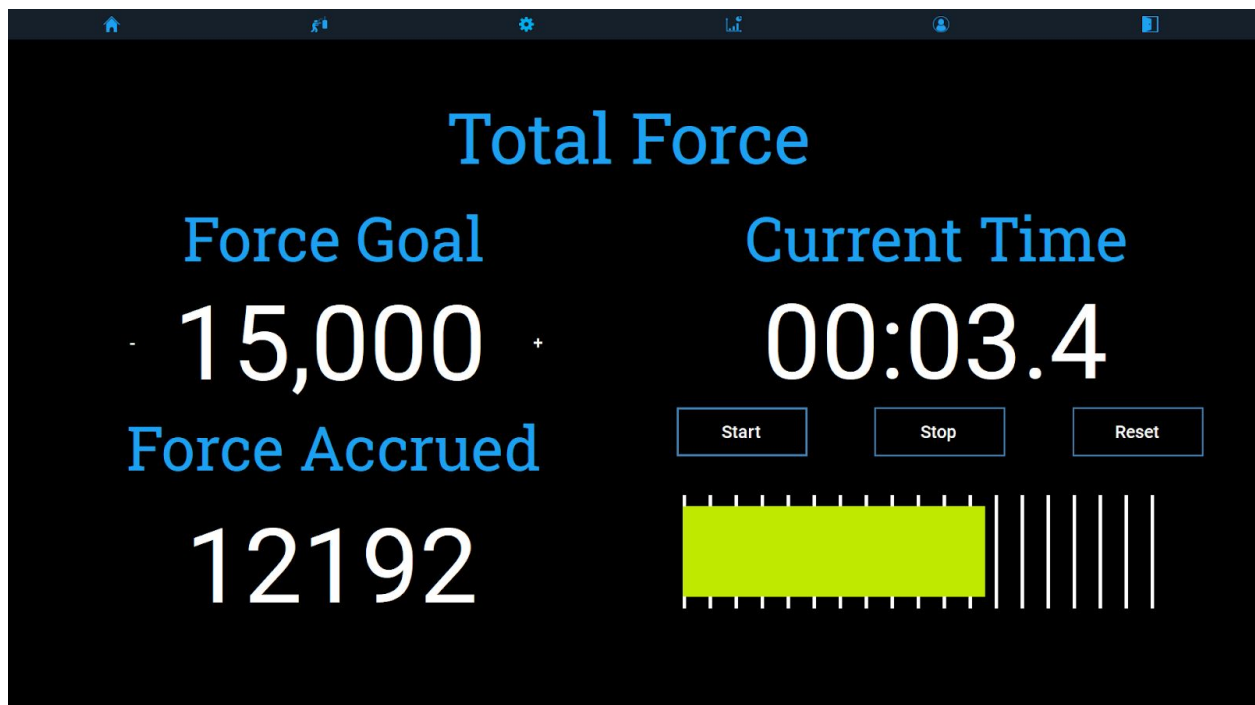
Combo Score



Combo Score interface with a black theme. The top status bar shows icons for home, signal, settings, Wi-Fi, battery, and user. The main content area displays the title "Combo Score" in large blue text. Below the title, there is a "Force" section with a progress bar (orange bar followed by 8 white bars) and a table of values. To the left of the table are three buttons: "Start" (green), "Stop" (red), and "Reset" (orange). Below the table is a "Time Interval" section. At the bottom, the "Score" is displayed as 6,223 N and the "Time" is displayed as 5.26 s.

43	704	632	323	451	341	456	711	634
----	-----	-----	-----	-----	-----	-----	-----	-----

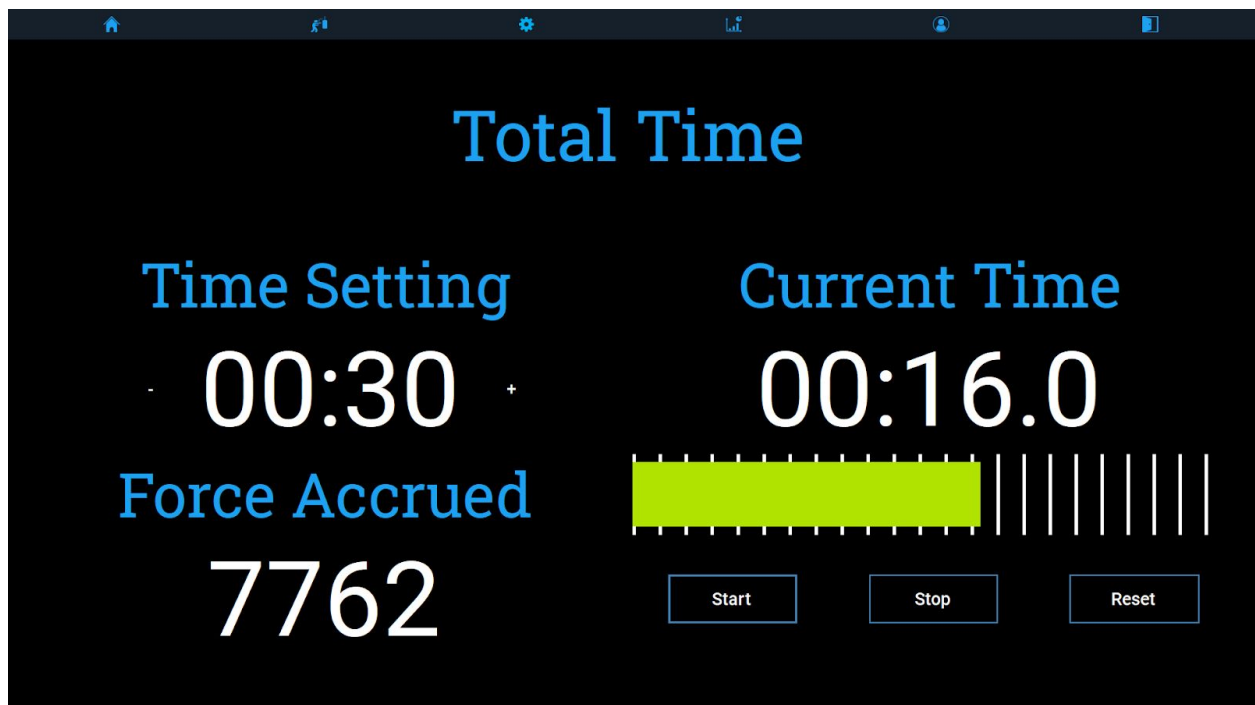
Total Force



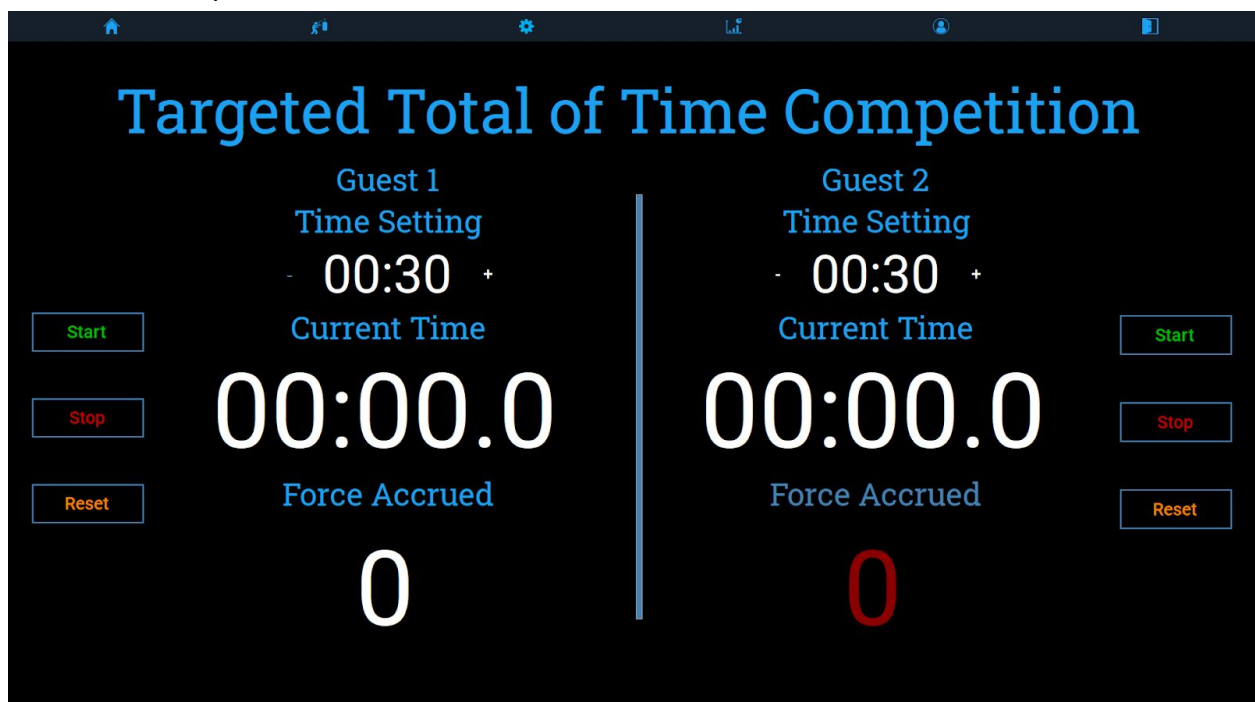
Total Force Competition



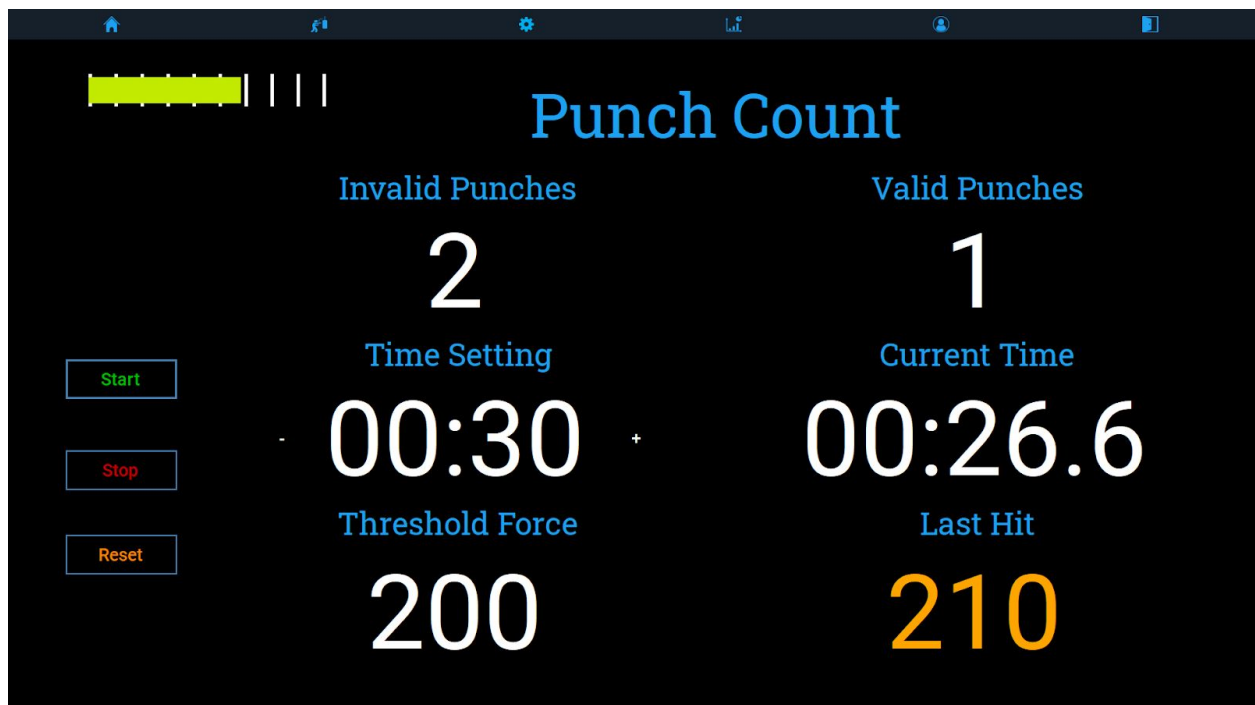
Total Time



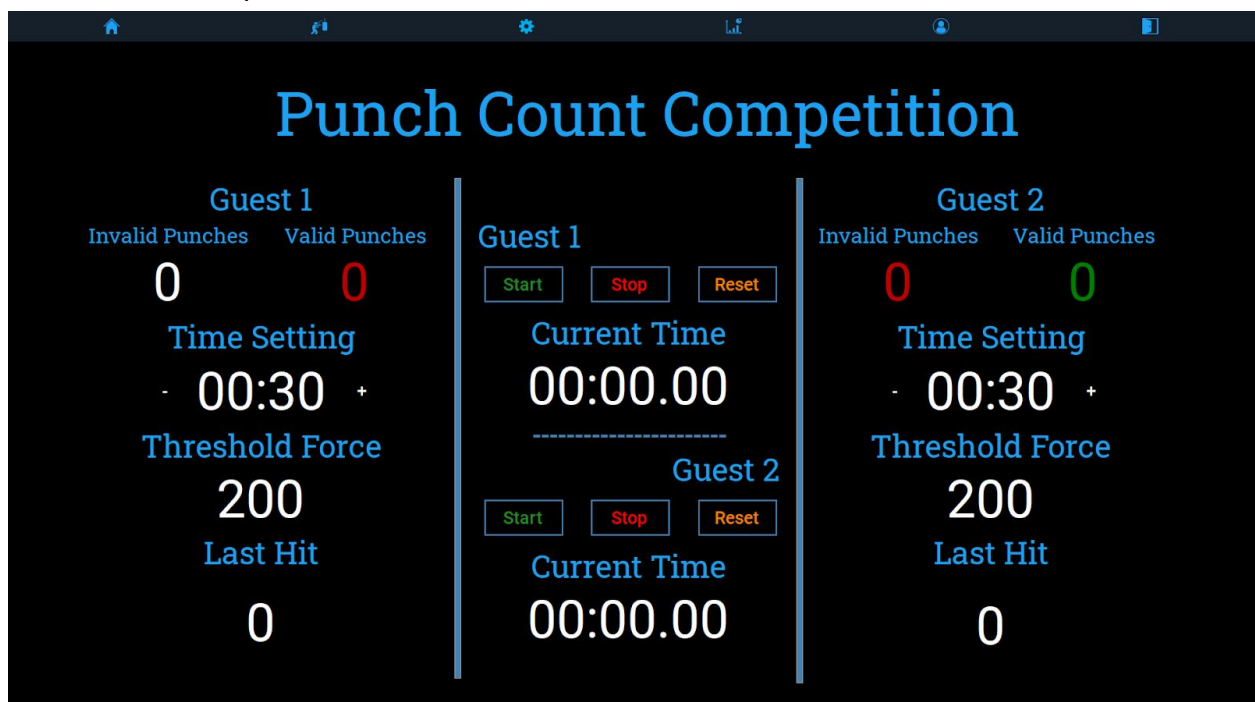
Total Time Competition



Punch Count



Punch Count Competition



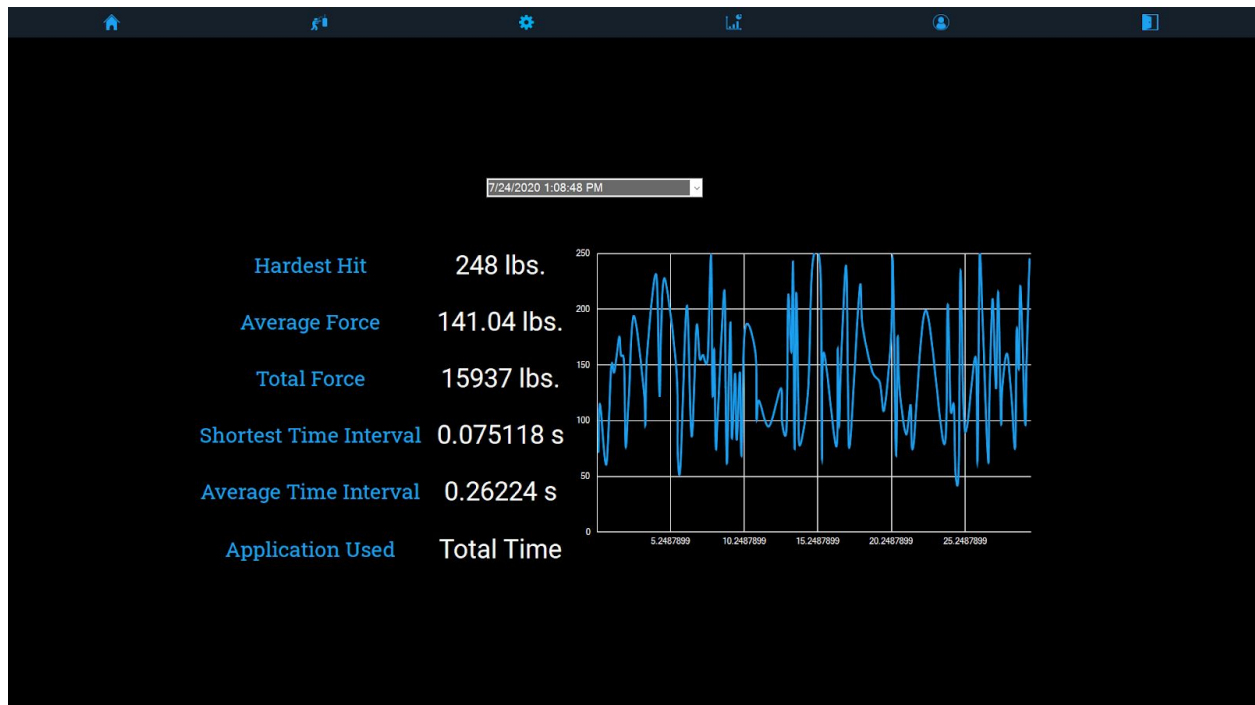
Punch Challenge



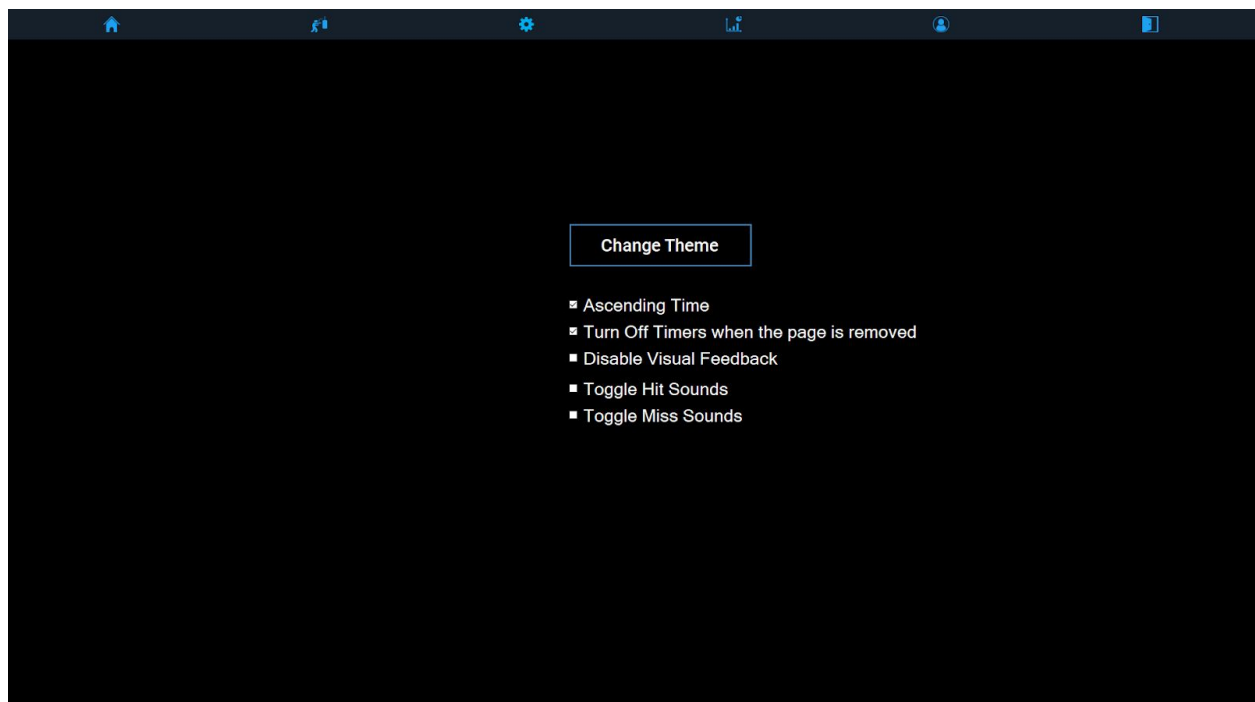
Punch Challenge Competition



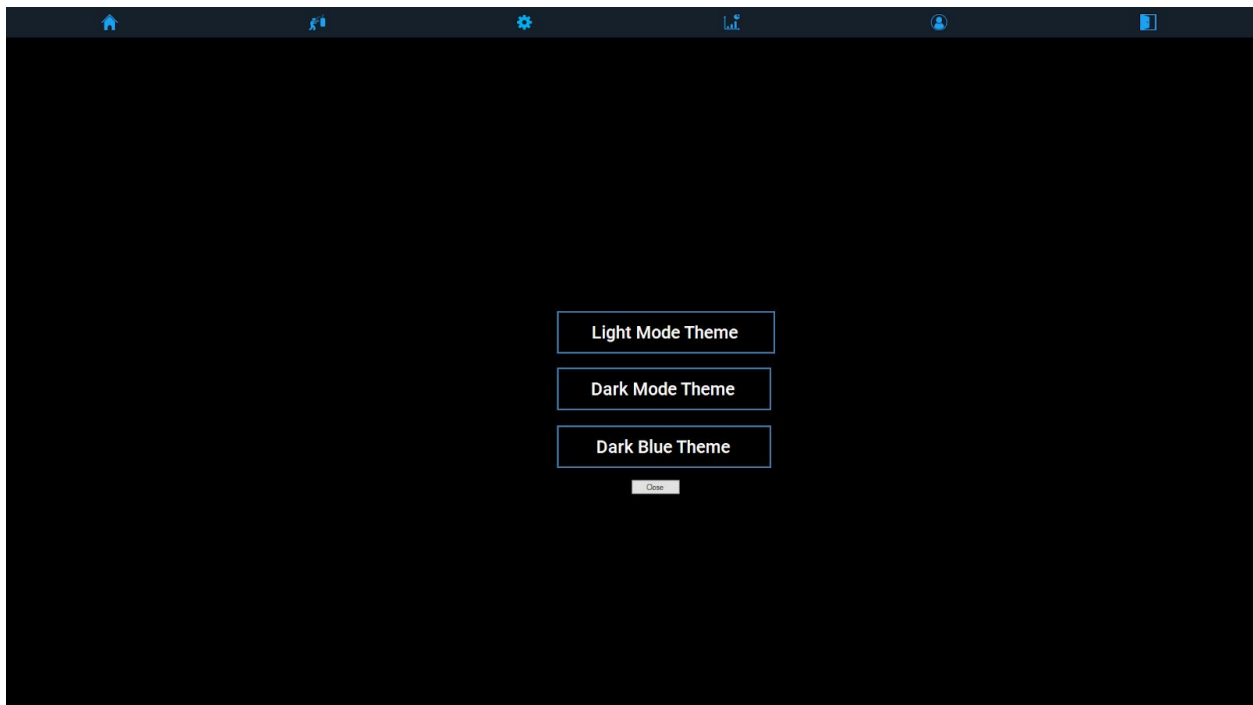
History Page



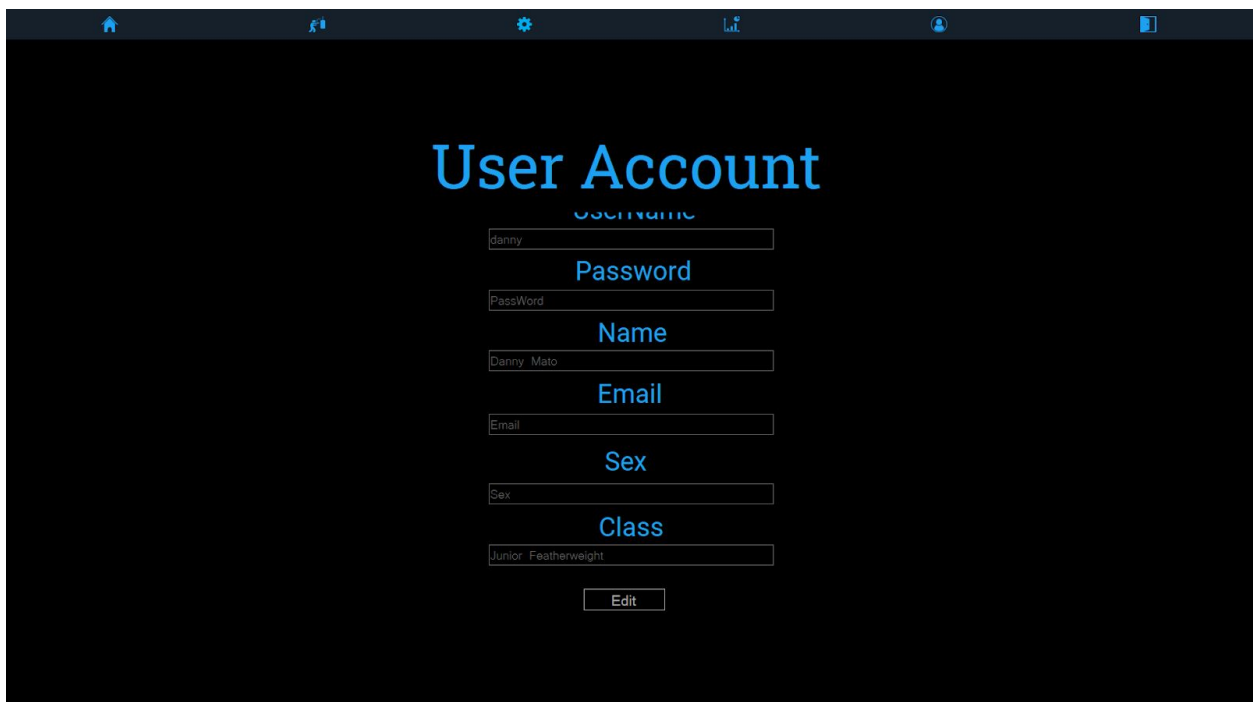
User Settings



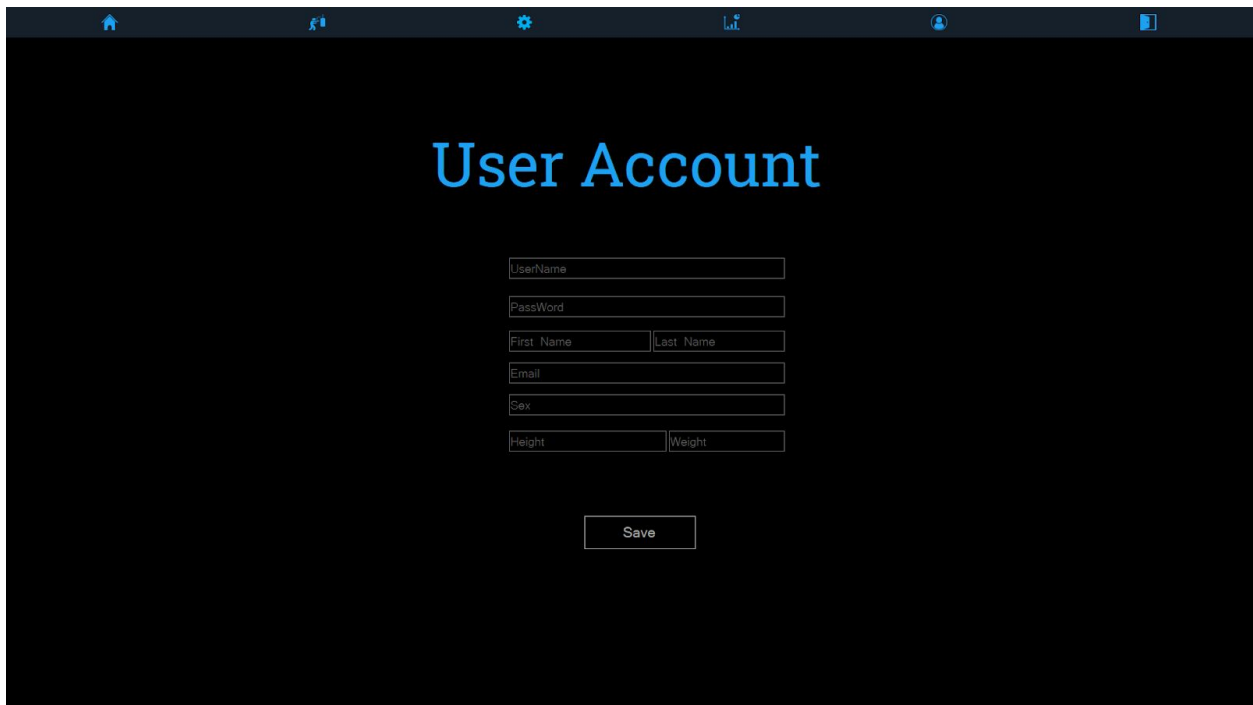
Theme Selection



User Account View



User Account Editor



The User Account Editor interface features a dark blue background with a title bar at the top containing icons for home, user, settings, data, and notifications. The main title "User Account" is displayed in a large, light blue font. Below the title, there is a form with the following fields: "UserName", "PassWord", "First Name" and "Last Name" (split), "Email", "Sex", and "Height" and "Weight" (split). A "Save" button is located at the bottom center of the form.

User Account

UserName

PassWord

First Name Last Name

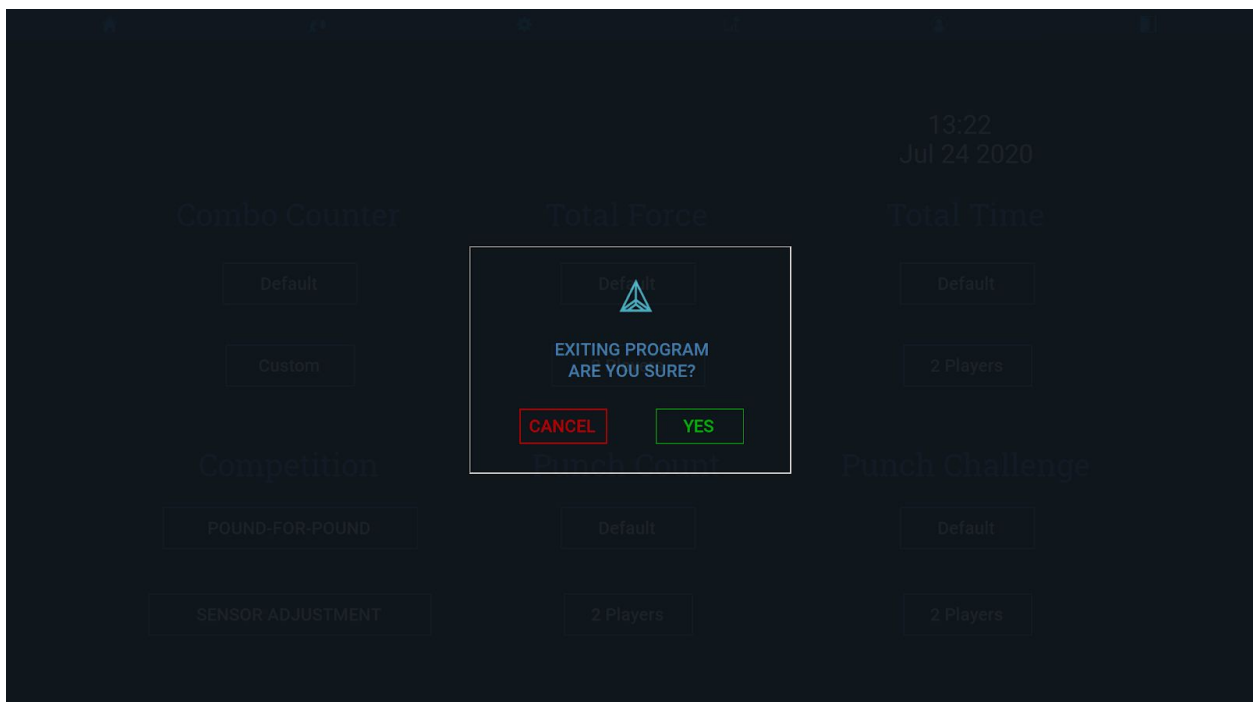
Email

Sex

Height Weight

Save

Exit Dialog



The Exit Dialog interface shows a dark blue background with a title bar at the top containing icons for home, user, settings, data, and notifications. The main content area displays a grid of settings for various challenges: "Combo Counter", "Total Force", "Total Time", "Competition", "Punch Challenge", and "Punch Challenge". Each challenge has a "Default" button and a "2 Players" button. A central dialog box is overlaid on the screen, asking "EXITING PROGRAM ARE YOU SURE?" with "CANCEL" and "YES" buttons. The "YES" button is highlighted in green.

13:22
Jul 24 2020

Combo Counter

Default

Custom

Competition

POUND-FOR-POUND

SENSOR ADJUSTMENT

Total Force

Default

2 Players

Punch Challenge

Default

2 Players

EXITING PROGRAM
ARE YOU SURE?

CANCEL YES

Appendix C - Sprint Review Reports

This section covers sprint reviews and retrospectives.

Sprint 1

Approved User Stories:

- **User Story 1**
 - As a developer I want to setup the Virtual Machine provided to us by the University for use on the project
- **User Story 2**
 - As a developer I want understand c# and how visual studio interacts with User Interface
- **User Story 3**
 - As a developer I want to setup Visual Studio to be able to work with the technologies used in the project
- **User Story 4**
 - As a developer I want to understand how the current system works and where there are areas of improvement

Rejected User Stories:

Sprint 2

Approved User Stories:

- **User Story 5**
 - As a developer I would like to make sure the text on screen is readable and UI elements are centered
- **User Story 6**
 - As a user I would like to hover over menu options to give a brief description of what they do
- **User Story 7**
 - As a developer I would like to access the database from all classes using a single object
- **User Story 8**
 - As a user I would like to visualizations of sessions post workout
- **User Story 9**

- As a user I would like to see a confirmation dialog before exiting the program
- **User Story 10**
 - As a user I would like to see the history of my last sessions
- **User Story 11**
 - As a developer I would like to load fonts that are not default fonts
- **User Story 12**
 - As a user I would like to be able to change through preset themes
- **User Story 13**
 - As a developer I would like to have a class to store all necessary font elements

Rejected User Stories:

Sprint 3

Approved User Stories:

- **User Story 14**
 - As a Developer I would like to use custom versions of the Windows Forms to be able to access our own theme and font information
- **User Story 15**
 - As a Developer I would like the page to only comprise of one window with different pages
- **User Story 16**
 - As a Developer I would like the interface to adjust depending on the size of the window
- **User Story 17**
 - As a Developer I would like to design a couple of preset color schemes for the application for users to choose from
- **User Story 18**
 - As a Developer I would like to ensure sure all UI elements are uniform and consistent
- **User Story 19**
 - As a User I would like to be able to calibrate Sensor in a more intuitive way
- **User Story 20**
 - As a User I would like be able to choose themes and color scheme
- **User Story 21**

- As a Developer I would like to center UI elements
- **User Story 22**
 - As a Developer I would like to remove duplicate options
- **User Story 23**
 - As a Developer I would like to make all Forms transparent to make Theme Mangagement easier
- **User Story 24**
 - As a Developer I would like to clean up old old code to make it more readable
- **User Story 25**
 - As a Developer I would like to document and comment new code

Rejected User Stories:

N/A

Sprint 4

Approved User Stories:

- **User Story 26**
 - As a user I would like to see visual feedback from the application when the bag is struck to make sure my hits are registered
- **User Story 27**
 - As a user I would like the see the history of my last sessions
- **User Story 28**
 - As a user I would like to see visualizations of sessions post workout
- **User Story 29**
 - As a developer I would like to store information of workouts in database
- **User Story 30**
 - As a developer I would like to restructure database to implement new features
- **User Story 31**
 - As a developer I would like to add a class for to define weight division
- **User Story 32**
 - As a developer I would like to interact with the database to make global changes
- **User Story 33**
 - As a user I would like to have a user settings page to control and save preferences to my profile

- **User Story 34**
 - As a developer I would like to have user changes be implemented
- **User Story 35**
 - As a user I would like to have a clock on the homescreen so I can keep track of the time
- **User Story 36**
 - As user I would like to be able to toggle sounds
- **User Story 37**
 - As a developer I would like to address UI issues in the User Account page
- **User Story 38**
 - As a developer I would like the user's settings to be taken account of during the course of the application
- **User Story 39**
 - As a developer I would like to use a dictionary to change the way pages are stored for easier implementation

Rejected User Stories:

N/A

Sprint 5

Approved User Stories:

- **User Story 40**
 - As a user I would like to choose between 12 hr and 24 hour format view for clock on Home Screen
- **User Story 41**
 - As a developer I would like for the visual feedback to be extended to the other pages
- **User Story 42**
 - As a user I would like to change my user account information and move it
- **User Story 43**
 - As a user I would like to be able to see the application I used in the history section
- **User Story 44**
 - As a developer I would like to add the original theme
- **User Story 45**
 - As a developer I would like to restructure UserManager to better work with database

Rejected User Stories:

- **User Story 46**
 - As a user I would to view more than two players at once
- **User Story 47**
 - As a developer I would like to redevelop how force is calculated
- **User Story 48**
 - As a user I would like to view history by which application/session/game used
- **User Story 49**
 - As a user I would like to see total output for more spans of time i.e (month, year)
- **User Story 50**
 - As a user I would like a endurance mode that will ring at set force threshold

Sprint 6

Approved User Stories:

- **User Story 59**
 - As a developer I would like to make a video introducing the product
- **User Story 60**
 - As a developer I would like to have a video showing the developer setup process and the information needed for maintenance
- **User Story 61**
 - As a developer I would like to have a video showing a potential user how to use the system
- **User Story 62**
 - As a developer I would like to have a have video detailing the presentation and introduction
- **User Story 63**
 - As a developer I would like to have a video discussing the shortcomings of the project along with the wishlist
- **User Story 64**
 - As a developer I would like to create a poster unique to each individual user
- **User Story 65**
 - As a developer I would like to create a powerpoint presentation summarizing the development process
- **User Story 66**
 - As a developer I would like to work on final document

- **User Story 67**
 - As a developer I would like to verify all meeting documentation is readable and ready for submission

Appendix D

User Manual

Installation Guide

Development Environment

- Visual Studio 2017 or 2019
- MySQL Community Edition with MySQL Workbench

MySQL Setup

- The database data and schema has been exported to a file in the project directory

To import into MySQL Workbench

1. Log into the server
2. On the left sidebar, click the “Administration” tab
3. Click Data Import/Restore
4. In the Import Options
 - a. Change to “Import from Self-Contained File”
 - b. Navigate to the folder that contains the .sql data export file
 - c. Press Start Import to initiate the import
5. The schema and the data should now be in the server and you can use the program

Project Setup

1. Open the “ComboCounter.sln” file in Visual Studio
2. Navigate to the DBConnection.cs file in the Classes folder
3. Change the DBuser and DBpassword to the password you entered when installing MySQL
4. Open the project properties by right clicking on the .csproj file in Visual Studio and click Properties
 - a. Click on the Debug tab in the properties window
 - b. Change the working directory to the folder that contains the .csproj file

User Installation

*Currently the program is not ready for production use by the user***

Maintenance

User Interface

- We have made classes which inherit from the Windows Forms Button and Label class which automatically make use of the fonts and themes provided by the FontManager and ThemeManager respectively.
- They get the fonts and color in the constructor so either can be overridden if it is assigned later on in the program.
- The ThemeManager checks the UserManager to find the current theme setting and then gets the appropriate color for the item from the ThemeConstants class
- The FontManager contains 3 different fonts in a PrivateFontCollection
 - The PrivateFontCollection stores the fonts in alphabetical order of the FontFamily
 - There are many preset font styles for different types of buttons and labels
- The custom class should appear in the toolbox when using the Visual Studio designer to create new pages
- To make a new page it should inherit from the BaseFormControl in order to be put in the Dictionary on the Main page
 - There are quite a few examples on how to add the page to the Dictionary in the Main.cs file
- HomeScreen and UserSettings are not a part of the Dictionary because they have different events that the Main needs to listen for so they are separated instead of downcasting

Database

- Currently all code which makes contact with the MySQL database is stored in the DBConnection class
- This is to reduce code reuse and so that the database name, username, and password are not stored throughout the application and only in one place
- The DBConnection class is a Singleton so that there are not many DBConnections and instead is only one that is managed by the class

References

<https://dev.mysql.com/doc/dev/connector-net/8.0/html/connector-net-reference.htm>

<https://docs.microsoft.com/en-us/dotnet/framework/winforms/>
