

Rowing Eagle

Rowing Canada Aviron – Custom Graphical User Interface

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Introduction

Rowing athletes need strength and endurance in combination with accurate rowing techniques to be successful and to compete competitively. Therefore, it is important to monitor the parameters related to rowing performance. Rowing Canada Aviron is recognized as the national governing body for the sport of rowing in Canada and has devised a need for an online system that:

- Analyses and quantifies the rower's stroke quality, including stroke rate and split.
- User-friendly graphical interface to display data.
- Training tool that improves coaching ability and directly enhances athletic development.

There is currently an onboard unit that is able to record position, time, and motion from the individual boats, and the development of the Rowing Eagle software application would provide an evaluation of acceleration and position. The beneficial impacts of this tool would be increased sports performance, personal growth, and engagement with the community. The Rowing Canada organization fosters excellence and provides a supportive and inclusive environment where rowers can improve their skills with innovation technology.

Project Goals

- **Data Processing Capabilities**
 - Input raw data from the onboard unit and extract the relevant rowing parameters.
- **Visual Display**
 - Evaluate and present the data points in an engaging and user-friendly way
 - Include stroke rate and split graphs.
- **Simplicity**
 - Design the system to be flexible, maintainable, and accessible so that future design alterations can be made.



Design Objectives

1. Simple data transfer method
2. Software framework used is efficient and consistent
3. Display data granularly, on a per-stroke basis, including a zoom function
4. Comparisons to current Gold Medal Standards
5. Easy to operate, intuitive layout, effective engagement between the user and the interface
6. Accessible offline and can be used around the country
7. Flexible and maintainable design so future developments can be made
8. Clear and concise implementation so that new design teams can easily understand how it works

Detailed Design

A functional prototype was constructed within the timeframe of this project using a Java-based, model-view-controller software called Spring Boot. The interface layout was designed to incorporate the objectives set by Rowing Canada, including uploading, processing, and flexibility. The elements of the working interface are listed below, with the session view pictured in the figure to the right, and the stroke rate and split graphs picture above.

- **VIEW ALL SESSIONS**
 - Detailed list of all the sessions uploaded.
 - Includes specific information and a search bar to quickly identify the entries.
- **CLICK!**
 - If an individual session is chosen, an overview screen will pop up, showing the detailed data of the upload.
 - Includes basic data like location, boat type, rowers, distance, and duration.
 - Map function to show the path taken during the training session.
 - Stroke rate graph which displays the acceleration versus time.
 - Split graph, which is overlaid with the Gold Medal Standards for comparison.
 - Both graphs have a zoom capability to focus in on specific strokes.
- **UPLOAD NEW SESSION**
 - User can import data recorded from the onboard unit in the form of a .csv file.
 - Manual entry fields that provide more information about the session, like location and rowers participants.
- **SETTINGS**
 - Section to upload new athlete profiles.
 - Section to change the Gold Medal Standards details.

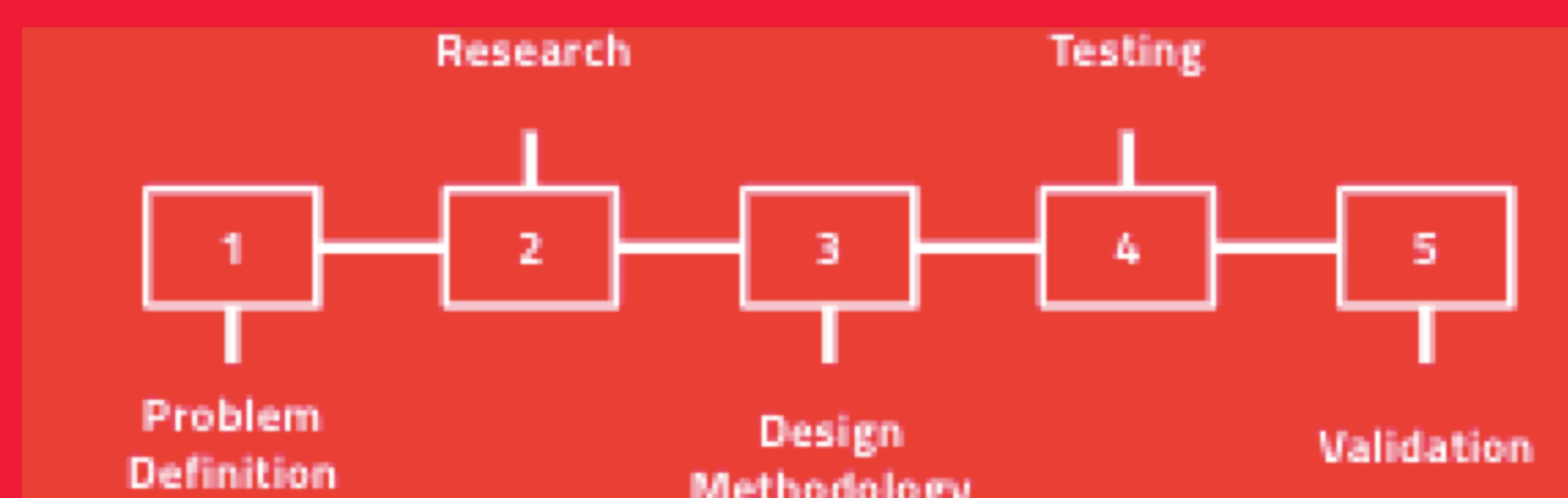
Design Methodology and Testing

Once the scope of the project was established, background research and literature reviews were conducted. The materials examined included:

- Assessing Constraints and Limitations- input data format, compressed timeline, cost, no in-person testing
- Existing Resources – SpeedCoach GPS and Rowing in Motion
- Software Framework – Python, C, Java, Spring Boot Single, Spring Boot Local
- Weighted Objective Charts- used to compare and contrast the potential solutions

The software determined to be most beneficial for the project was Spring Boot Local, which would be used to develop a completely new graphical user interface, as it provided design freedom, had a low cost, and could be altered in the future. The stages of construction involved:

1. Architecture
 - Waterfall Development-separate structural elements into smaller, sequential tasks.
 - Basis framework was needed first.
 - Having sub-systems allowed for quick iterations and increased productivity.
2. Detailed Design
 - Rapid Application Development-fast-paced iteration of the specific components.
 - High-quality models with fast production.
3. Analysis Checklist
 - Debug internally.
 - Confirm goals and objectives using fundamental concepts



Testing and validation of the tool was done after a functioning prototype was built. The tests used were:

1. Integrated Unit Testing – specific interface components
2. System Testing – interface as a whole
3. Supervisor feedback – verify the usability of the interface
4. Weighted Objective Charts – referred back to the tables to confirm the goals and objectives were achieved

Conclusion

It was concluded that the developed custom graphical user interface was capable of accurately processing input data and displaying it in an intuitive manner. The visual aspects provided engagement with the user and lead to easy comprehension of the rowing material. Rowing Canada's coaches and athletes now have a training tool that will enhance athletic ability, focusing on stroke rate and split. Testing confirmed that the basic framework and specific components worked properly, meaning it was a valid design. The Rowing Eagle successfully implemented the initial design goals and objectives, focussing on data processing, usability, and simplicity.

This is the first prototype of the tool and future iterations will be made, including additions to the displayed data and alteration to the interface if the coaches' preferences change. Some of potential improvements that can be further developed are:

- Incorporate a video synchronization element, to show the precise moment of each of stroke taken.
- Improve the mapping function to provide more accurate location information.
- Create a system that is able to autonomously extract and upload input files from the onboard sensor device to the web portal. The web portal could also be updated to allow access across the country, not just locally.

The screenshot shows a web application interface with a navigation bar at the top containing 'VIEW ALL SESSIONS', 'UPLOAD NEW SESSION', 'SETTINGS', and 'LOGOUT'. Below the navigation bar is a search bar and a 'Show 10 entries' dropdown. The main content is a table with columns: 'Id', 'Upload Date', 'Session Date', 'Location', 'Type', 'Athletes', and 'View'. The table contains 10 rows of session data. At the bottom, it says 'Showing 1 to 10 of 38 entries' and has pagination controls for 'Previous', '1', '2', '3', '4', and 'Next'.

Acknowledgements

Thank you to the following people for helping with the supervision, feedback, and data collection of this project. The production of the Rowing Eagle Graphical User Interface would not have been possible without your support.

- Dr. Colin Bradley
- Natasha Stefani
- Chuck McDiarmid
- Maksym Kepsky
- Dr. Babak Manouchehrini
- University of Victoria – Engineering Department



April 2021