Hogeschool Rotterdam - Technische Informatica 2

Automation of signalling in sailing competitions

User Research

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Contents

1 Summary

This report presents the user research of the device known as Auto Dick 3. It is a device that assists jury members with the starting sequence of sailing competitions. By conducting interviews and physical tests the papers aims to assess the needed understanding for effective operation of the device, with as goal to reduce the minimal required training of jury members before operation.

In this report, it becomes evident that using the device is not as intuitive as it could be. Beginning with an introduction to the device's purpose and an explanation of the methods used including user interviews and physical testing. Key findings from this research are that participants generally managed to assign settings correctly after receiving an explanation, but confusion arose after starting a race due to unclear instructions. The report concludes with recommendations to improve the usability of the device: adding labels to make setting adjustments more intuitive, enhancing the visibility of instruction execution times, and using lights to highlight interactive buttons during races. These recommendations aim to make the system more user-friendly and effective for all users.

2 Introduction

Signaling at sailing competitions is traditionally done by a jury crew of around five members on a signaling boat. These jury members are responsible for raising and lowering flags, keeping track of events, and issuing sound signals to notify sailors to take action.

In the case of our client, the Koninklijke Nederlandse Zeil- en Roeivereniging, the jury is made up of volunteers. However, the club is recently experiencing a shortage of available volunteers, which creates significant challenges in managing the signaling process effectively.

The Automation of Signaling in Sailing Competitions project is centered around developing a device to assist the jury on the signaling boat during competitive sailboat races, aiming to reduce the minimal required volunteers. The device aids the starting sequence by showing which flag to raise, playing audio cues to indicate flag changes to the racers, and logging all events.

The device is a waterproof case that houses a screen for displaying information, a rotatable knob for changing the starting time of a race, four rotary switches for adjusting the starting settings, and four buttons for starting, ending, or logging special events during the race. The user first uses the four rotary switches to program the starting sequence, after selecting a starting time using the rotatable knob the user can press the start button to start a race. When a race is started the device displays the current and following instruction for the user on the display screen. During a race the user may press the offense button in case a offense is made. The user may press the sound horn button at any time to manually sound the horn. Refer to [Figure 1] for a visual representation of the workflow.

The current implementation of the device has proven effective in supporting volunteers who have received training with the device or have experience in race management. We aim to explore ways to make the device more intuitive for those with little to no prior experience, making it accessible for more volunteers.

At the project demonstration on 30/05/2024, we invited visitors to test the device. Our goal was to research how intuitive the layout and handling of the device are for users with varying degrees of experience and knowledge about the subject.

2.1 Objectives

The objective of this user research study is to understand how much understanding a user needs of the device to operate it effectively, and what could be done to make the device more intuitive for users.

2.2 Scope

The research focused on a wide variety of users, ranging from those with prior knowledge of competitive sailing to those without any such background.

3 Method

1. **User interviews:** Conducted short interviews with participants to estimate their knowledge on the subject.

2. **Physical testing:** Conducted usability tests with participants to observe their interactions with the device.

Participants: The participants in this study are people that visited our project demonstration on 30/05/2024 at Wijnhaven 107, Hogeschool Rotterdam. This ranges from young students to working adults.

4 Results

Some of the results are separated by experience of competitive sailboat racing.

- **Little or no experience:** Refers to those that who at most know about sailing, but have no experience with the racing aspect of sailing.

- **More experienced:** Refers anyone that understands the working of sailboat racing.

4.1 Are users able to quickly discern the usage of the device?

Without explaining the usage of the device or workings of sailboat racing, we asked the participants to tell us their assumptions about the device. By observing the participants navigate the device without prior knowledge of the system we hope to learn what parts of system are self explanatory and why. Our expectations are that the highlighted buttons make it easy to understand what needs to be done even if the user may not understand what it all means.

Little or no experience: Didn't understand what they were looking at, but they understood that they could turn the rotation switches to change some settings and press the start button. They mentioned this was because of lights pulling their attention to it, indicating it was something they could interact with.

More experienced: They could quickly point out how to change the settings for different racing sequences, mentioning the labels and lights make it clear what actions to take. Not everyone was certain how to change the next starting time.

These observations mostly mach our expectations on the buttons. The participants however had difficulty figuring out that the rotary knob was responsible for setting the starting time. The suggestion was made to use labels or lights similar as the buttons on the UI.

4.2 Is starting a race intuitive with only knowledge on racing protocols?

After an explanation of how a competitive sailing race worked with the accompanying flag protocols [1], we asked the participants to begin a race that starts in 5 minutes that was non-repeating, had a sequence of 3-2-1-0, didn't use an orange flag, and used the Papa flag. Our expectations are that the proces of starting a race is intuitive enough for the volunteers. By providing the participants with minimal knowledge that an average volunteer might posses or could be taught in a short amount of time we hope to confirm our assumptions.

Any experience: No problems were experienced during the assignment and starting of the race for all levels of experience.

The participants efficiently used the turning knobs to select the requested settings and started the race. These observations confirmed out expectations.

4.3 Are instructions provided during the race clear to understand?

After the race was started by the participants, we asked them what action they thought they needed to take. The screen would display various information to them: the current time, the time until they should execute the current instruction, the current instruction and the next upcoming instruction. By inquiring about their assumptions about what actions they should take we hope to learn if the information is displayed in an intuitive way. Our expectations are that the instructions will be clear, but maybe displays too much information at once.

Little or no experience: They thought they needed to raise the class flag and then wait for n seconds until the next instruction. When pointed out that they needed to wait n seconds until they should raise the class flag, they noticed the instruction in the corner with an execution time, saying it was too hidden and that the text in the center should be more clear.

More experienced: Also the more experienced people were confused by the instructions. They were also uncertain whether or not they could use the transgression button since its lights were off.

These observations showed that there were clear improvements to be made on the display. The current instruction in the centre of the screen did not clearly convey when to execute the operation. Also none of the buttons were highlighted making participants assume no buttons could be pressed.

5 Conclusion

By testing our device on a broad demographic, it has become clear that there are some features, such as the lights highlighting the options, that make it intuitive to use. However, it is evident that the current device requires additional instructions before any user can truly operate it effectively. Some changes can be made to the device to make it more intuitive to use. One of these changes is to make it more clear how to change the starting time, this could be achieved in a similar way as the setting switches, by using lights or labels. Another change is to make the instructions clearer when a race is started, this might be achieved by showing the execution time of an instruction more clearly. The last change that can be made is showing what buttons can be pressed during the race, this could be done by highlighting the buttons with lights. The results of this research should be used to improve the next iteration of the device and make it more intuitive for users to use.

References

[1] T. Farquhar, "STARTING RACES USING RULE 26", 25/01/2005, [Online], Available: `https://www.ussailing.org/wp-content/uploads/2018/01/RRS26_Start_Sys.pdf`, [Accessed on 30/06/2024].
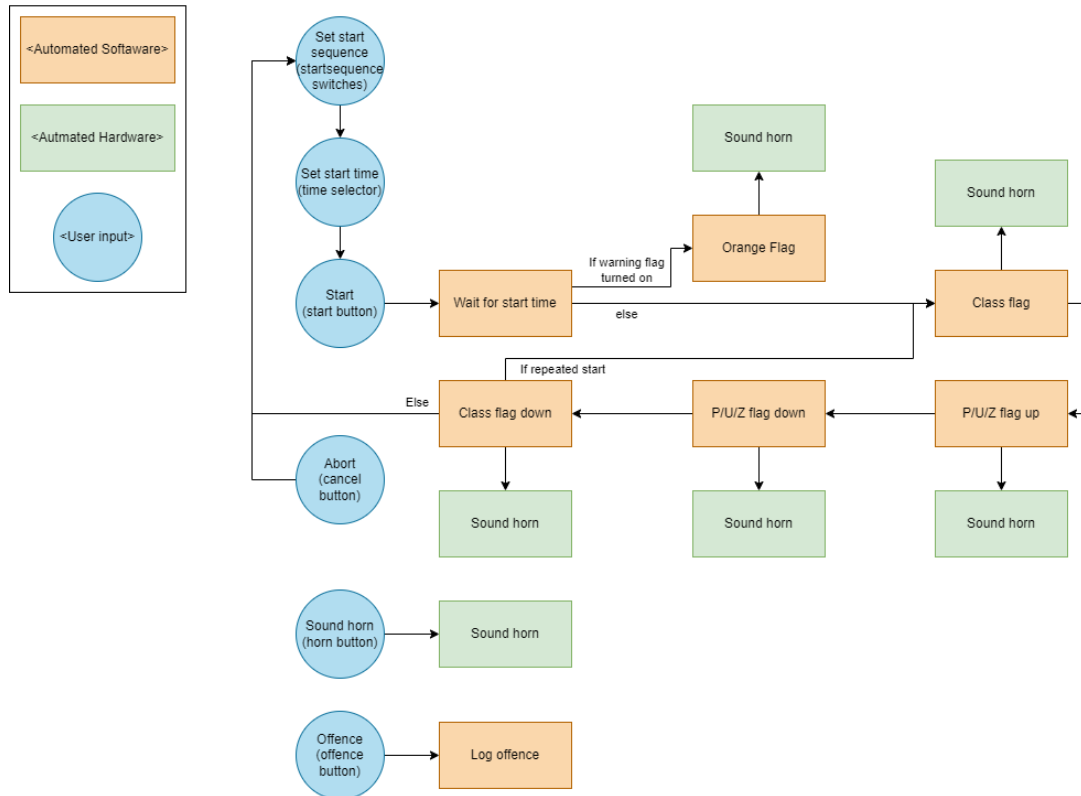
6 Appendix

Figure 1: Auto Dick 3 usage flowchart