Requirements Analysis Report

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March 2023

1 Problem to be solved

The purpose of this project is to make a SmartTable.Why would we need this? Well, imagine you are in a crowded restaurant. You have to wait for the host to bring you to a table that isn't reserved. Once you sit down, you will need to grab the waiter's attention to order and then to get the bill. This is a lot of work for people with social anxiety or people who are disabled. That is the problem our table is trying to fix.

2 Introduction

Our intended users are: a client in a restaurant and the waiter in the restaurant or other service-based establishments. The client has difficulties communicating with others, because of social anxiety, disability, or other reasons. The waiter is overworked and needs the help of the SmartTable to lessen his workload. The different options for our interface implementation:

- Gesture-based interface using a leap motion sensor [1].
- A cube, object representation of actions.
- Voice control commands using a phone application.
- Gestures-based interface using conventional cameras (OpenCV).
- A remote with buttons for changing the colors.

2.1 Experience Sequence

The customer enters the restaurant. The table has Led lights on its side that indicate the different states it has.

- Table is green by default.
- When the client sits on the table, its color changes to red. It uses simple pressure sensors to tell when someone is sitting [2].

- When the client wants to request the waiter's attention, they make a gesture, speak to the app, or press a button. The table changes color from red to blue.
- There is a timer that turns darker blue the more the client waits.
- Waiter approaches and turns off the timer in a similar way to the client, resets table status and it goes back to the color red.
- When the client requests the bill with a gesture, voice, or button, the table changes color to yellow.
- When the client sets the table to "do not disturb" in the same way as above, the table changes color to white.
- Waiter sets table to reserved status similarly as above, the table then changes to red.

This process will be explained in more detail in the requirements section.

3 Requirements

3.1 Functional requirements

- The system should identify when a user is seated on the table.
- The system should provide an interface for both user types (client, waiter) to input commands.
- The system should visually show the confirmation of a command executed by both user types (client, waiter).
- The system should show visually the current state of the table.
- The system recognizes these commands: occupied table, the client wants to order, the client does not want to get disturbed, client requests the bill, table reserved.
- For each of the commands the visual confirmation should use a different color.

3.2 Environmental requirements

- The system's visual indicators should be visible in a variety of lighting conditions.
- The system interface should be able to work under different light and sound conditions.
- The system's visual indicators should be visible no matter the position of the table.

- The system should not interfere with the intended use of the table.
- The system should withstand any incident common to restaurant tables.

3.3 User characteristics

- Client: The expected skill set of the client is a novice.
- Waiter: The expected skill set of the waiter is expert.

3.4 Usability goals

- The commands used by the client should be simple and easy to master.
- The commands used by the waiter should have a certain level of complexity, this should avoid replication from the client side. But at the same time, the commands should be understandable and trainable to the workforce.

3.5 User experience goals

- Using the command interface should be an enjoyable experience.
- The system should be responsive when receiving commands.

4 Requirement fulfillment

We have four proposals for the system but with a preference for the first one:

- Hand gestures with leap motion sensors.
- Voice commands via phone app.
- Hand gestures with a conventional video camera.
- Cube with different tabs on each surface for each different action.

We have three proposals for the system but with a preference for the first one:

- Set of led lights under the glow of the table.
- Set of led lights as a ring surrounding the table.
- Set of led lights as ceiling light over the table.

For the system to recognise a user is sitting:

- a pressure sensor beneath the chair.
- ultrasonic sensors in the side of the table.

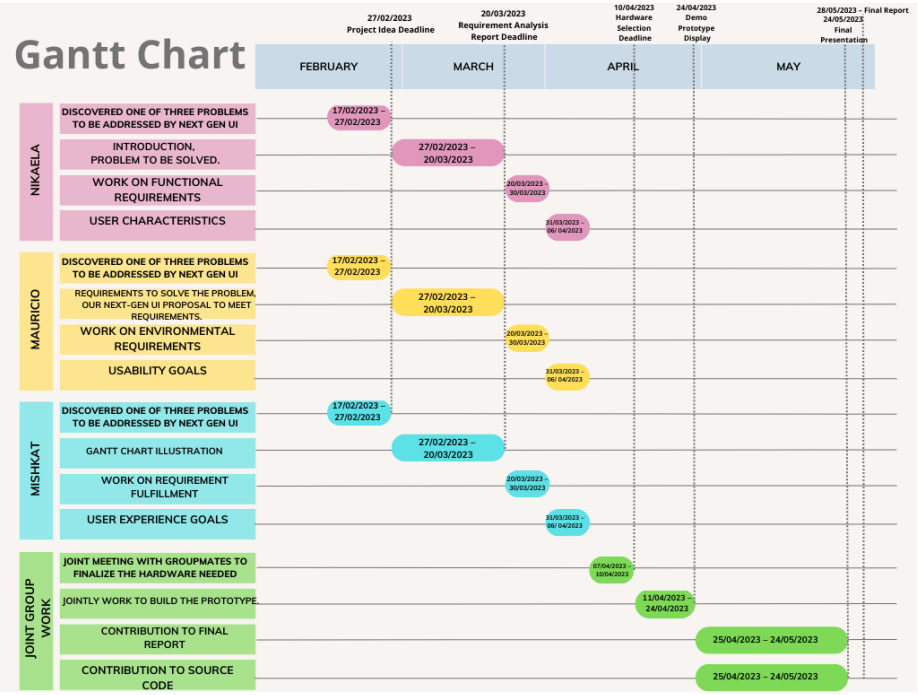

Figure 1: Gantt Chart

References

[1] I.-A. Zaiţi, Ş.-G. Pentiuc, and R.-D. Vatavu, "On free-hand tv control: experimental results on user-elicited gestures with leap motion," *Personal and Ubiquitous Computing*, vol. 19, pp. 821–838, 2015.

[2] J. Cheng, B. Zhou, M. Sundholm, and P. Lukowicz, "Smart chair: What can simple pressure sensors under the chairs legs tell us about user activity," in *UBICOMM13: The Seventh International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies*, pp. 81–84, 2013.