Nurse AR User Interface

High-Fidelity Report

Group 1E

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Problem Domain

For this project the interface design problem was to create a virtual reality (VR) interface for a specific user class within a hospital in a world where everyone is assumed to own their own VR headset, which for this project was assumed to be a Microsoft HoloLens 2. The user class we decided to design this VR interface for was nurses.
To complete this project we designed our interface around three specific application scenarios that would regularly be undertaken by a nurse. This included a symptom lookup, a patient information page and a medicine ordering screen.

The nurses work environment can be very mentally straining with long working hours, and very early shift starts or late finishing times being common, for this reason all three scenarios were designed to make the nurses emotional state as calm and comfortable as possible while using the interface.
The symptom lookup was designed to be as efficient and user friendly as possible in the hopes of keeping the nurses as calm as possible. This was because the symptom lookup is likely to be the most stressful of the applications, as successfully and efficiently diagnosing a patient can have a very significant impact on the patient's physical health. To make this as efficient as possible we implemented features such as voice-to-text searching, a recently searched symptoms section and an auto-fill bar that suggests options depending on the letters the user has typed, if they chose to type instead of speak.The screen layout for this scenario, as well as the rest of the scenarios was very minimalistic, employing mainly white or a light shade of grey as the colours, and having only the necessary functions and information on the screen, for the purpose of making the the interface as easily viewable and traversable as possible.
The patient information page is a much less stressful procedure for nurses, as editing the patient's status or checking their information is not as urgent, relative to the other scenarios, however this page was still designed as efficiently as the others, with the patients information clearly labelled, as well as the edit status option being clearly defined as an interactable button to make it as easily usable as possible for the nurses.
The medicine ordering screen once again employed the same strategies as the previous scenarios to keep the nurse as calm and comfortable as possible while using the function, with the two main functions being to order and reserve medicine. These were clearly defined and kept only a click away with confirmation buttons and pop-ups in case situations arose such as not having enough stock, clicking the wrong function or ordering/reserving the incorrect medicine or incorrect amount. These quality of life functions were all intended to minimise the chances of any accidents and keep the nurses emotional state as calm as possible.

Design Process

The process of designing the high fidelity prototype took several weeks, many attempts, trial and error, and different drafts until we got the final version we were satisfied with.

The designs were based on our low fidelity part, so the look and processes of the high-fidelity prototype derive from the low-fidelity, which were both created using figma, as it allowed and easier transition from the low to the high-fidelity.

Our process on development was largely similar to how we created the low-fidelity program, though many changes had to be made.

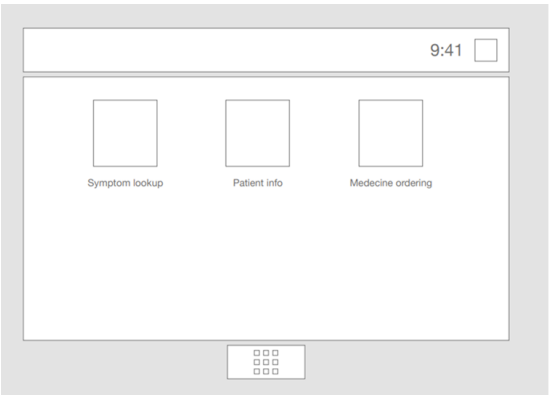
After we brought the low-fidelity look over to the high-fidelity, we updated the design to look more like a real user interface, and not simple drawings.

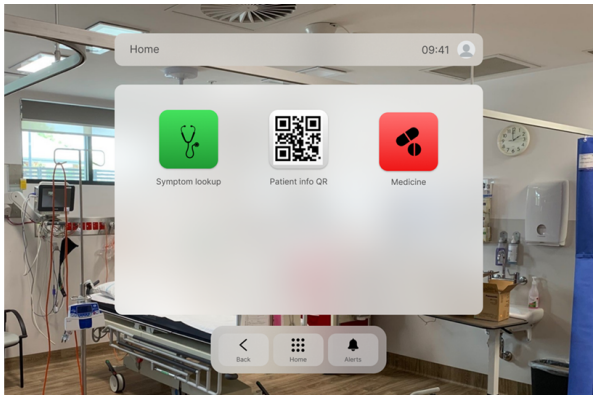
A photo of a hospital was added on the background to showcase the scenarios more accurately for users. We also commanded all the necessary buttons and inputs to perform as per the previously established scenarios and tasks to the best of our ability.

We also made many design changes after vigorous testing and observing how users navigated the user interface, and particularly what they had trouble with.

We listed all that needed to be fixed, and went back to the prototype to try and correct all of the errors users found. During this design process, we also went back and changed scenario tasks so that they reflected the newly updated prototypes and so that users could understand what to do better, as well as being able to work for what firms can and can't do. We did this on both testing workshops, and through many weeks after, until we were left with the final version we are happy with now.

Here is an example of our design process, from low fidelity to our high fidelity:

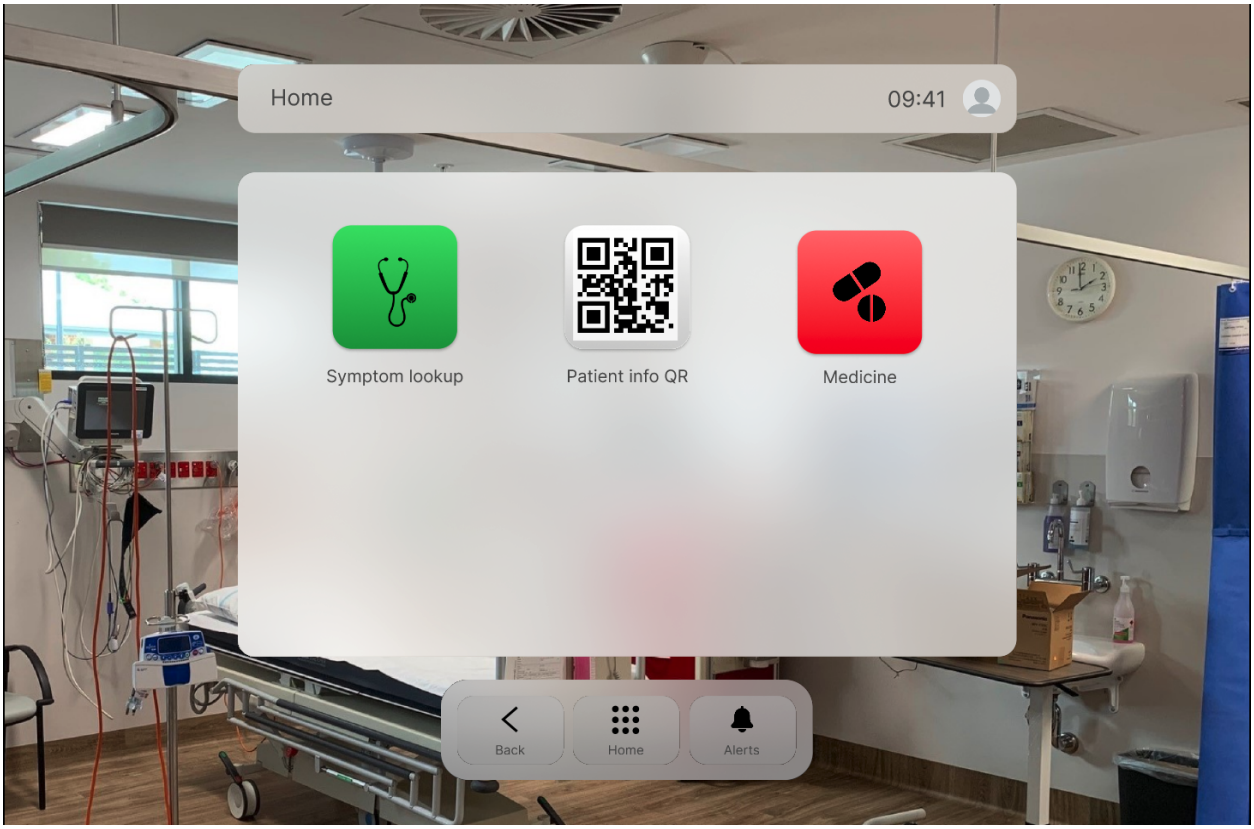




Clearly, many changes were made during the process of designing the prototypes. It shows just how much work was done by our team to provide a clean working high fidelity prototype derived from the basic stages of low fidelity.

Design

Home screen



Upon putting on the hololens headset, users are immediately introduced to the home screen. This screen serves as their central navigation hub, from which they can explore various applications and scenarios.

The window is structured into three distinct sections:

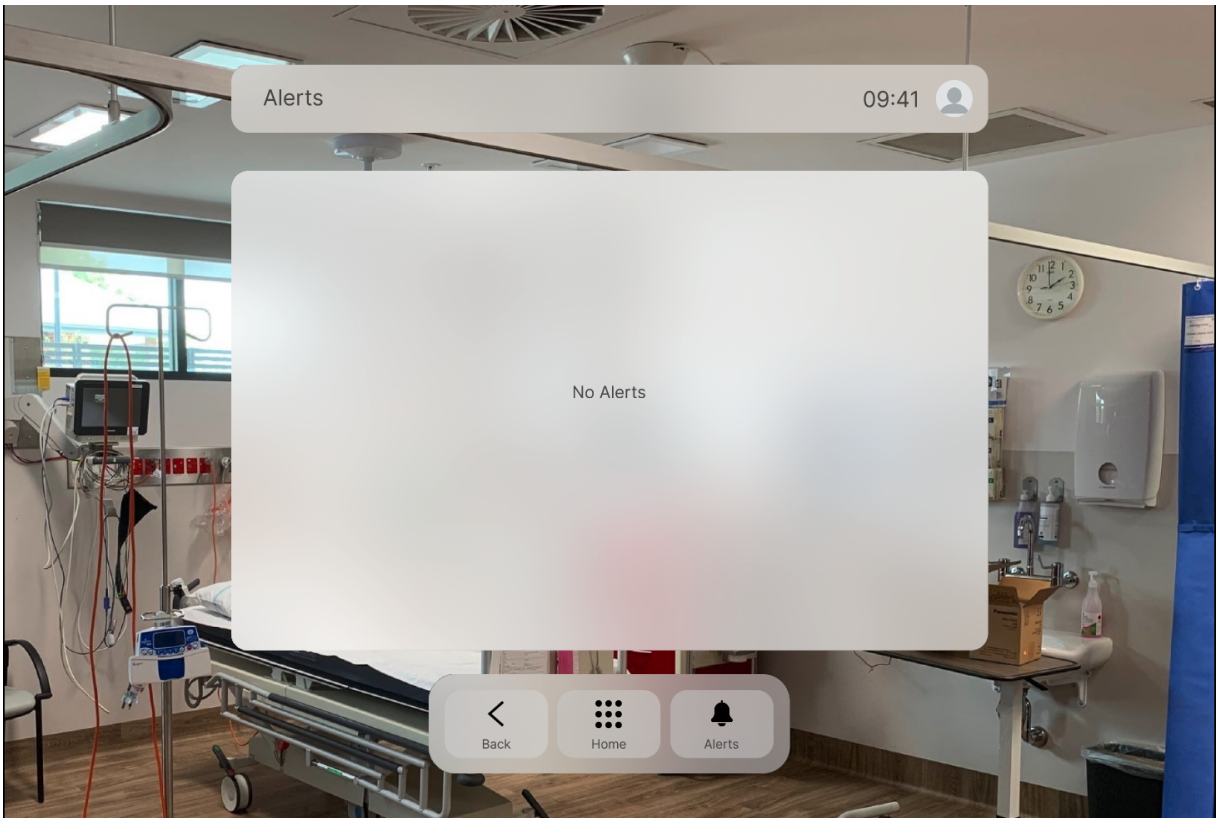
Status Bar: This bar prominently displays the title of the current view. Additionally, it provides the user with the present time and the profile picture of the active user.

Content View: This view displays the contents of each screen. On the home screen, it presents a grid layout of applications, namely 'Symptom Lookup', 'Patient Info', and 'Medicine', each awaiting user selection.

Navigation Bar: This is the user's command centre. It features a 'Back' button, allowing users to navigate a previous screen. The 'Home' button offers a shortcut back to the central hub, while the 'Alerts' button opens the alerts screen.

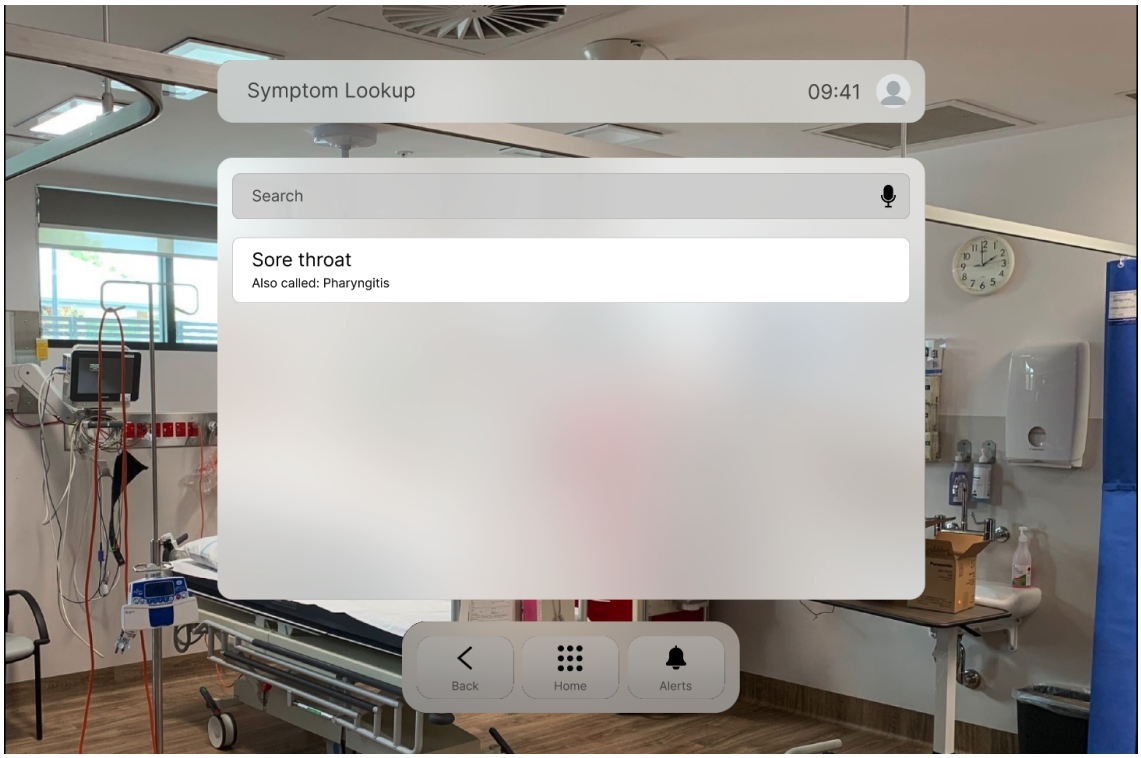
These elements are superimposed onto the user's surrounding environment, with a blur effect ensuring clear visual delineation. Importantly, users will find the status bar and navigation bar consistently present across various screens, enabling easy navigation and situational awareness.

Alerts screen



The alerts screen provides nurses with a list of vital notifications, ranging from patient-specific alerts to general hospital updates. Conveniently, this screen is accessible from anywhere within the application via the navigation bar, ensuring timely information access for nurses

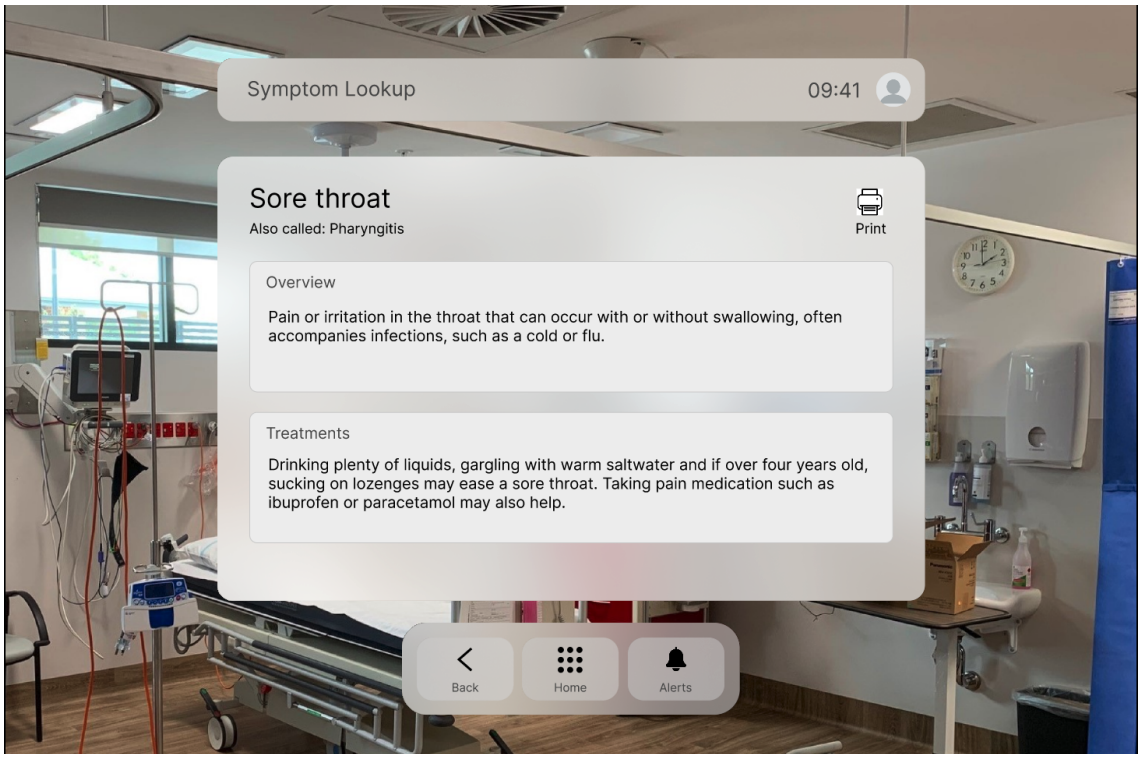
Symptom lookup screen



The symptom lookup application enables the user to lookup a patient's symptom by name. The search field at the top of the view allows the text input via a keyboard as well as through voice dictation by pressing the microphone button.
Under the search field is a list of recently looked up symptoms.

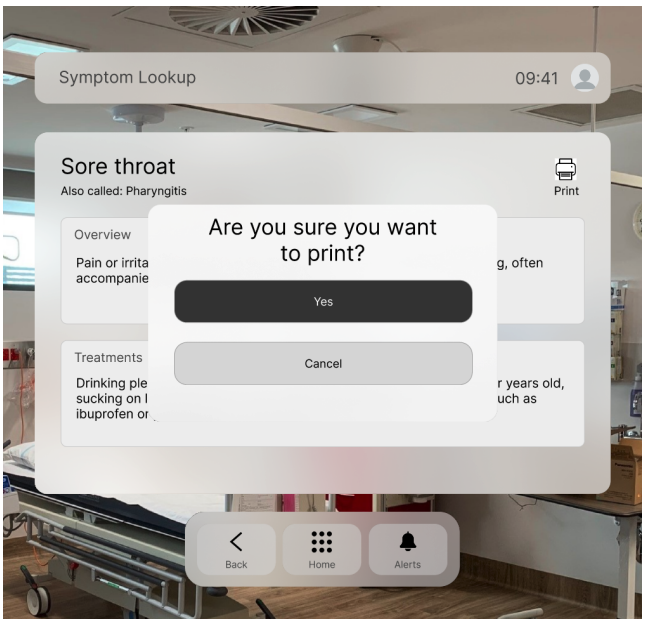
During testing the user was required to press the most recent symptom to open the detail symptom screen..

Symptom detail screen



The symptom detail screen displays the name and scientific name as well as an overview of the symptom and the available treatments for treating the symptom.

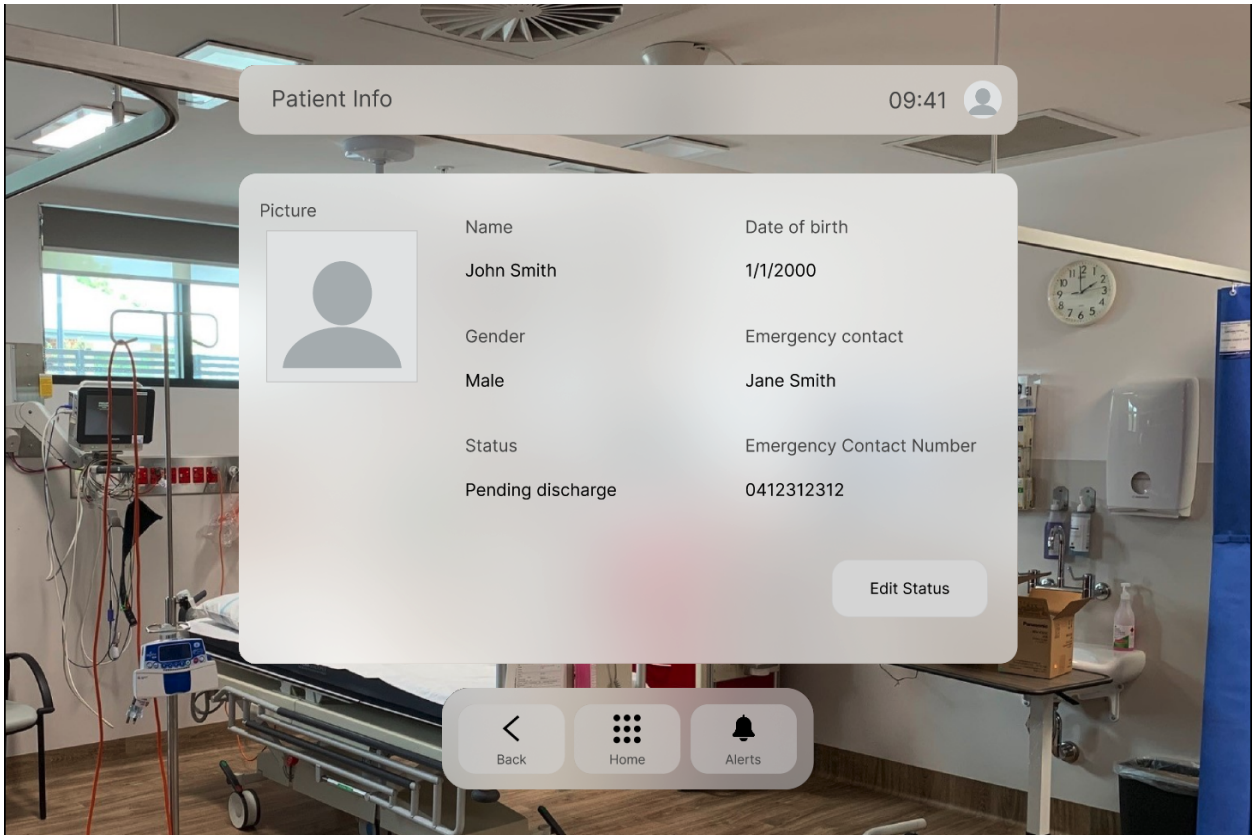
There is a print button in the right corner that allows the user to print the symptom, this was tested by the user during the testing period.



Patient info QR screen

The Patient info QR screen, allows the nurse to scan a QR code located on the patient's bed. When a nurse looks at the QR code through the hololens, the system will read it and lookup the patient's file. When scanned correctly the QR code will be displayed in the UI before navigating to the patient info screen. The UI was designed to allow for the maximum amount of the environment to be visible, whilst scanning the QR code, this increases situational awareness which is vital in a hospital setting.

Patient info screen

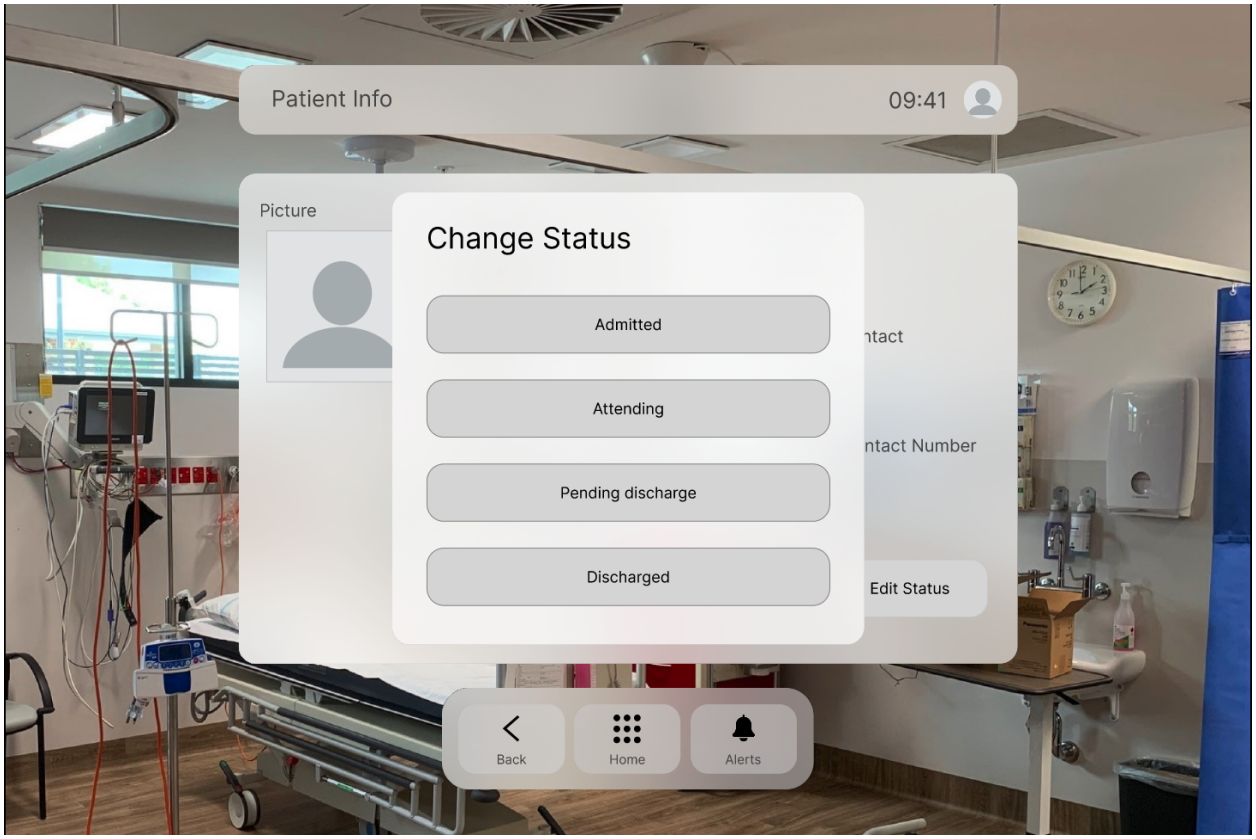


The patient info screen acts as a comprehensive dashboard detailing essential information about a particular patient. Displayed prominently are the patient's photo and name, ensuring easy identification. This is complemented by other vital details such as their date of birth, gender, current hospital status, and emergency contact information.

Nurses have the capability to modify the patient's hospital status. This dynamic feature allows them to keep records updated in real-time, reflecting the patient's ongoing progress through the hospital.

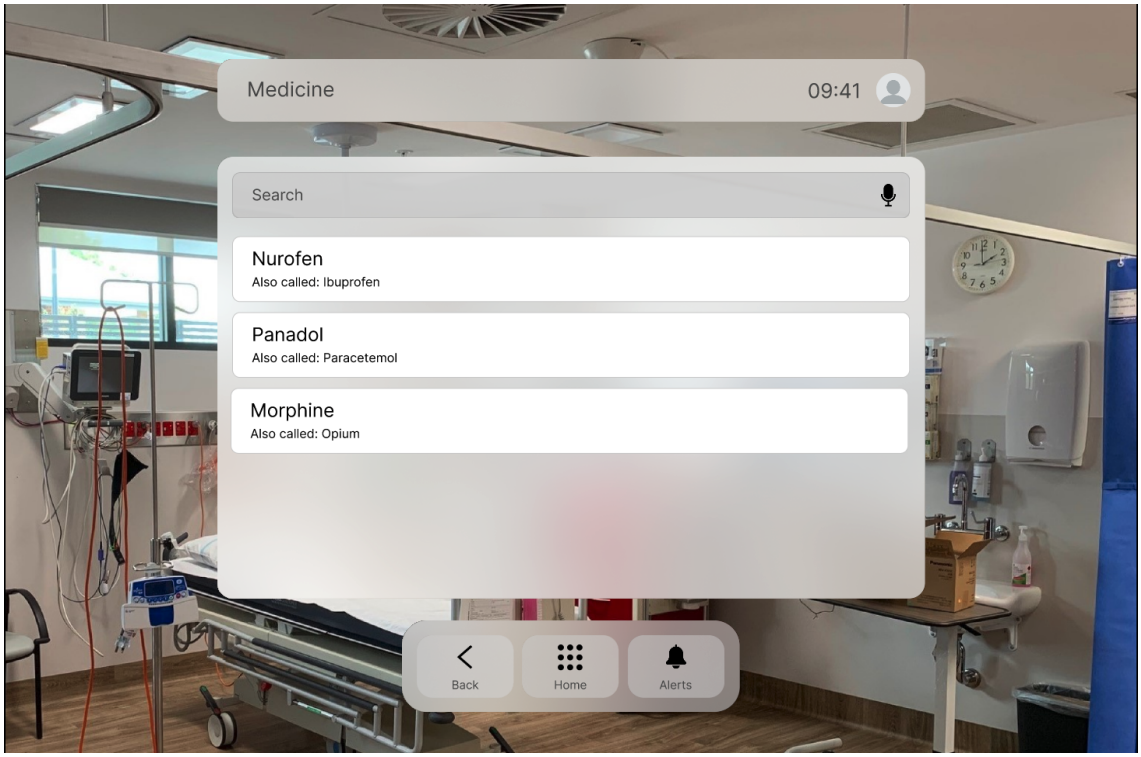
The UI is divided into 3 columns for the profile picture and two columns of potential related textual information.
During testing the test user demonstrated the ability to change the status of the patient. When the Edit status button is pressed the status overlay is presented.

Patient info change status screen



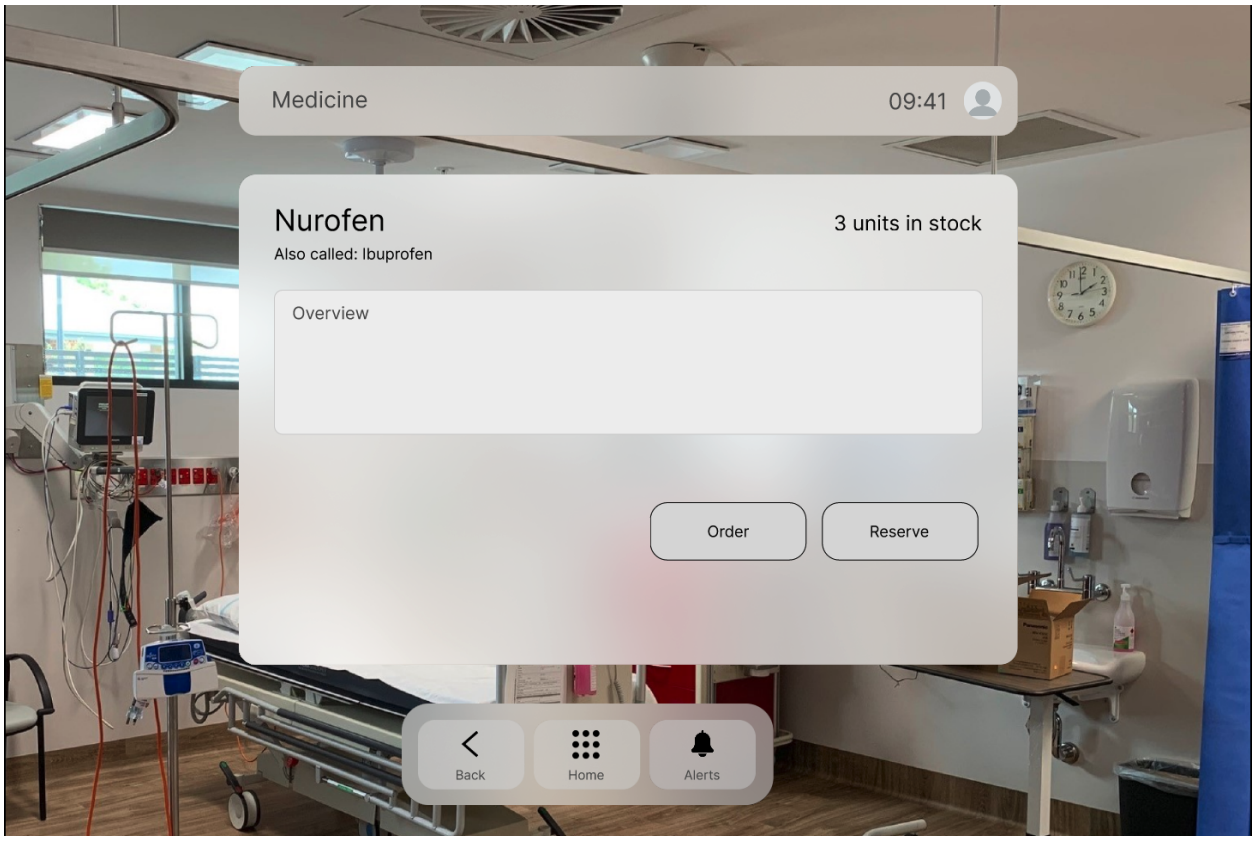
The Change status overlay presents the user with a list of available options, these represent the patient's progress. Pressing on an option dismisses the overlay and updates the status to the one that was just chosen.

Medicine screen



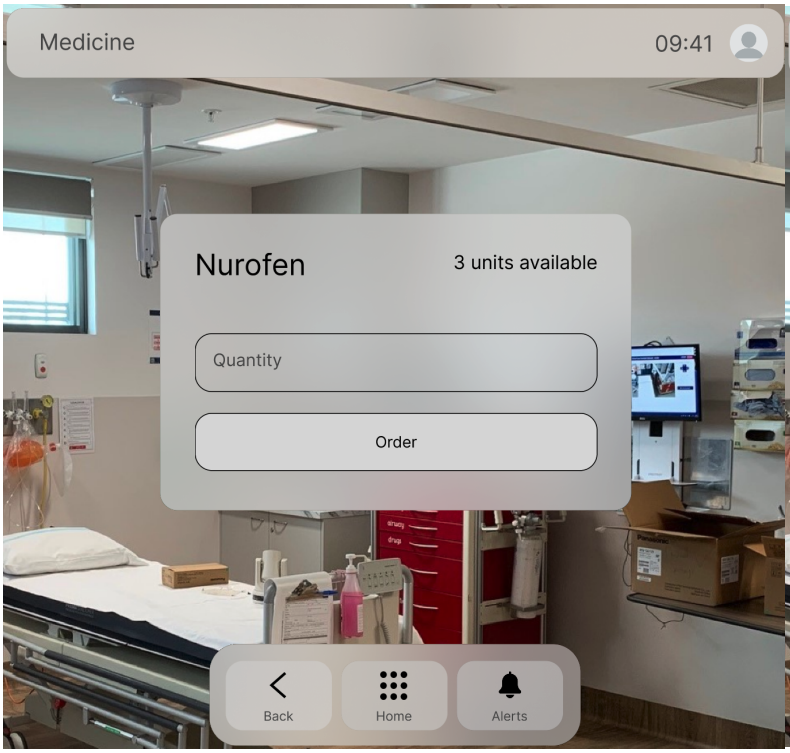
The medicine screen is similar in design to the symptom lookup application. It has a familiar search input field, with support for voice dictation. Under the search field is a list of recently lookup medicines. When the nurse presses a recently looked up medicine, the screen will navigate to the detail view.

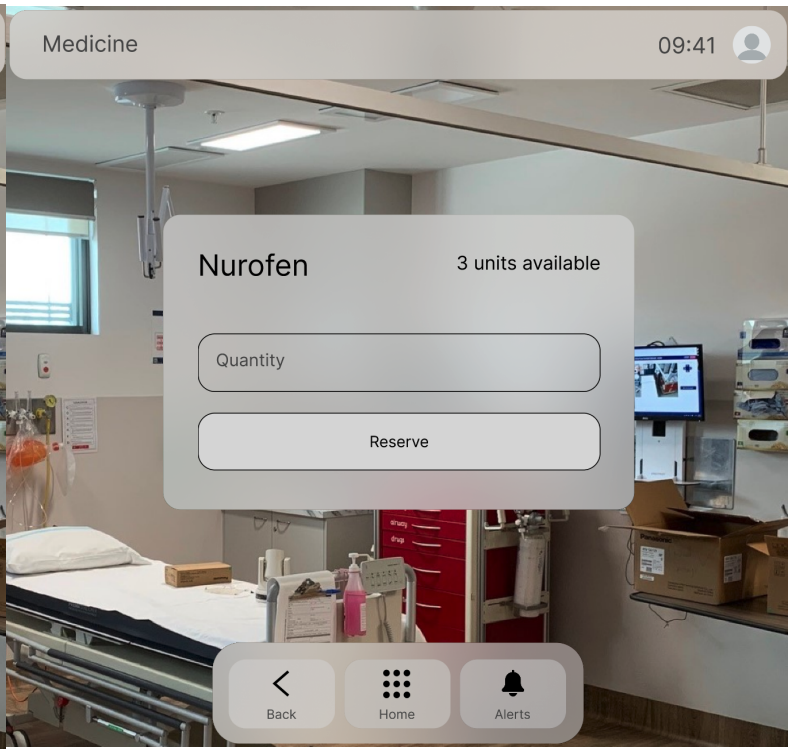
Medicine detail screen



The medication information screen showcases comprehensive details about a specific drug. It presents both the common and scientific names, the quantity in stock, a summary of the drug, and options to place an order or reserve it.

Medicine order and reserve screens





The left image displays the order screen, allowing nurses to request medications like Nurofen and view available quantities. Nurses can specify the desired amount in a provided text field. Clicking the order button initiates the request and seeks user confirmation. Meanwhile, the right image depicts the reservation screen, where nurses can set aside needed medications. Its interface closely mirrors that of the ordering screen.

Prototype development

For our user interface prototype, we utilised Figma, a renowned web-based professional UI design platform. Figma has proven to be pivotal in ensuring that our high fidelity design accurately represents our conceptualised ideas.

Advantages of Using Figma

Web-based Functionality: Figma's web-based nature means team members can easily collaborate on the project without the need for downloading specialised software. The only requirement is a standard web browser, streamlining the design process.

Real-Time Collaboration: One of the standout features is Figma's ability to support simultaneous collaborative work. This ensures that team members can contribute, modify, and revise the design in real time, fostering a dynamic workflow.

Component System: Figma's component functionality empowers designers to craft reusable elements. Once these components are integrated into the design, any alterations to the component automatically update across all instances, ensuring consistency.

Interactivity: The platform facilitates the creation of interactive elements. For instance, buttons can be made clickable, allowing users to traverse between screens with intuitive transitions.

Presentation Capabilities: Showcasing the interactive prototype becomes straightforward with Figma, as it can be effortlessly demonstrated via a link in a web browser.

Challenges Encountered

Performance Issues: Given Figma's web-based architecture, we noted occasional lag, especially with more extensive projects, potentially affecting the fluidity of the design process.

Pricing Model: To harness the full suite of Figma's capabilities, either a paid or educational licence is indispensable, which might not be feasible for all.

State Limitations: Figma's prototype feature doesn't currently support dynamic states or interactive changes based on user input. This constraint forced us to design multiple versions of the same screen, leading to redundancy. The drawback was particularly evident in the patient info screen; when updating a patient's status, the prior screen wouldn't reflect the change. To circumvent this, we had to design separate screens for each possible outcome, inadvertently adding to the project's bulk and impacting performance.

In conclusion, our experience with Figma for prototype development was largely positive. Despite a few challenges, the platform's advanced collaborative and design features enabled us to bring our conceptualised user interface to life effectively. Figma's capabilities streamlined our design process, and its interactive elements enriched our prototype's user experience.

Evaluation

Heuristic Assessment

In Week 9, we performed a heuristic assessment on the first high fidelity prototype iteration. Together we explored the prototype, and found the following problems:

- Lack of intention check for printing
- Lack of feedback from after an attempted print operation
- Medicine lookup page linking to the wrong page
- Ambiguous button labels
- Scan QR code interface lacks sufficient affordances for the user to reliably perform the expected action
- Lack of ‘cancel changes’ option for updating patient status

Between the heuristic assessment and user testing, the above problems were addressed. The linking from the medicine lookup page was corrected in our prototype platform, printing and status changing confirmation were added, as was a success message for the print operation, and the ‘edit status’ button on the patient info page was enlarged. The QR scanning page was given a placeholder animation to help the testers understand how the final product will work. Further, the frame overlay of that page was redesigned to conform better with the most commonly used symbol for the action of scanning a QR code.

Risk Assessment

Risk	Risk Level (5 = highest risk)	Application Scenario Tests	Mitigation Strategy
Not all buttons are clear in what they do	5	This is tested in all application scenarios by having the tester use all buttons at least once, then comparing time, clicks and errors after mitigating the issue	Larger buttons, interface affordances and contrast between the button and background can mitigate this issue
No clear changes button	5	This is tested in scenario 2 by having the user specifically clear the change after editing status	Adding the clear changes button and having it clearly labelled and visible
No printer pop-up for user to confirm the print	4	Tested in scenario 1 by having the tester use the print button, then checking the observation sheet for any issues	After pressing print button the user should get a screen to confirm the print
Entire screen not immediately in view	4	This is tested in all scenarios by seeing if the testers have all information present on the screen upon opening the necessary screen	Change screen resolution until the user has no need to scroll to immediately see all information on the screen
No indication for printer success	3	Tested in scenario 1 same as the printer pop-up above	Add a pop-up after printing that confirms whether the printer worked
No indication for status change	3	Tested in scenario 2 where the user used the status change, the observation sheet can be checked after in case the user still had any issues	Add a pop-up to confirm whether the users status change was successful or not
No camera crosshair	2	Tested with the use of the QR code scanner in scenario 2	Add a crosshair symbol to the QR code scanner

Briefing and Application Scenarios

Hello, thank you for helping us with testing our prototype. Today you are a nurse working in a hospital, our prototype will help you with specific tasks that you would encounter in everyday working (we think). You will be given a scenario card, which will have 3 tasks for you to complete on it, we will provide you with paper and a pen to write with.

Please note: The tasks can be completed in any order. If at any time you wish to end the test, please let one of us know.

Index Cards

Scenario 1: Symptoms

Task 1: Print most sore throat symptom

Task 2: Click sore-throat and read the overview

Task 3: Navigate back to home, after finding sore-throat

Scenario 2: Patients

Task 1: Scan given QR code, read patient DOB

Task 2: Edit patient status, submit

Task 3: Edit patient status, clear changes

Scenario 3: Medicine

Task 1: Check stock level of Nurofen

Task 2: Reserve Panadol

Task 3: Order Morphine

Observations

Throughout the testing process of the high-fidelity prototype, many observations were conducted in both weeks 9 and 10. This was done to see the strengths of our prototype so we can enhance it, and what doesn't work so the faults can be fixed. Like our low fidelity prototype, as the users navigated the user interface, our group observed what they did and wrote down notes. After they completed all scenario tasks, we asked the user some questions. Here is an example of the questionnaire survey given to some user testers:
Was it usable:
- tester1: yes
- tester2: very easy to use
- tester3: yes

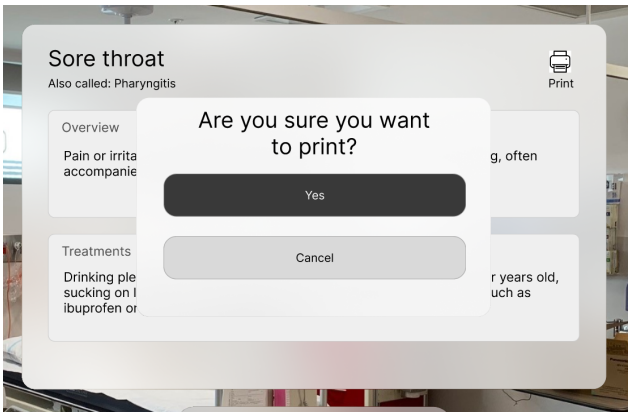
number of clicks:
tester1: scenario1: 18 (1x miss-click on print button)
tester2: scenario1: 26
scenario2: 17
Did anything leave you feeling slightly concerned/unhappy?
- tester1: no
- tester2: reserve does not let you enter a value
- tester3: no
Any favourite features?
- tester1: scan QR code animation
- tester2: this is fast to use, which is important for the use case
- tester3: scan QR code animation
Is there any room for improvement?
- tester3: nah it's good. Just change the icon for patient info

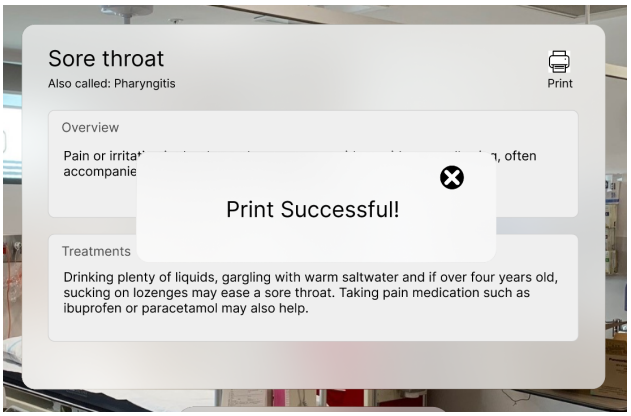
By the end of each testing session, we complied the main points from the user questions. We would then try and fix these results in time for next week's workshop. For example:
Things to do:
patient info button needs a qr code symbol and blue colour
pop up messages for ordering and reserving medicine
change back button
make home page buttons and labels bigger
get rid or change quantity for medicine
get pop up message for clearing changes

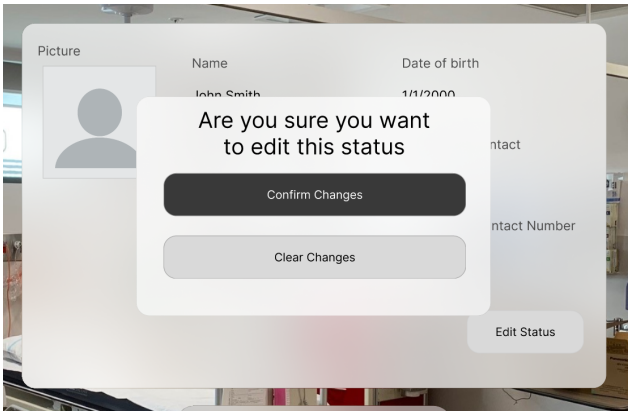
Based on these observations, it was clear the medicine look up section of the user interface needed a lot of work on our first week. So thanks to careful observations by our team, we fixed those errors and the medicine lookup section worked as intended, and testing users could focus primarily on other areas of the prototype. There were significantly less problems for second week of testing, as observations showed our prototype was well underway to be quite successful.

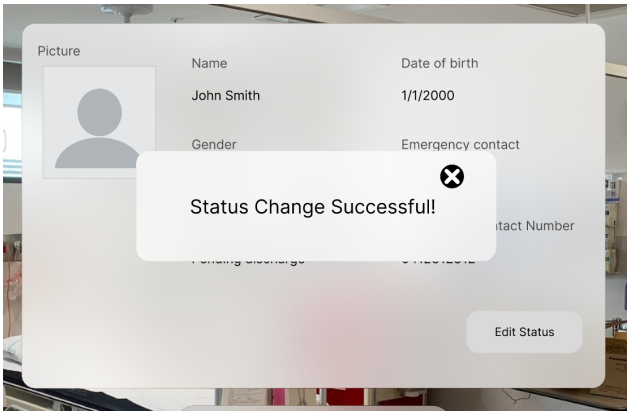
Risk resolution and prototype iteration

Intention checks were added to the printing and status updating operations as popups (“Are you sure you want to print?” and “Are you sure you want to edit this status?”), as well as feedback, also as popups (“Print Successful”, “Status Change Successful”).

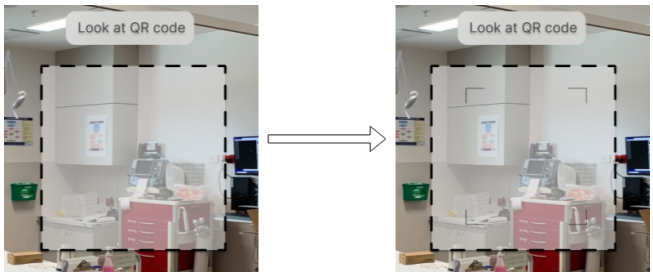








Added light corner framing, described as ‘cross-hairs’.



The symbol for the patient info button was changed from an abstract bust with plus sign, to a QR code.

The behaviour of the back button was also modified, so that it would go to the previous page, and not re-open popups.

Reflection

Iterative design process was used during our project to progress through any oversights that we, the developers, had in the early developmental stage of the project. We originally had thought that the design we started with was going to be an almost finished product, however if we had stuck to that thought process we would not have ended up with an excellent result. The feedback that was received throughout the usability testing was able to excel the development in ways that we could not have predicted, we received incredible feedback on specific areas that we were then able to iterate to make the user experience as stress-free and usable as possible.

A great example is the design changes that went through in terms of accessibility, with implementing icons on the home page that replaced a standard interaction with one much more intuitive. The initial response to the buttons was mixed, with some users understanding the original and then some being stuck for as long as 25 seconds trying to decipher which is appropriate for the scenario they were assigned. The feedback these users put forward to us was a large catalyst in implementing the new design of the buttons, which in term resulted in a maximum navigation time of 5 seconds, around a $1/5^{th}$ of the original maximum time. If there was to be something to be changed in the final version in relation to this design example, it would be the choice of colours. We have a somewhat randomised choice (green for symptom lookup, red for medicine) choosing these specific colours has resulted in a slight bit of confusion with users tending to relate the chosen colours to confirming or denying, these colours would be better off being a more neutral palette.

The risk assessment portion of our project benefited greatly from the use of iterations of design, this can be seen in the addition of a microphone icon added to our search bars. This was implemented with the intention of allowing the end user to be able to use text to speech, instead of having to use the quite difficult to use default keyboard for the HoloLens. This design decision was influenced by having hands-on experience using the device that we were prototyping for, most members of the team had trouble with fine motor movement when using the device. After realising this, we changed our design to not be only navigable using the built-in keyboard, sadly this was not able to be tested due to the software used to create the prototype. The only thing in terms of our prototype that we feel that could be changed is the limitations of using Figma, our textboxes (and therefore the microphone button) were rendered unusable due to the limitations of the software. We would have used a more advanced software given the chance to re-design the whole project, or the SDK for the HoloLens itself.

Another crucial part of the developmental process was the evaluation of the project as well as being able to successfully evaluate feedback received from the usability testing phase of the prototype. The testing took place over numerous sessions which allowed for iterations of the prototype to improve on feedback given per session, this resulted in notable increases in the metrics we used for checking results (times, click per scenario). We did this to improve the prototype to the point of users being able to flow through each scenario with ease, which is extremely important to be able to achieve for our target user, which is a nurse in a busy

environment. If there was something to be changed about our usability testing/evaluation of the project phase, we could have created more scenarios for the users to go through.

Overall, thanks mostly to the use of the iterative design process our project was able to progress concurrently as we were receiving feedback from users involved in our usability testing. As previously mentioned, if we were to make any improvements to the final design they would have included: more neutral colours for the home screen and choosing a different software to make the prototype in which would allow better interactions within the prototype, as well as more in-depth scenarios for the users to test.

Conclusion

The design methodology detailed in the above report played a crucial role in shaping our virtual reality interface tailored for nurses using Microsoft HoloLens 2. Rigorous testing, user feedback, and subsequent iterations were instrumental in transforming initial concepts into a functional and user-friendly application.

Our experience emphasised the importance of continuous adaptation. Key successes included significant improvements in accessibility, notably the substantial reduction in navigation times, and the implementation of a more neutral colour palette. Furthermore,the risk and heuristic assessments process proved invaluable in identifying potential challenges.Through iterative design, we successfully implemented solutions to address these issues.

However, it's worth noting that limitations in the prototyping software posed challenges for certain aspects of our design. Despite occasional performance issues, our collaboration through Figma enabled real-time adjustments, ensuring a coherent and consistent user experience.

The thorough evaluation and multiple iterations based on user testing elevated our prototype to a level where nurses can seamlessly navigate various scenarios, ensuring efficient and stress-free task execution. This report underscores the significance of design methodologies in crafting interfaces closely aligned with users' needs and preferences, especially in complex environments such as the healthcare setting use case.

Minutes And Summary Of Meetings

Meeting Minutes for 09/06/2023 1:34PM

To do Items

- Assign members parts of the initial high fidelity to complete in figma
- Do risk assessment
- Do heuristic assessment

All contributed in meeting notes and week tasks
Corey, Ryan and Jake isn't in attendance for actual meeting

Meeting Minutes for 09/13/2023 2:08 PM

Today we went through the current version of the high fidelity prototype. We saw what was wrong with it and made changes so it could be ready for testing. We could only test scenario 1 and some of scenario 2. We made observations and dot points of what we need to do with the high fidelity prototype.

Things to fix in high fidelity:

- Update look of program
- Fix medicine look up.
- Make a print button popup.
- Add camera crosshairs for patient lookup.
- Add clear changes.
- Change resolution so everything is seen without having to move the screen around.
- Buttons need to be specifically clearer on what they do
- Indicate printer confirmed
- Pop up window for confirming or cancelling changes

All contributed in meeting notes and week tasks

Meeting Minutes for 09/20/2023 1:47 PM

Things to do:

- patient info button needs
- a qr code symbol
- blue colour
- messages for ordering and reserving medicine
- change back button
- make home page buttons and labels bigger
- get rid or change quantity for medicine

All contributed in meeting notes and week tasks

Zoom Meeting Minutes for 09/30/2023 5:00 PM

Today, the team reviewed the latest iteration of the high fidelity prototype. We identified areas that needed improvement and implemented or planned necessary changes to prepare it for future testing. Throughout the session, we made detailed observations and noted specific points for further refinement in the high fidelity prototype.

Zoom Meeting Minutes for 10/06/2023 5.00 PM

collaborated to prioritise the identified problems from previous and devised a plan to address them effectively. Team members shared valuable insights, ensuring a comprehensive understanding of the prototype's strengths and areas needing improvement. These discussions guided our refinements, ensuring the prototype aligns seamlessly with user expectations and project requirements as we approach the ending of the project .
All contributed in meeting notes and week tasks

Meeting Minutes 10/11/2023 1:18 PM

Things to do:

- fix clear changes
- reserving panadol
- ordering morphine.
- Make buttons and labels larger if possible

All contributed in meeting notes and week tasks
Jake, Ryan and Lindsay wasn’t in attendance for actual meeting