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Computer Science Department

User Manual

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Github Repository: https://github.com/CS3733-D21-Team-O/BW-App

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1. Introduction

The application presented here is for the Brigham and Women's Faulkner Hospital, developed by a team of 10 software engineers from Worcester Polytechnic Institute. As a software engineering team, we created a Java application to be potentially displayed at the hospital kiosks at the Brigham and Women's Faulkner Hospital. For our application, implements the following three major components that have been influenced by a series of surveys and interviews of potential users:

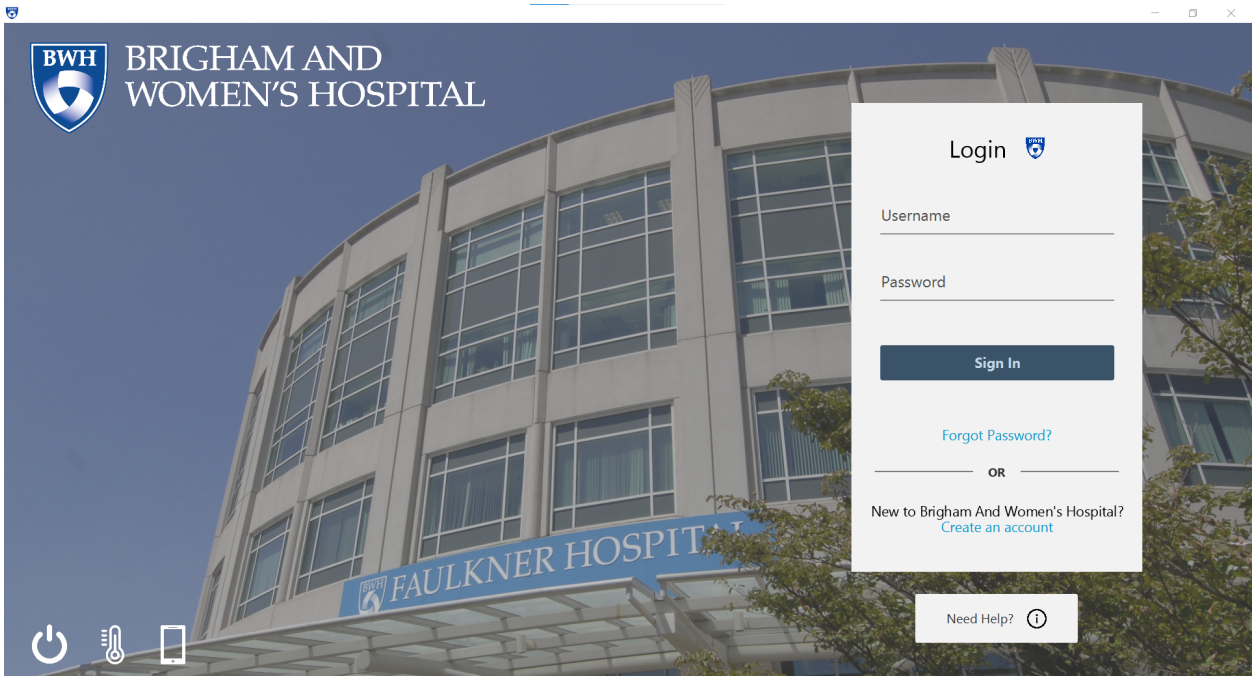
a. A pathfinding system that allows patients to choose a destination in B&W Faulkner Hospital and display the fastest route to that location with an up-to-date map.
b. A map editor, where hospital administrators are able to add, edit, or delete locations from an existing map in order to update viewers.
c. A request service that allows employees to request hospital services (i.e. security, laundry, or maintenance) when or where necessary.

We also have a couple completely additional features, along with several extensions of those functions we are proud of. Among these are our sharing features, with the ability to text or email your path to yourself, or just use the QR code on the screen to get it on your phone. We also have prototype

2. Logging in & Layout

2.1 Logging into the Application

We tried to make clarity the core of the login process. When you open the app the first thing you get is the option of what type of login you want.



If you are a patient with covid, or just a patent that will likely be using the hospital often you should make an account. If you have some symptoms or close contact you need to send a form to the nurses in order to get permission to enter with symptoms through the covid entrance. This is done with our mobile application after you fill out the covid survey. If you log into a kiosk/desktop version of the application you will not be able to fill out the form because you are already in the hospital, and should leave or already have permission.

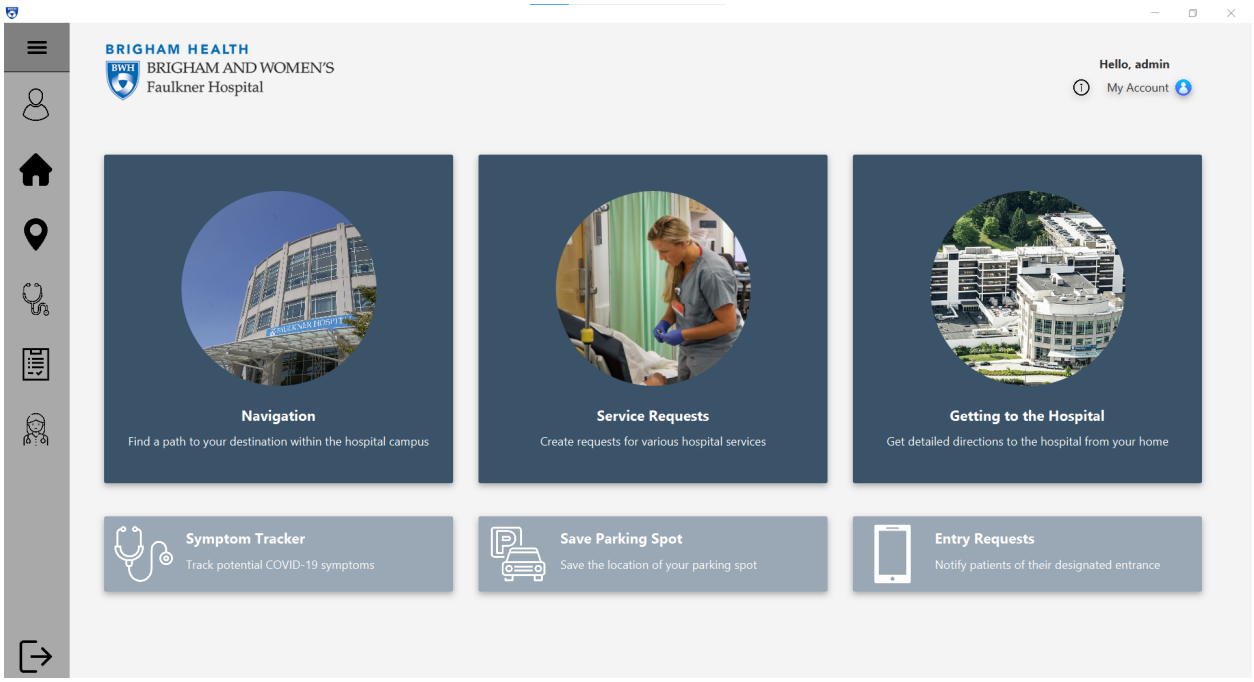
If you are an employee you have increased permissions, and thus can not create an account as freely, but do not need to fill out a form when you sign in, because you will usually be inside the hospital. You must submit your information and then wait for an admin to grant you access the first time you log in. Once they do you should be able to fill out more forms while logged in.

Admins are an even more protected version, with all the privileges of an employee and more. Only the most trusted employees should be given admin permission because they can change and remove whatever they please, including who else is an admin. The app comes with one admin that can grant other employees access, change service requests after they are created, and edit the map.

If you don't have one of these accounts there is a make a new account button that lets you go through the process. You will need to wait for authorization if you are an employee.

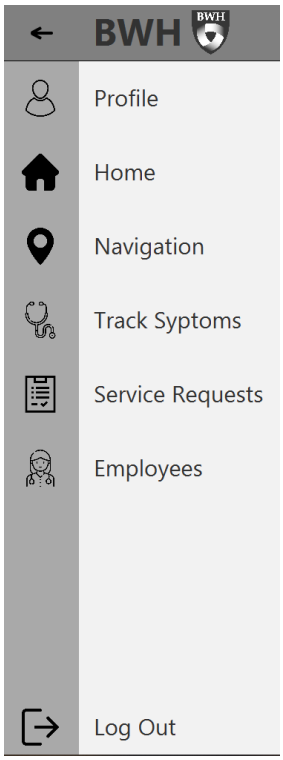
2.2 Main Screen

The main screen is what greets you when you have finished logging in. Here you find the options our application has for you.



- Firstly there is our Navigation feature, which gives detailed directions on how to get between any two rooms in the hospital.
- Next there is our about page for patients, which gives credit to those who helped make this application possible, details about its makeup, and more. For staff it is the service requests button, to see all the forms to be filled out or completed.
- Getting to the hospital is our driving/travel directions feature, allowing for convenient directions from your location to the hospital itself thanks to google maps integration.
- There is our symptom tracker, which allows people using the mobile version to see if they are safe to enter the premises. **Note: These are simply the specifications our hospital has currently decided for whether a person can enter our hospital without special permission. You can still have Coronavirus if you fit these parameters. You could not have Coronavirus and not meet these standards. They exist simply to protect everyone within the hospital as there are people at EXTREME risk that trust us to keep them safe in these walls and these standards keep them healthy. Lying on this form could kill or permanently injure you, or even more likely your loved ones and those of others. We respect your health, respect ours' and our patients'.**
- There is the direction to our parking features, allowing for your spot to be recorded for your reference after a long appointment.
- Finally there is our last feature, that varies per user. For an admin it is the admission form interface which allows them to see all of the requests to enter the building. For an employee it is also entry requests and for a Patient it is our desktop prototype of the mobile app.

2.3 Side Menu



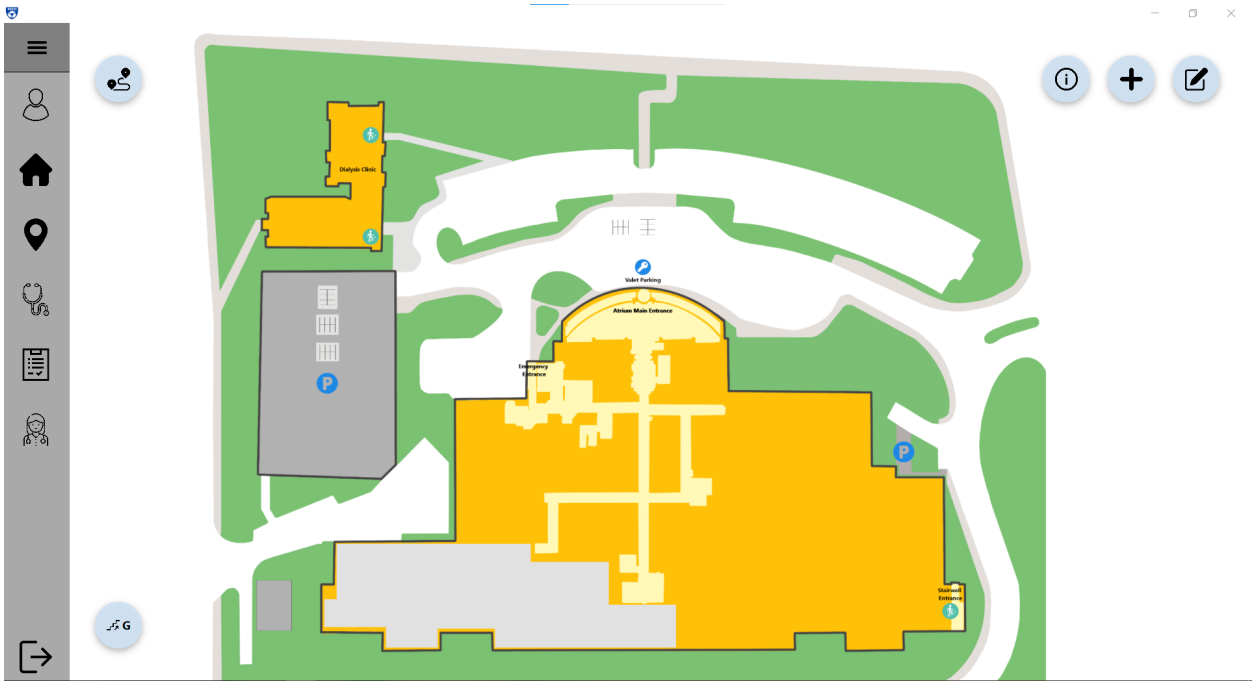
The side menu contains many of the features we alway want the user to be able to navigate to. While its contents is different depending on who is logged in, it is always waiting in the top left of the screen for you to click and expand it.

The side menu always contains these options: log out (at the bottom), navigation, user profile, symptom tracker, and of course, home. Employees have service requests, and admin has the employee manager on top of that. Patients have the about page.

3. Pathfinding Application

3.1 Pathfinding within the Hospital

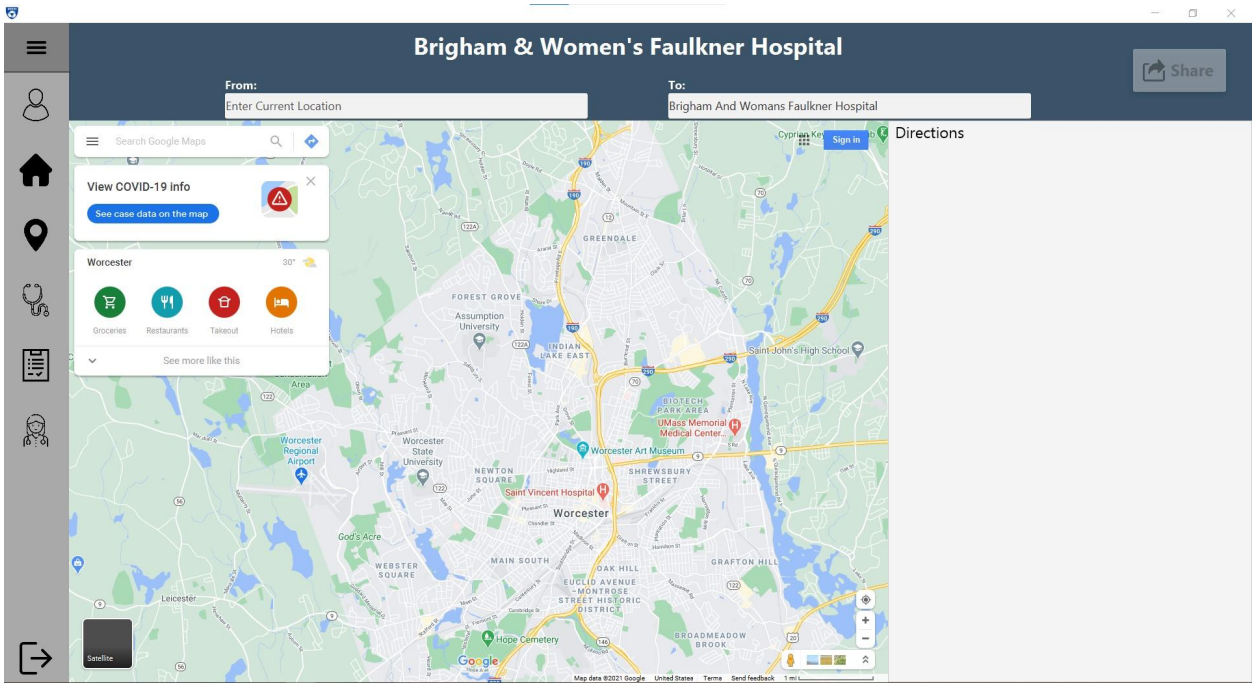
Pathfinding within the hospital is one of the primary features of our application so we worked hard to make it as intuitive as possible.



Firstly there are the features that allow you to better observe the map, zooming and floor switching. Zooming is as simple as scrolling on your scroll wheel or using a squashing/stretching motion on your touchscreen. The map should preserve your perspective zooming in and zoom you out to the full map for ease of use. For map switching just look to the M at the bottom of your screen to open the map menu. It will stay open and display all the floors, as well as the campus, for as long as you want until you click it again to get it out of the way.

Now that you can see all of the hospital it's time to pick your location. Simply right click on your location or where you plan on being and select set as start . Repeat this process with the destination you have in mind, or write it in if you were told its name, and hit GO on the top left menu to make a path appear on the screen. If you have selected the wrong location simply right click on the map and hit clear path to try again, or hit the clear button next to the GO button. This path goes to elevators or stairs on one floor and then resumes the path at the floor you are getting off at, then directing you to your destination. The direction of travel is indicated with the arrows.

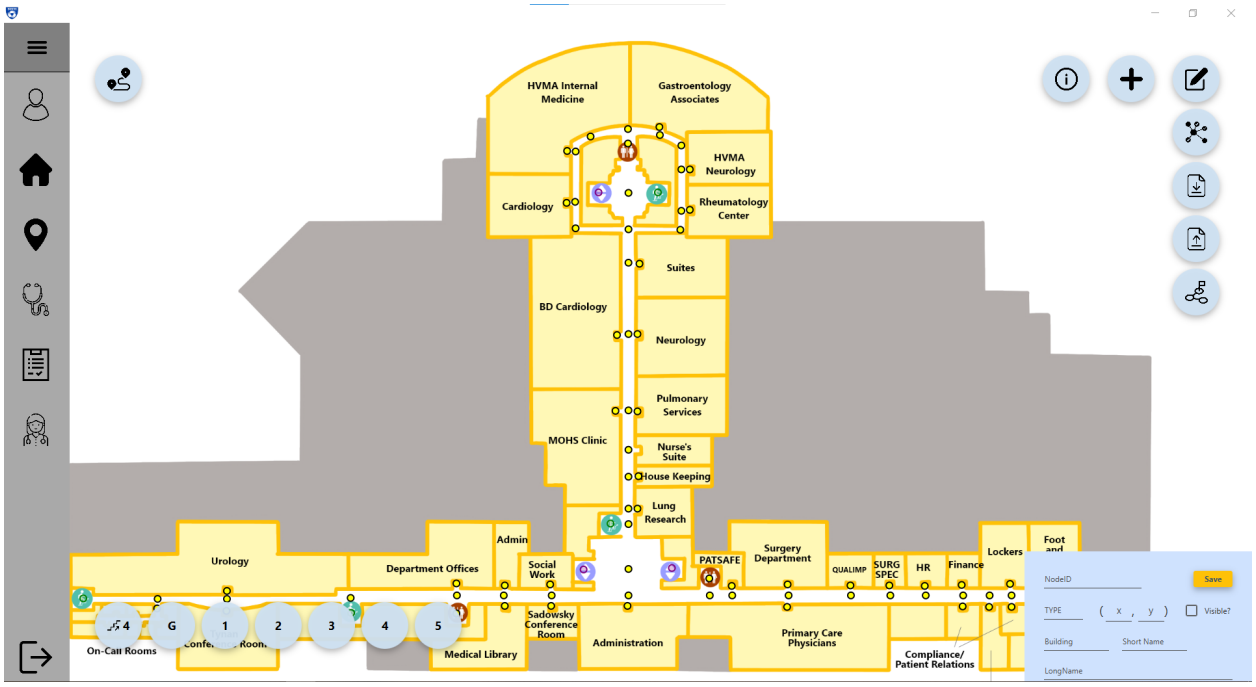
3.2 Pathfinding to the Hospital



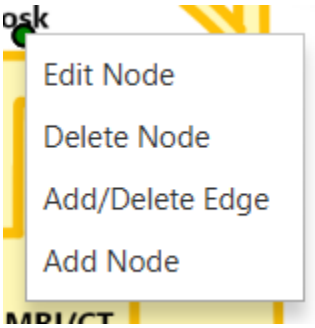
Perhaps the section with the least need for explanation, because it uses a very familiar user interface that of google maps. We have our own boxes in order to facilitate instant directions to the hospital, in addition to the usual google map features, so just put your home address or current location's address into the first box, press enter, and see map as well as text directions be displayed on the screen bellow.

4. Map Builder

Note: All features associated with the Map Editor are both only accessible to the Admin, as they should be the only ones able to make changes to the publicly accessible map, and are also only able to be done in the editing mode, which is activated by pressing on the notepad on the upper right hand corner of the screen when you are an admin in the Nav page. Clicking this button again with a map that creates no errors will return you to Navigation and save your changes. Your changes are also saved whenever the you make a change, but it is not recommended that you quit the application with the editing page open, as something could be saving.

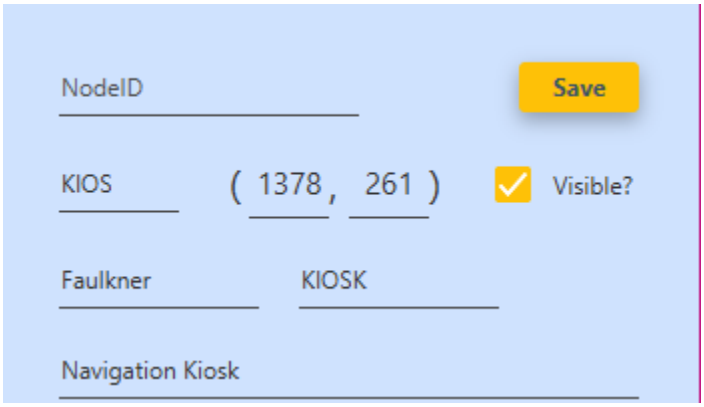


4.1 Nodes



4.1.1 Adding Nodes

Right click and press the add node option to add a node at that location. This will make a node with no edges or details in the location you clicked. Make sure to add details such as type of node (doorway, elevator, hallway) and edges to make the node functional. If you don't add edges you won't be able to leave the edit screen because you will have created some impossible paths. Once the node appears on the screen add what details you want the node to have (Name, type, visibility) and then click save to save the node.



4.1.2 Editing Nodes

Right click close to the node (checking after to see if it is the correct one) and select edit node. This will pull up a menu with the current features of the node much like when you are creating a node. You can then change any of these as you please and then click save to make those changes to the map.

4.1.3 Deleting Nodes

First right click as close to the node as possible and double/triple check in the details box that pops up that it is the node you intend to delete, because getting rid of edges and nodes you don't mean to and not realizing is the best way to ruin your experience with this editor. Once you are sure this node should be removed, click the delete node option in the right click menu.

4.1.4 Dragging Nodes

As the name of this feature suggests, simply drag on top of or as near as possible to a node and then drag it to where your desired location is. This is one of the most convenient ways to make small changes to layout, corrections, or smoother corners.

4.1.5 Aligning Nodes

The first step to alignment is to select as many nodes as you please using shift and clicking on them. These nodes should appear blue. Once you have all the nodes selected blue that you want to align, select the node (in green as normal) that you want them all to adopt the horizontal or vertical position of. Once you select that node, select horizontal or vertical from the editing menu, horizontal making all of the blue nodes the same height as the green node, and vertical making them the same place across the screen instead.

4.1.6 Invisible Nodes

One of the qualities we have in nodes is invisibility. This can be changed while in editing mode and is one of the things you chose when creating a node. If a node is invisible it is entirely a stepping stone between one or more nodes, meaning it is part of the path and functions to make the paths the map draws look nicer, but doesn't appear as a node in directions and is not selectable as a start or end position. This feature is intended to make curves look nicer without overwhelming the user with directions whenever they need to negotiate a turn.

4.2 Changing Edges

4.2.1 Adding Edges

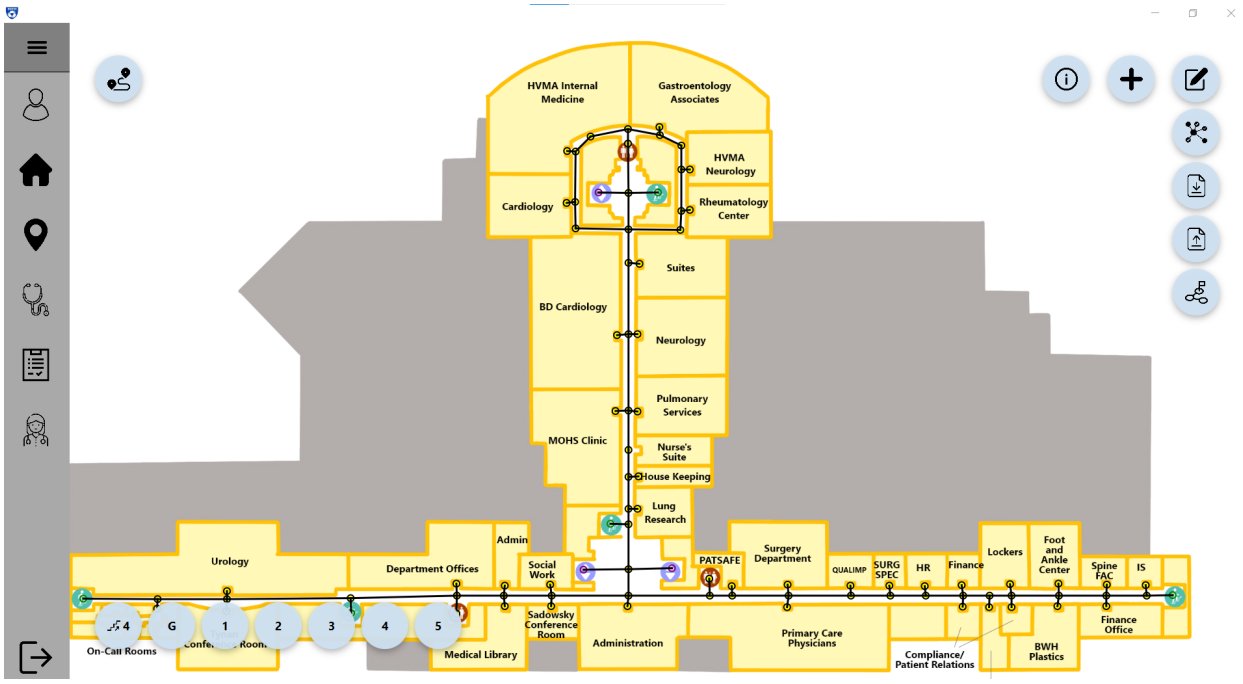
First right click near one of the two nodes you want to have an edge. Select add/delete edge. The menu should disappear and the node should remain green. Now right click on the second node and see if the line that connects them is blue. If that line is blue and it's the edge you want then click on add node to make that blue line into a permanent edge.

4.2.2 Deleting Edges

Deleting an edge is the same as creating one, but you select two nodes that already have an edge and the edge is displayed as red once you select the second node. Clicking add/delete node when this red edge is shown will delete that edge and remove it from the database.

4.2.3 Showing Edges

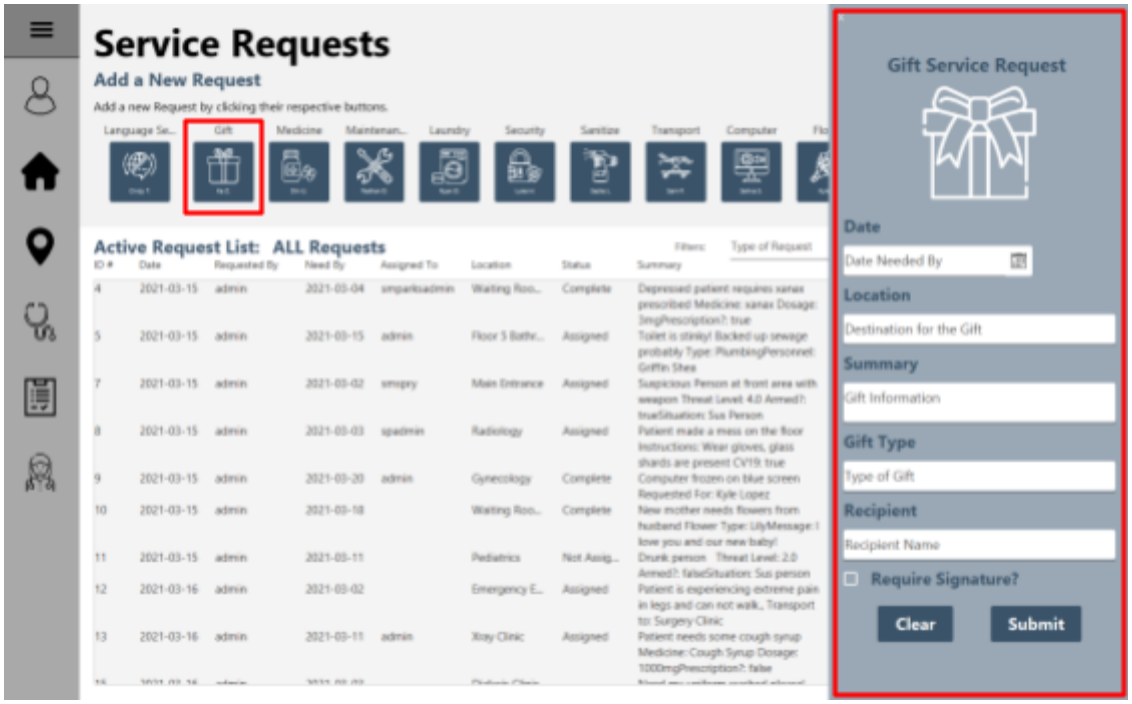
In the editing menu there is a option that looks like one node with many nodes attached to it. Clicking on this shows all edges in the current map. This isn't always the best to have on, as it makes the map quite busy, but is useful in order to see where connections are while editing. Clicking it again turns this mode off.



5. Service Request Component

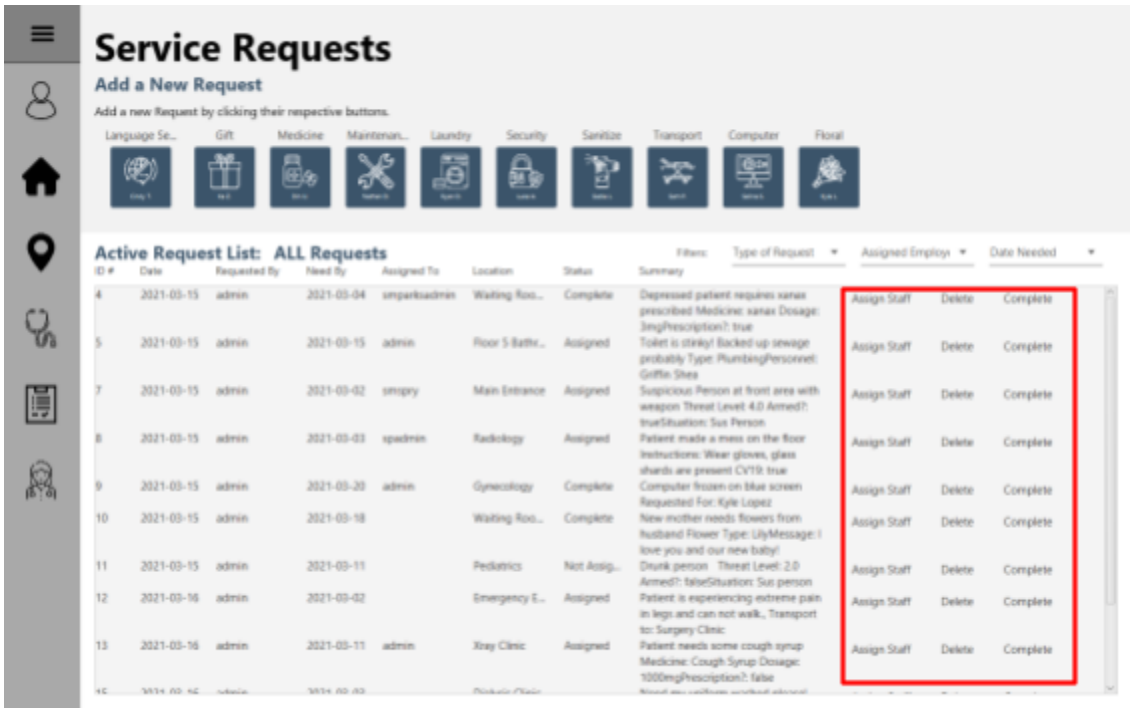
5.1 Adding Service Requests

In the service request page accessible from the home screen for the admin and staff, right at the top there is a list of service requests possible to fill out. Simply select the one of the options and the form will pop up for you to fill out with the specifics of the request. Click submit to send it to the database, clear to start over, and the x button if you have reconsidered sending the request.



5.2 Assigning Service Requests

You can change who is assigned to a service request. Simply locate the request on the list in the middle of the screen and click on the assign staff button. Then just input the staff member you want to complete the task and they will be assigned to it.



5.3 Completing Service Requests

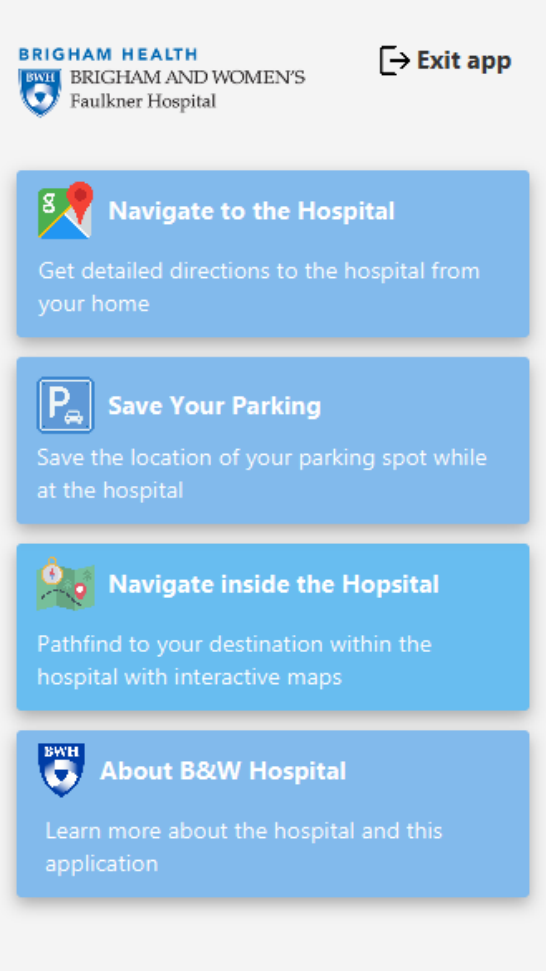
To mark a service request completed press the complete button next to the request on the list.

5.4 Deleting Service Requests

To delete a service request press the delete button next to the request on the list.

6. Mobile Application

In addition to our Desktop Application that would be displayed at various kiosks within the hospital, the team also developed a mobile application that would fit on a typical smartphone screen. This application was geared towards patients only. Therefore, its main functionality is to navigate to the hospital, navigate within the hospital, and save the patient's parking spot for them to navigate to and from.

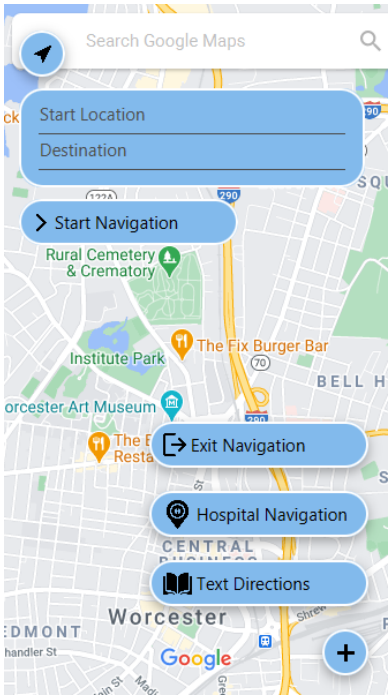


6.1 Directions to the Hospital

The first main button on the mobile application's home screen is the "Navigate to the Hospital" button. As this button would suggest, the next page would help the patient navigate from any location to the hospital. This can also be used in reverse by entering the hospital as the starting location and some destination as their end location.

6.1.1 Google Maps

To begin navigation, the patient would need to click the arrow in the top left corner. This button opens up an area where the patient can type in their desired start and end locations. After pressing the "Start Navigation" button, the map will display the route on the screen.



6.1.2 Text Directions

To get text directions, the patient can select the "+" button on the bottom right corner of the map which would bring up a selection of additional buttons. The "Text Directions" button would open a new page that would display a detailed list of directions from the starting location to the destination.

6.1.3 Additional Buttons

The "Hospital Navigation" button would lead to the navigation page for destinations within the hospital. Meanwhile, the "Exit Navigation" button would leave this google maps navigation screen back out to the mobile application's homepage.

6.2 Saving Parking Spot

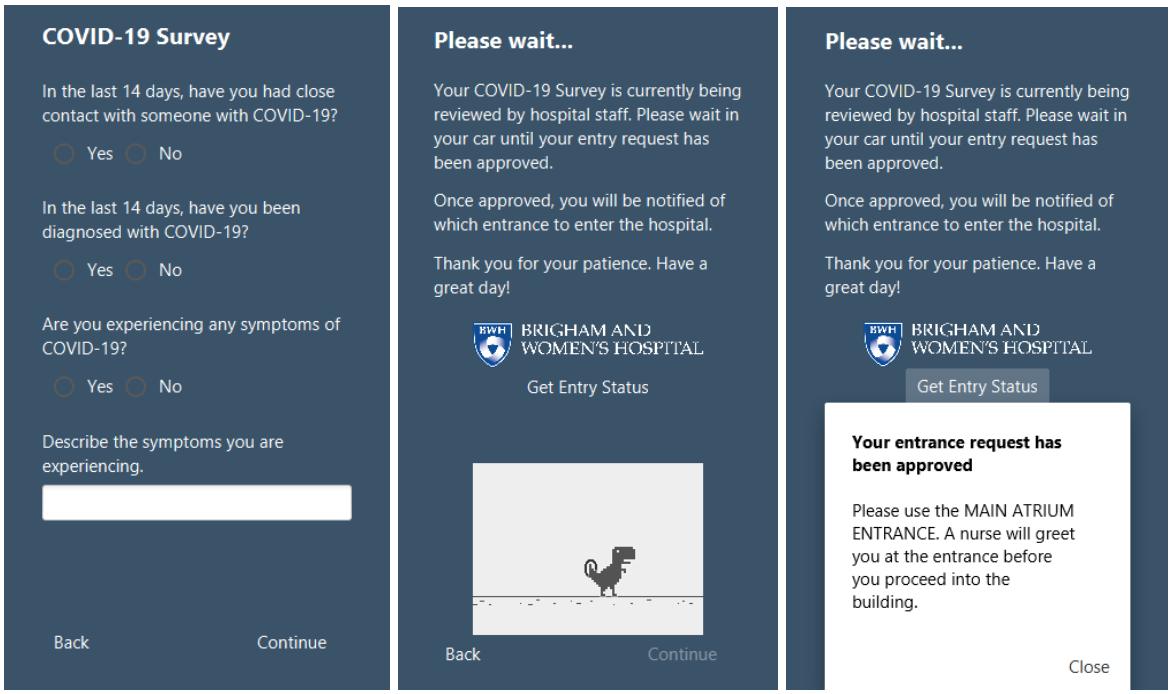
Going chronologically downwards on the homepage, the next button is the "Save Parking Spot" button. This button leads to a simple screen where the patient can type into an autofill textbox the parking spot number they are parked in.

6.2 Directions within the Hospital

Next, there is the "Navigate Inside the Hospital" button, which will help guide the patient to their desired end destination in the hospital with the help of an interactive pathfinding map.

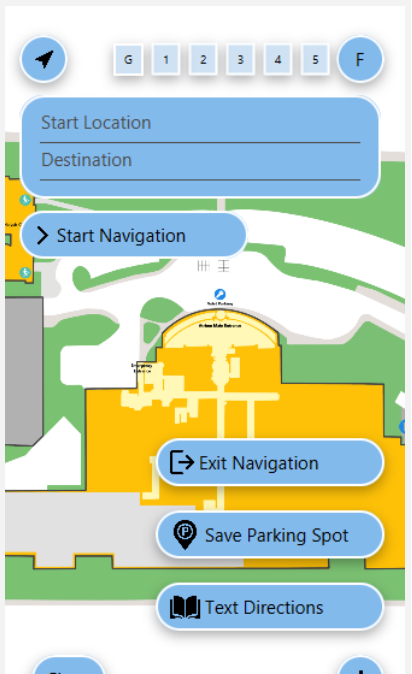
6.2.1 Covid Survey

The first screen that pops up when trying to get directions within the hospital is a COVID-19 survey. This quick survey helps hospital staff to determine whether to send the patient using the app to either the Main Atrium Entrance or the Covid Emergency Entrance. While this entry request is being processed, the patient is shown the following waiting screen. While informative of the process taking place, it also is able to entertain the dino game. Once the entry request is approved, a popup will automatically appear on the screen and inform the patient of their designated entrance.



6.2.2 Pathfinding in Hospital

The entrance that is designated for the patient by hospital staff will automatically fill the destination textfield of the hospital pathfinding application. That way, as soon as the patient gains access to the hospital pathfinding tool, they will only need to select their initial start location before a desired path is generated.



6.2.3 Saving Parking Spot

In the bottom right corner of the screen is a button with a plus symbol. When this button is expanded, it reveals three buttons one of which is the “Save Parking” button. This button leads to a simple screen where the patient can type into an autofill textbox the parking spot number they are parked in.

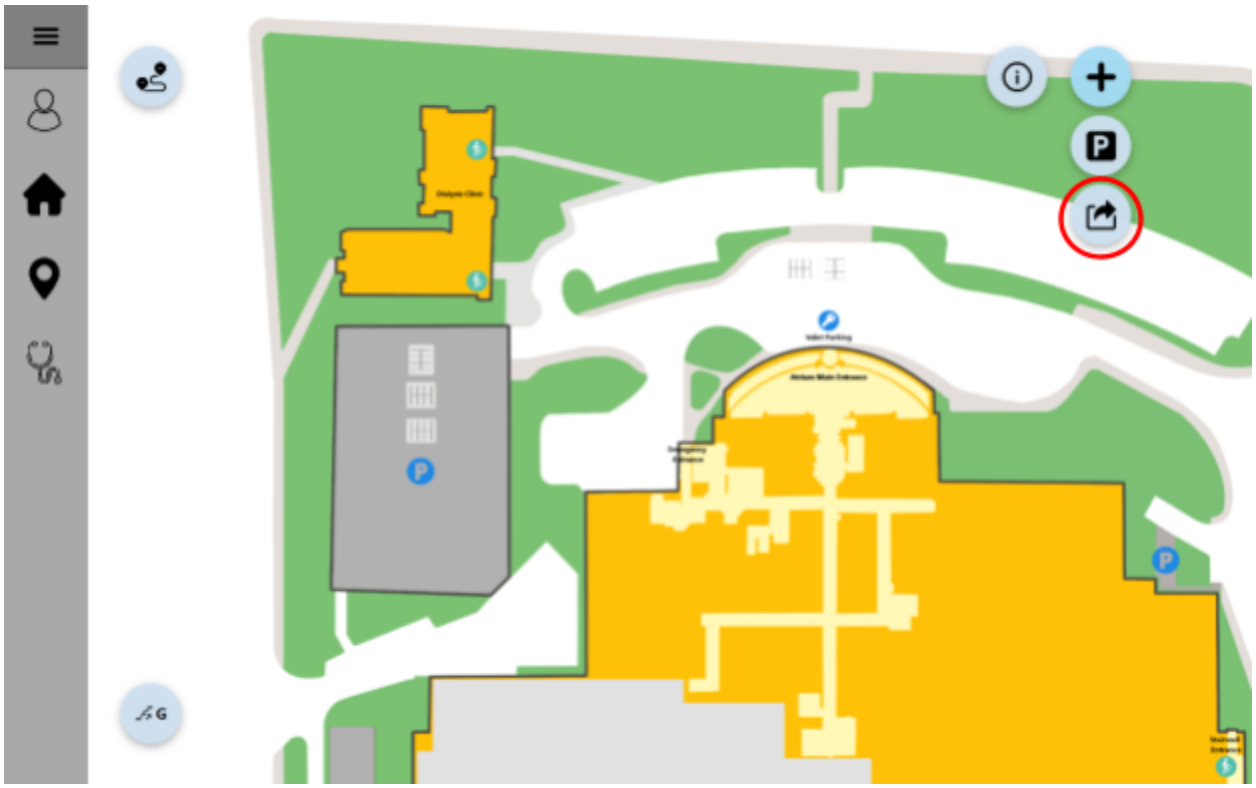
6.2.4 Text Directions

Similarly to the text directions on the Google navigation page, the patient can select the "Text Directions" button which would open a new page that would display a detailed list of directions from the starting location to the destination.

7. Special Features

7.1 Sharing Functionality

One of our special features is the ability to share your path in many different ways, accommodating all users and allowing you to have your directions wherever you go, or even send them to your friends. After you have found a path that works for you, simply click on the share button in the top right menu and it will send you to the share page.



7.1.1 Email

If you wish to have an image file of your path sent to your email you can simply input your email where prompted and then click the email me button. In a matter of seconds you should have the floors you must walk on and the directions through them sent to your inbox.

7.1.2 Text

Not dissimilar to the emailing option, simply write in your cellphone number to have the images texted to you promptly, so you can have your directions on the go.

7.1.3 QR

Perhaps the simplest option, just scan this QR code with a smartphone camera and be sent right to a page made for you with the full path laid out before you.

7.2 Temperature Checking Robot

When first opening the application, a user will first see the sign in page for both patients and employees to access their accounts. In the bottom left corner of the screen, any user can click on the middle icon depicting a thermometer to access the temperature sensing robot for the hospital as seen in figure 7.2.1. This feature of the application would be only available to users at the hospital that are using a computer at the information kiosk.

In figure 7.2.0, the robot used for this application is modeled by the circuit diagram with (1) as the arduino uno board, (2) as the speaker, (3) as the LED display, (4) as the motion sensor, and (5) as the temperature sensor.

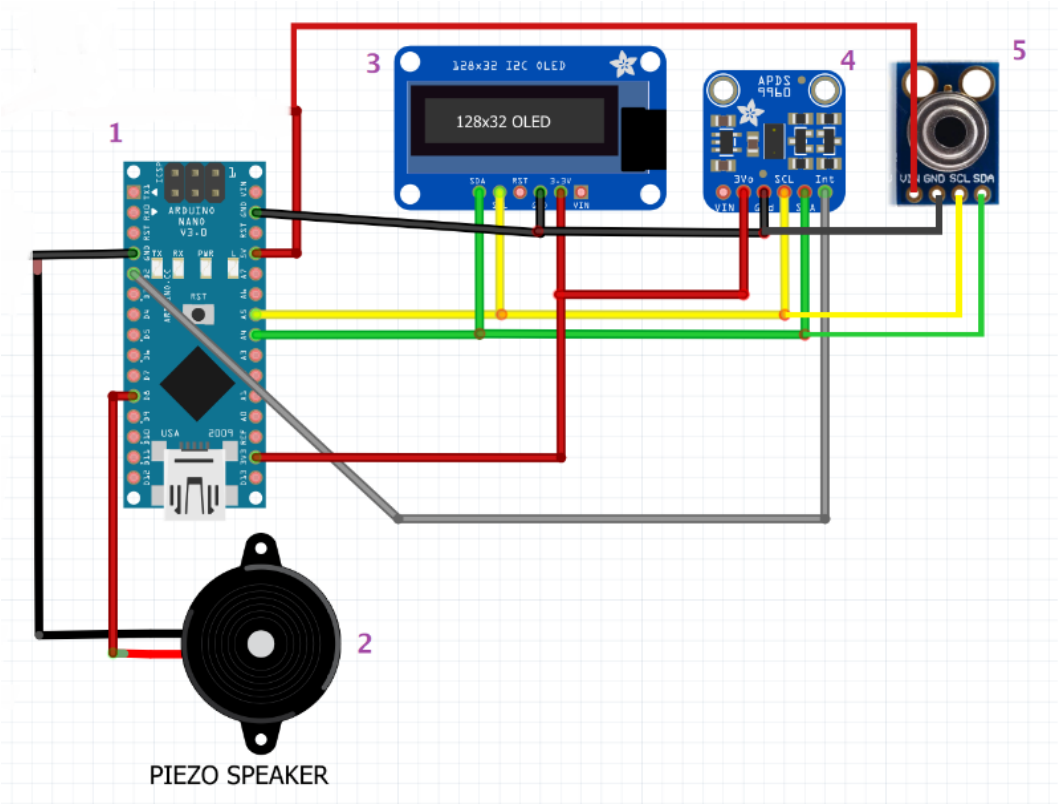


Figure 2.7.0: Robot wiring diagram.

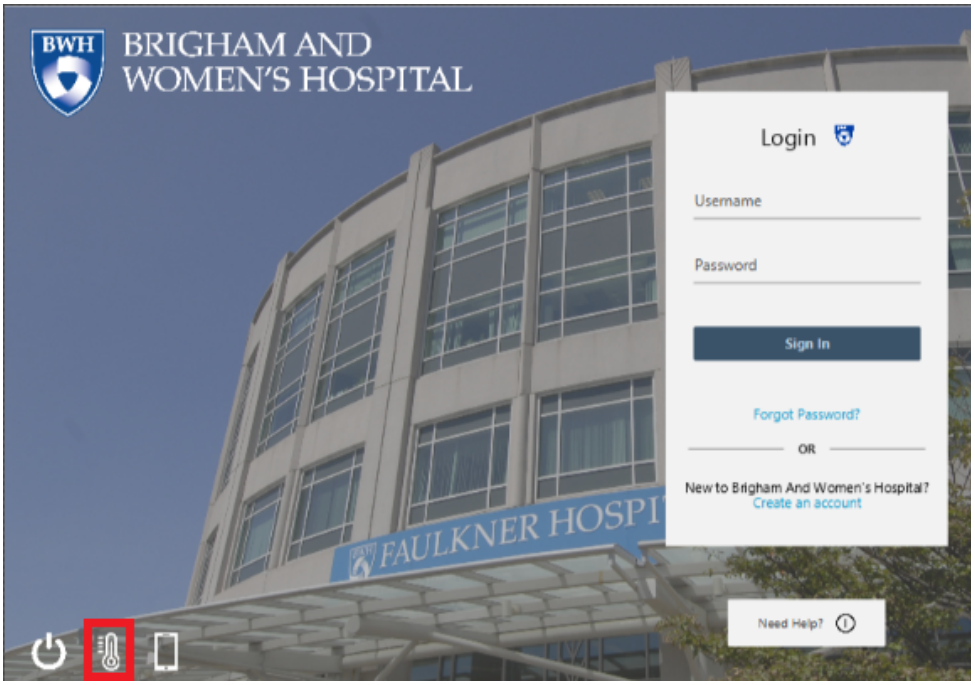


Figure 7.2.1: Login screen with the temperature checker button highlighted by the red box in the bottom left.

Once the user clicks on the thermometer icon, he/she will be brought to the B&W Temperature Checking screen and will be prompted to fill out a Covid-19 survey shown in figure 7.2.2. To successfully move onto the robot scanning the user, the user must provide the correct answers and permit the application to scan them. The user can click on a back button in the lower left corner to return to the login screen or click on the submit button to be cleared for the temperature sensor.

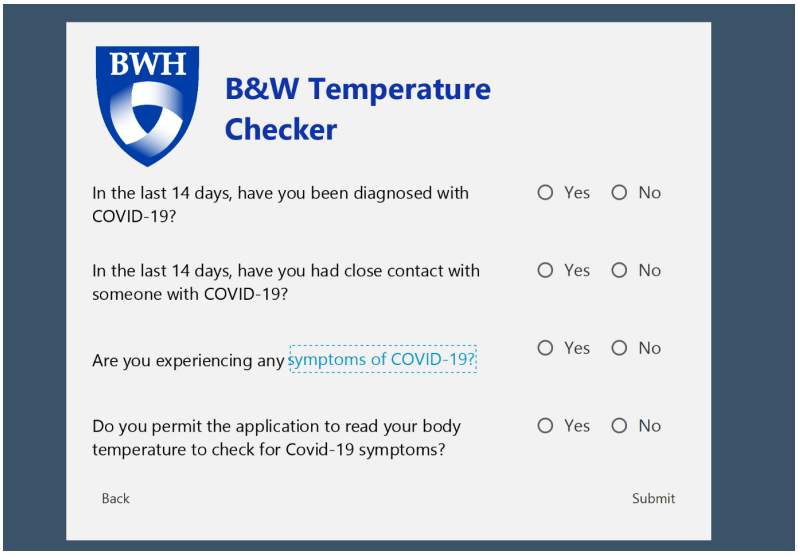


Figure 7.2.2: Screen displaying an empty temperature checker survey.

Once the user clicks on the correct answers to the survey, clicking on the submit button will record their temperature. Ideally, the sensor would be placed on top of the screen in order to scan the forehead.

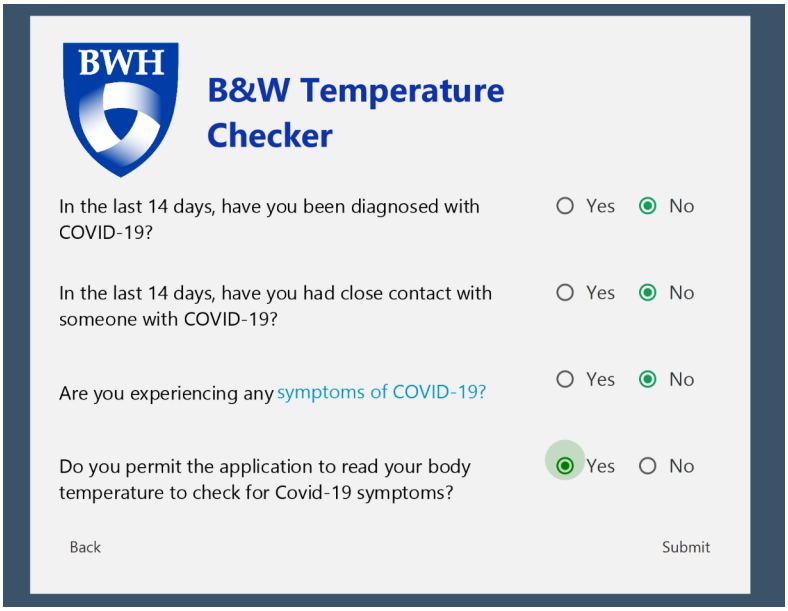


Figure 7.2.3: A completed temperature checker survey

If the user enters answers implying a risk of spreading Covid-19, the user will be faced with a pop-up message detailing the risk of spreading the virus and will be asked to leave the hospital. The Covid-19 risk warning is shown in figure 7.2.4. If the user missed one of the fields when submitting the survey, the application will notify the user that a field is missing and allow them to go back to the survey via a close button. The missing field popup is shown in figure 7.2.5.

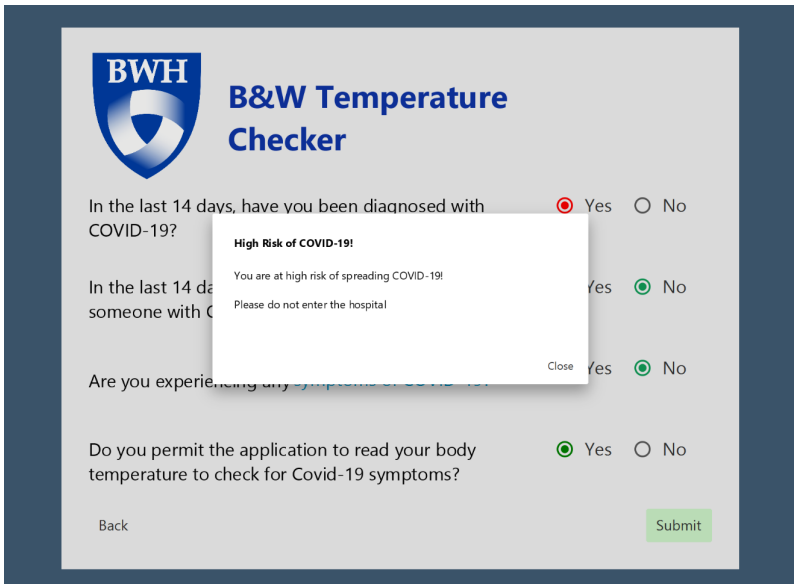


Figure 7.2.4: Popup warning for answers indicative of a potential Covid-19 patient.

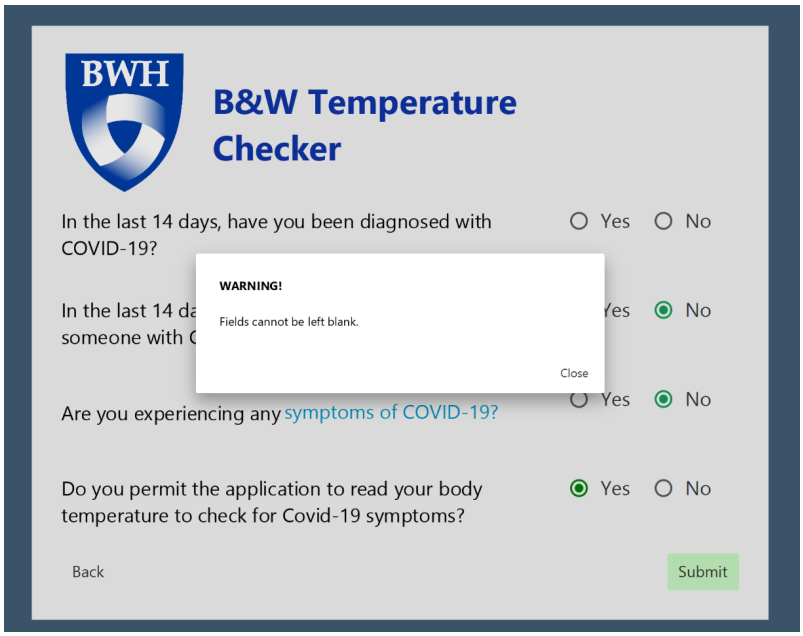


Figure 7.2.5: Popup warning for missing fields.

If the user was not standing directly in front of the sensor, the sensor will be unable to register any temperature and will display a “Not Detected” message to the LED display connected to the robot. Also, the application window will prompt the user to retry the sensor by aligning themselves with the sensor and to click the retry button. The button will cause the robot to scan for the temperature and begin sending data to the computer.

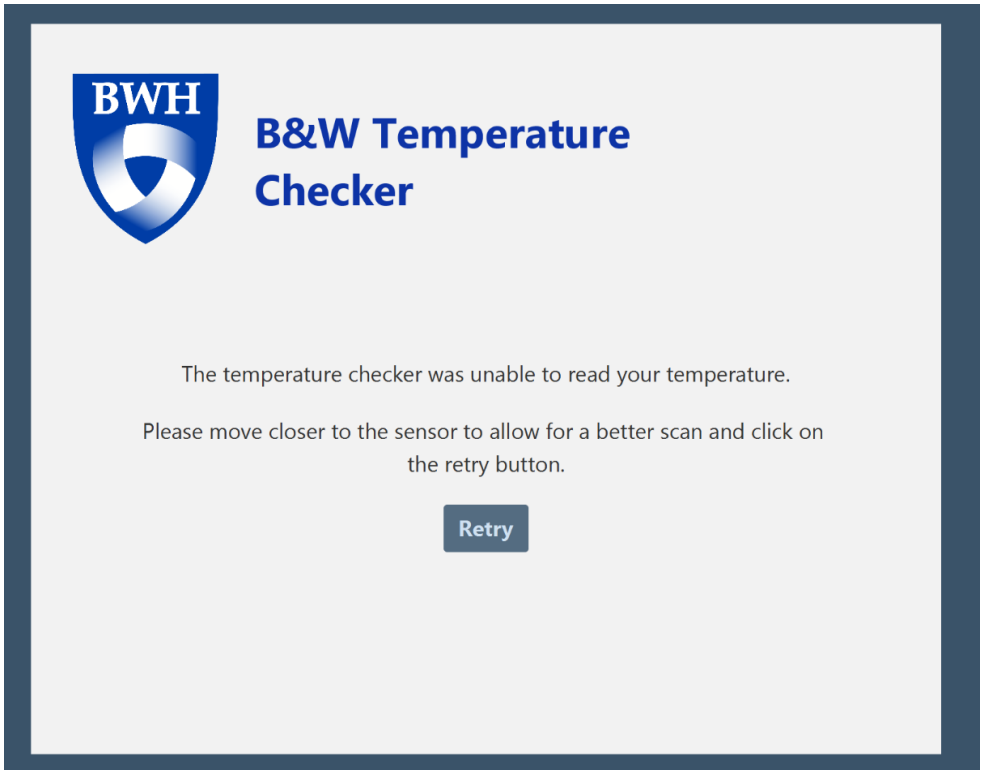


Figure 7.2.6: Screen displayed when the robot is unable to register something in front of the temperature sensor.

If the temperature sensor reads a body temperature below 102 degrees Fahrenheit. The LED display will show the temperature. The application window would then show the user that he/she is free to remain in the building and continue. Clicking on the continue button will send the user back to the login screen.

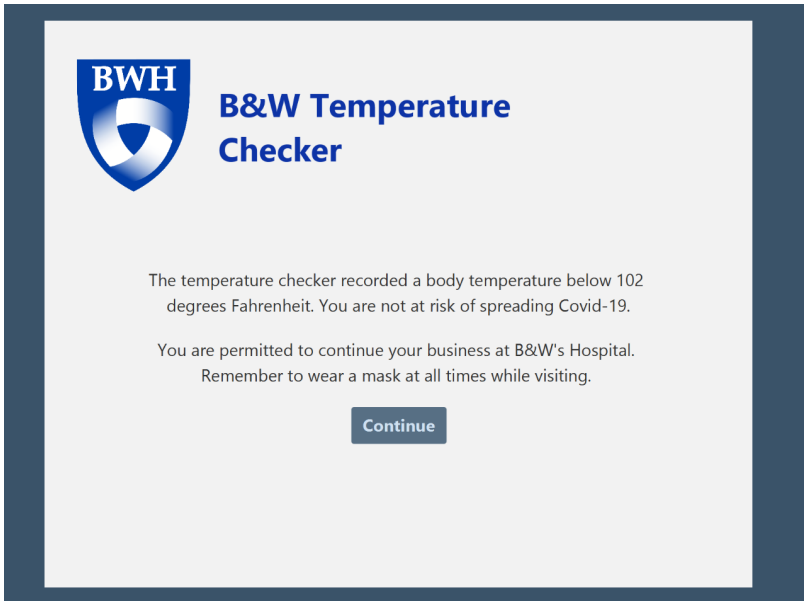


Figure 7.2.7: Screen displayed when the robot detects a temperature not indicative of Covid-19.

If the temperature sensing robot detects a temperature higher than 102 degrees Fahrenheit, the buzzer on the robot will make a high-pitched beeping noise and the LED display will flash with the temperature displayed. The application will notify the user of their high temperature and prompt the user to let the staff of the hospital of their conditions and fill out the Covid-19 survey to update their account. Clicking the continue button will send the user back to the login screen.

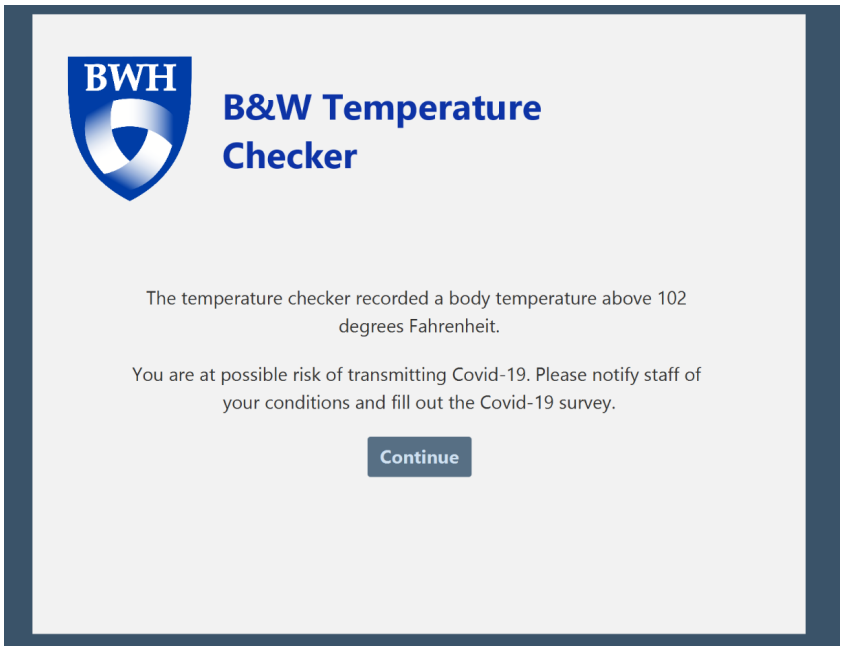


Figure 2.7.8: Screen displayed when the robot detects a high temperature.