CONNECTING AT-HOME NURSES WITH PATIENTS ONLINE

A Technical Paper submitted to the Department of Computer Science
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Computer Science

By
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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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PROBLEM INTRODUCTION

According to the American Association of Retired Persons (AARP), approximately 34.2 million Americans have provided unpaid care to an adult age 50 or older in the prior 12 months. About 6 in 10 caregivers assist with medical/nursing tasks, including injections, tube feeds and catheter care and only 14 percent of these caregivers report having received some preparation or training. Additionally, two in five caregivers consider their situation to be emotionally stressful and the percent is higher (45%) for those caring for a close relative (American Association of Retired Persons, 2015).

Today, over 65% of Americans who need long term care choose to hire in-home assistance instead of other care alternatives (U.S. Department of Health & Human Services Administration on Aging, 2019). However, even with this large demand, there is no existing system that makes hiring these nurses affordable and efficient. To find these medical professionals, patients and caregivers rely on either word of mouth or existing agencies. While word of mouth is unreliable and limited, the agencies charge an additional fee of 15%-30% on top of the nurse's rate (National Nurses in Business Association, 2019). The current agency system also requires a middleman to match patients and nurses, which further increases both fees and time. Additionally, these agencies do not allow patients to browse available nurses and directly contact them to instantly inquire about rates and availability, which could be problematic if a patient needs assistance unexpectedly due to a sudden illness or injury. Essentially, if a patient only needs one-time nurse care for some number of hours, it may not be worth the effort of going through an agency. Thus, overall, the high cost and long turnaround time associated with current nurse agencies provides a gap in the market that we hope to fill.

SOLUTION

We have created a web application, NurseLink, to connect registered nurses with a variety of qualifications to those needing an at-home nurse service. Our site has similar functionalities to care.com which connects babysitters, nannies, etc. to families, but our website specifically connects registered nurses and patients. Our site incorporates Google Authentication for sign up and log in, then requires the user to register as either a patient or a nurse before proceeding further, as shown in Figure 1 below.

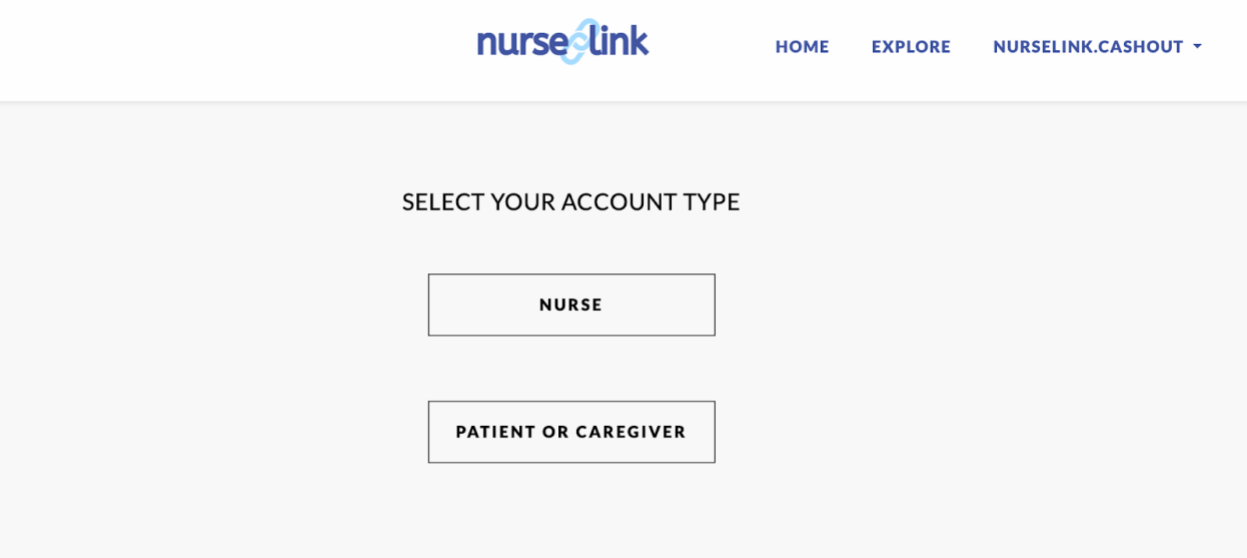

Figure 1*: Setting Up a User's Account After Sign Up with Gmail*

The resulting site functionalities and profile page information required differ for patients and nurses, as shown in Figures 2-5 below.

***Figure 2**: Navigation Options for a Nurse*

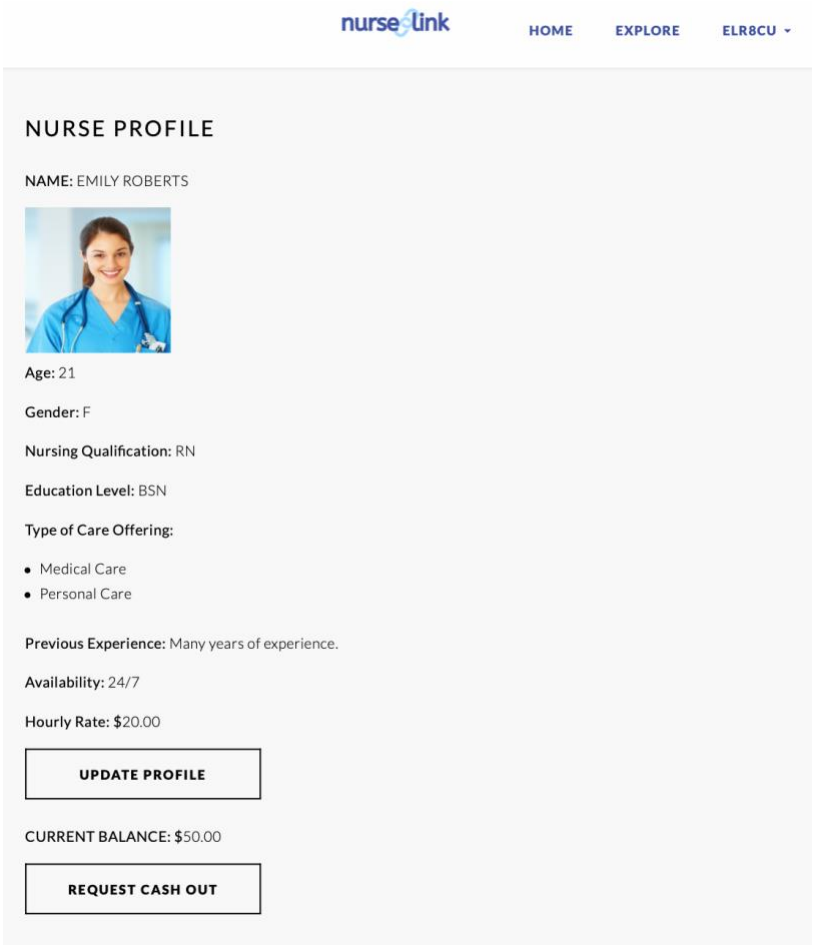

***Figure 3**: Example Nurse Profile*

***Figure 4**: Navigation Options for a Patient*

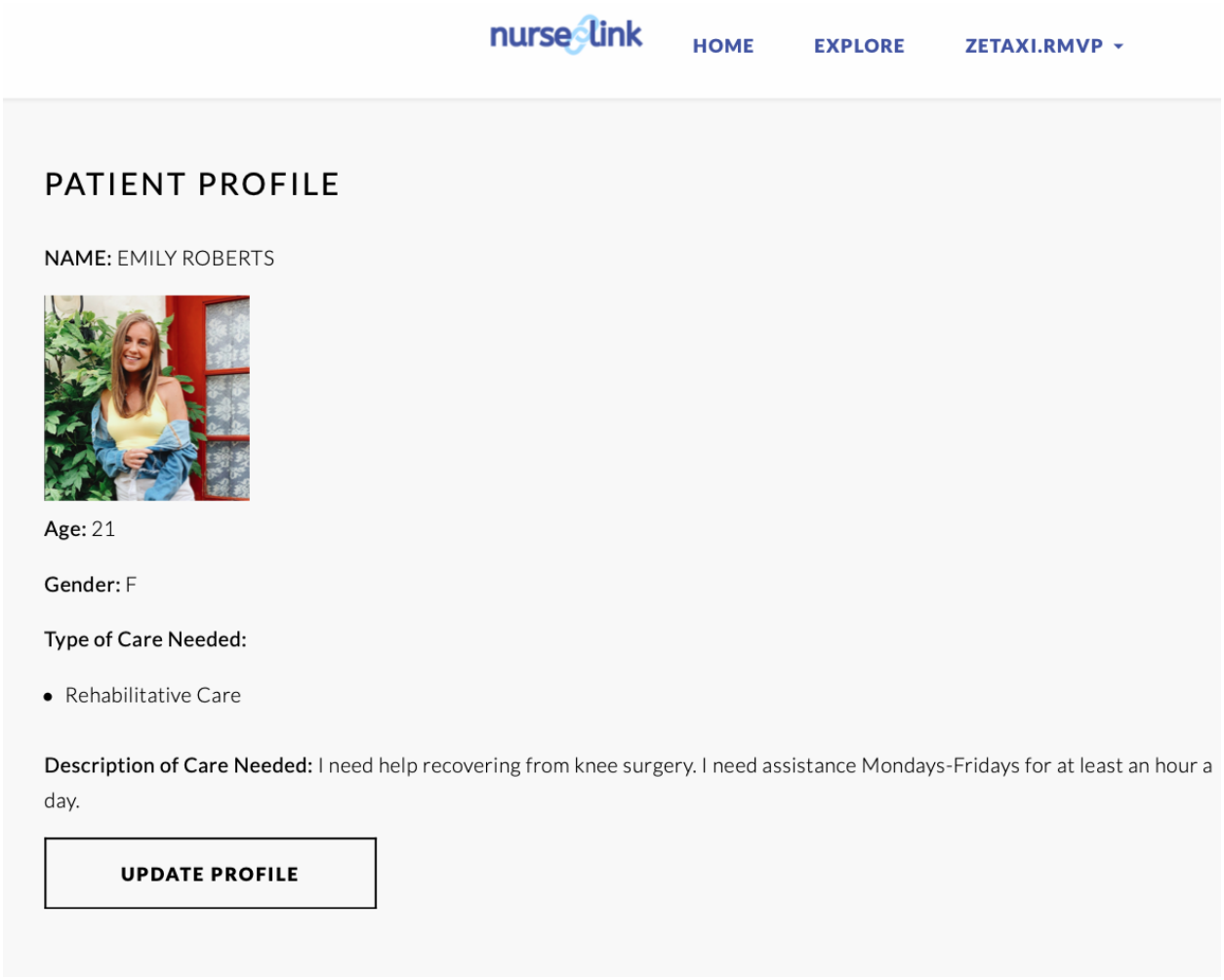

***Figure 5**: Example Patient Profile*

The individual requesting nursing care has the ability to use the Explore page to view and search for nurses based on zip code location and the specific type of care that they need, as shown in Figure 6 below.

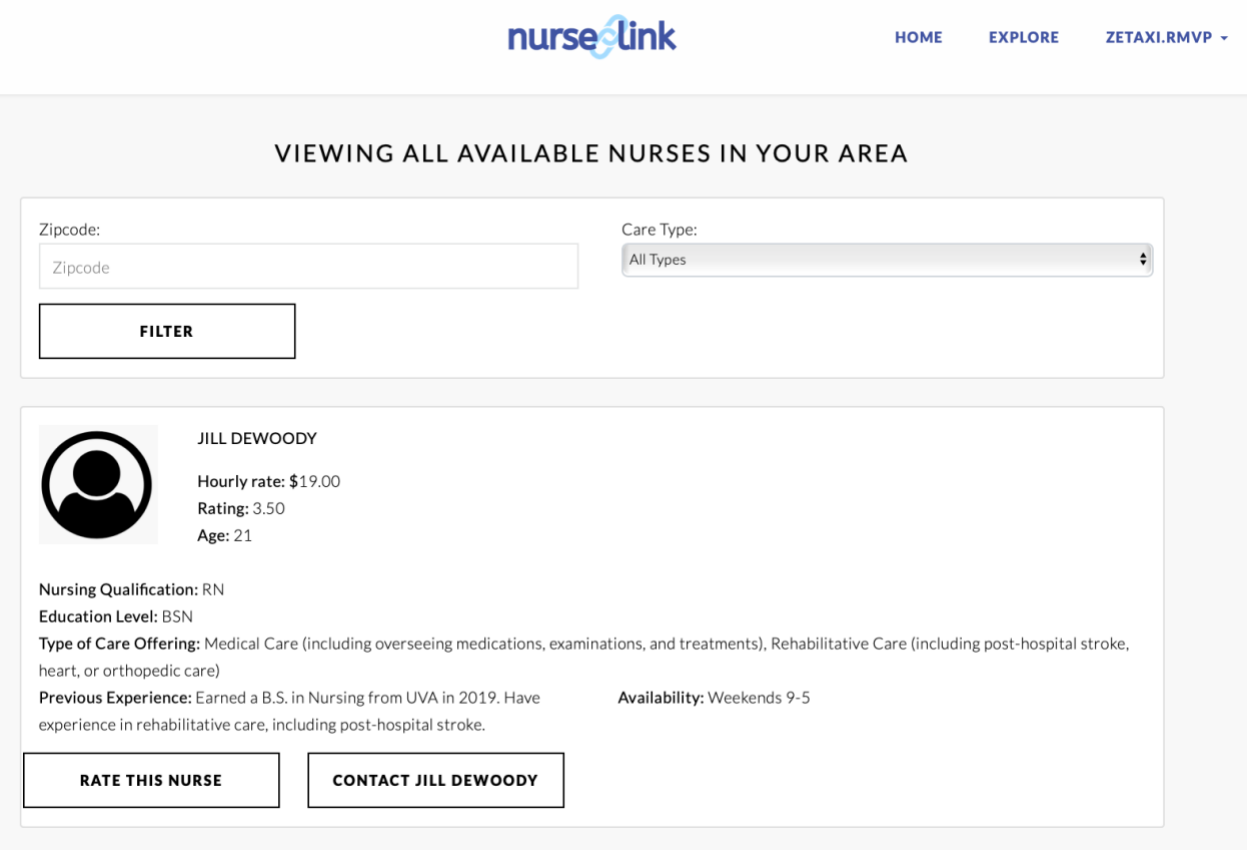

***Figure 6**: Explore Page for Patients to View Nurses*

Using the Explore page, this individual can also email a nurse directly by clicking the 'Contact' button or rate a nurse using the 'Rate This Nurse' button. The 'Contact' button is a mail-to link, while the 'Rate' button links to the Rating page, shown in Figure 7, where the patient can rate the nurse on a scale of 1-5. Once the patient clicks submit, they are redirected back to the Explore page and the nurse's existing rating is averaged with the submitted value.

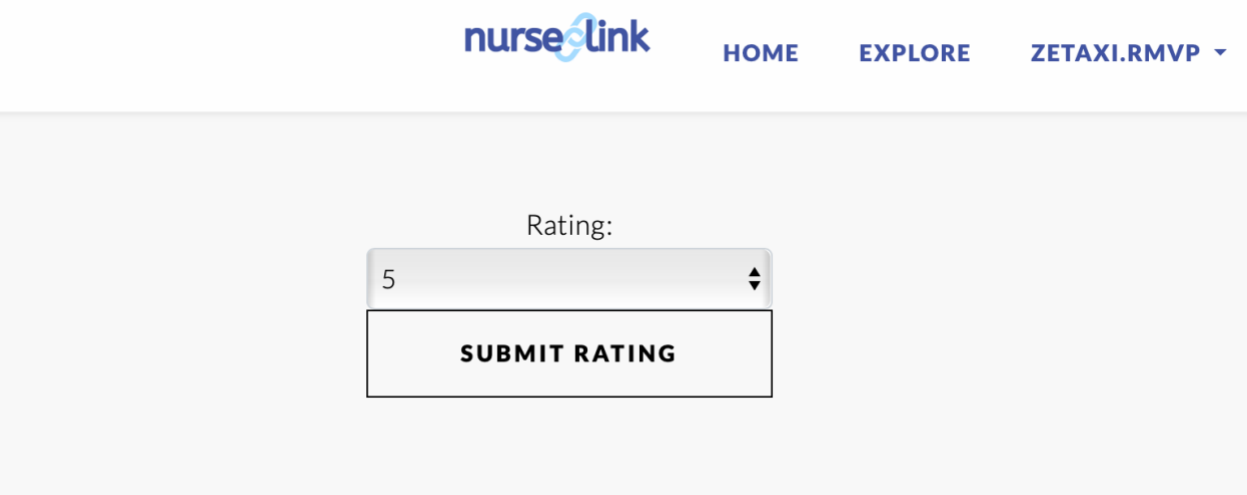

***Figure 7**: Rating Page Where a Patient Can Rate a Particular Nurse*

Meanwhile, a nurse can also use their Explore page to view available patients and search for patients based on zip code location and the specific type of care requested, as shown in Figure 8 below.

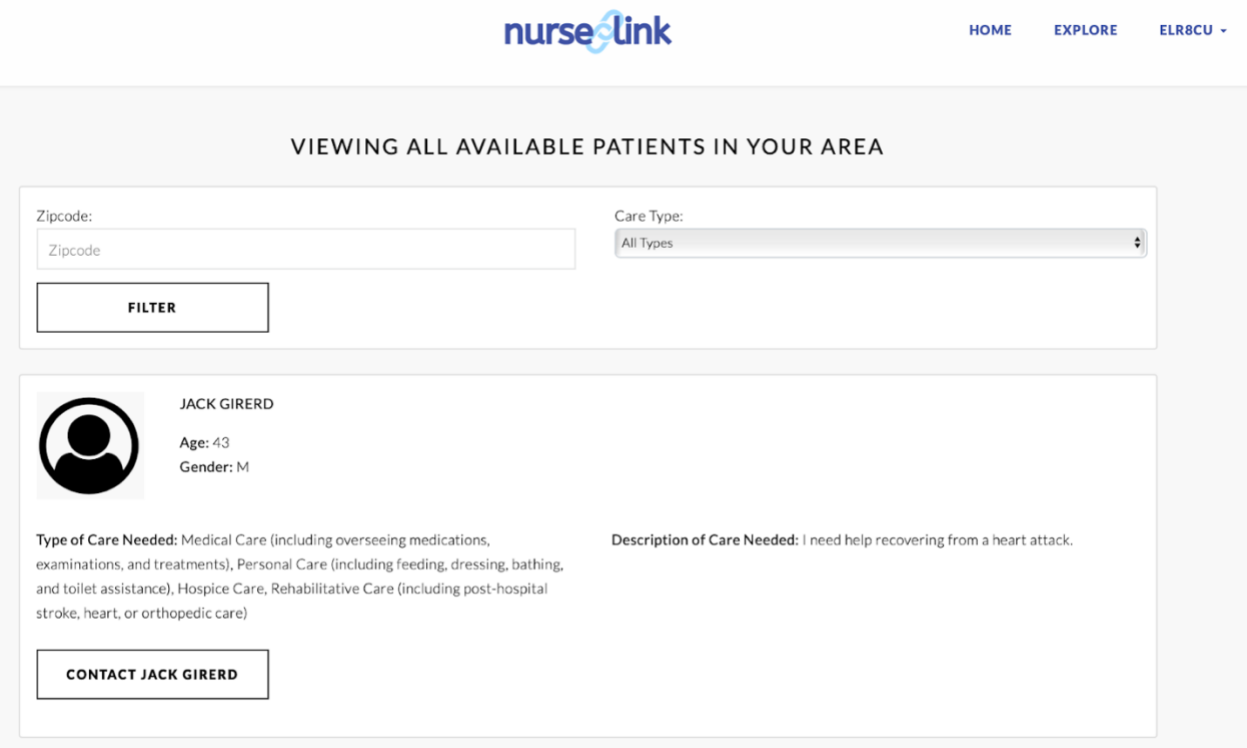

***Figure 8**: Explore Page for Nurses to View Patients*

On this page, the nurse can similarly use the ‘Contact’ button to send an email to the patient inquiring about more information or offering their services.

The payment system works as follows: when a patient and nurse agree upon a service, the nurse sends the patient an invoice using the Send Invoice tab, as shown in Figure 9 below.

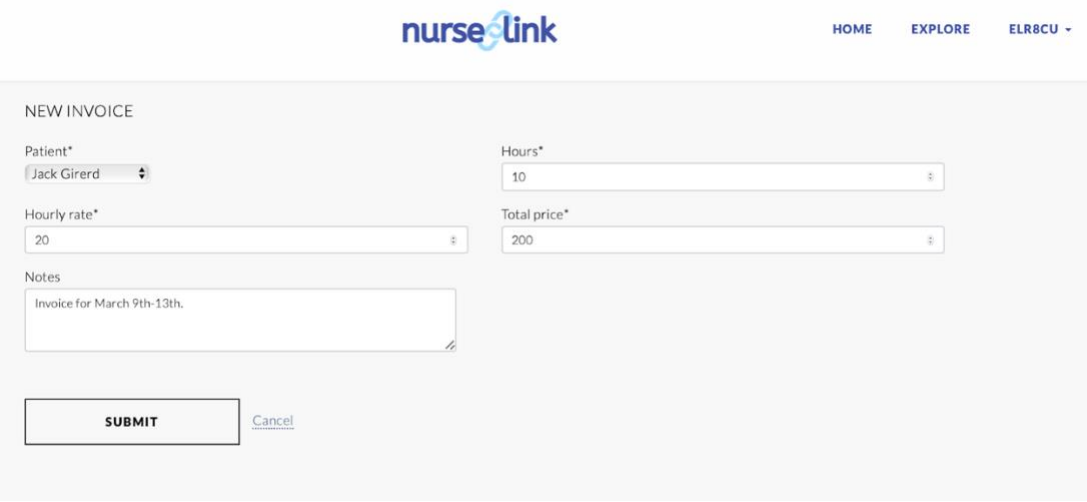

Figure 9*: Send Invoice Page*

The invoice will then appear on the nurse’s ‘Pending Requests’ page, as shown in Figure 10.

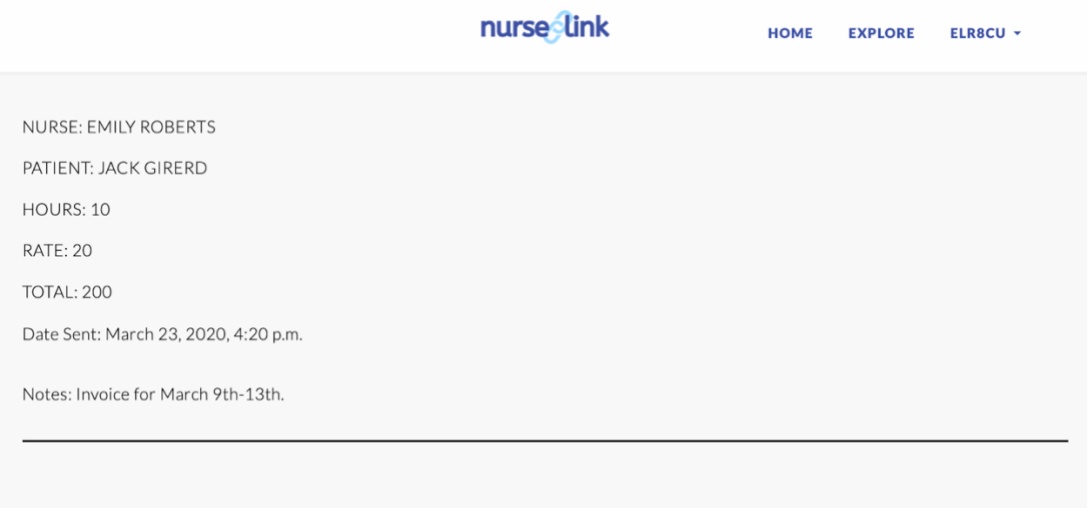

Figure 10*: Example of Pending Request on a Nurse’s Pending Requests Page*

The patient will also see the pending request on their Pending Requests Page, as shown in Figure 11 below.

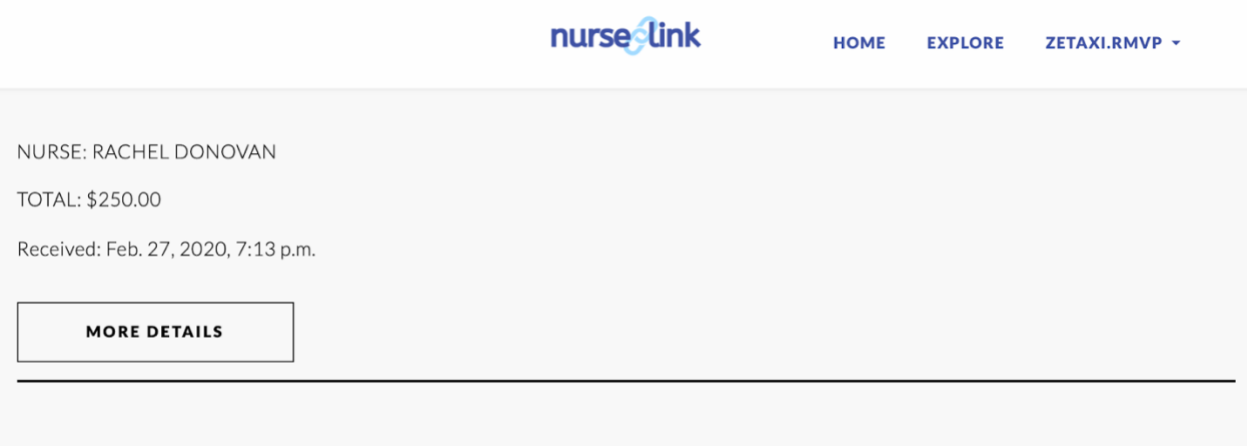

Figure 11: *Example of a Pending Request on the Patient's Requests Page*

The patient can then click 'More Details' to see the note on the invoice and pay NurseLink directly for the amount in the invoice by using PayPal, as shown in Figure 12.

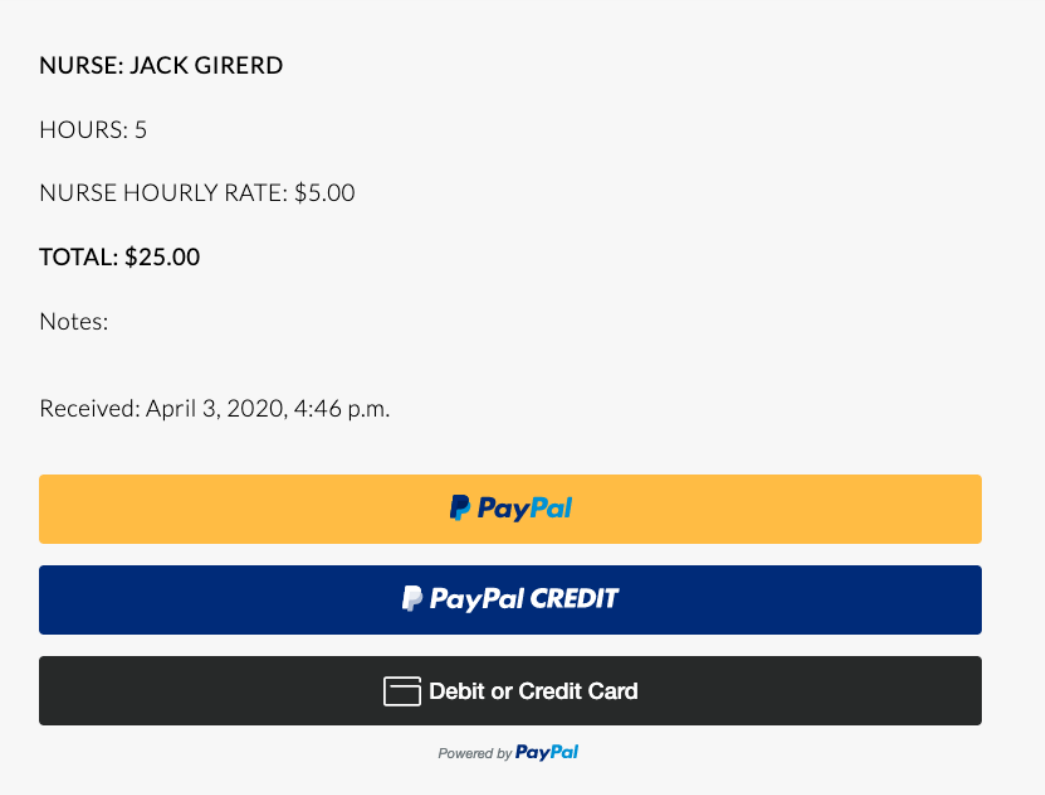

Figure 12*: Example of Patient Paying for Invoice*

Once the patient has paid the company, our site automatically removes the invoice from both the patient's and the nurse's 'Pending Requests' page and updates the nurse's balance accordingly. Then, the nurse can request a cashout by clicking the 'Cashout' button on their profile page, as shown in Figure 3 above, which sends NurseLink a pre-populated email. We can then verify the request and move the money to the nurse's PayPal account, resetting their balance.

DEVELOPMENT PROCESS

Our team used a scrum methodology for organizing the development of our web application, consisting of two-week development sprints followed by a sprint review and demonstration of a deliverable. At the beginning of the project, we defined requirements for our application based on key functionalities the application should provide. At the beginning of each sprint, 2-3 of these requirements were selected to be completed in the following two weeks.

For our full-stack, we employed the Django Python framework, MySQL, HTML, CSS, and Bootstrap. We used Git and Github to collaborate effectively on our code base. Finally, we deployed our application and database to the cloud platform Heroku. In the spirit of scrum, we deployed a finished deliverable to Heroku at the end of each sprint.

LIMITATIONS AND TESTING

At the end of our last development sprint, we began the process of beta testing our completed prototype. We noted at the beginning of this project that a potential limitation was our inability to perform rigorous beta testing given a lack of time and resources. Given this limitation, our beta testing was performed on nine university students. We created two testing scripts. The first was the role of a nurse on our site where we would take the user through the

steps of creating a nurse account, contacting a patient, sending a request for payment and redeeming their current balance. The second was the role of a patient on our site where we would take the user through the steps of creating a user account, exploring available nurses in their area, contacting nurses, and paying for services. As the user performed each step of the task, we took notes of where confusion or mistakes arose.

From our beta testing, we were able to identify changes to make to our initial prototype. For example, we noticed that the majority of our users had confusion when trying to rate a nurse. This was due to misleading titling of some of our functionalities in our menu bar, which we fixed in response. Users also expressed dislike for the appearance of our rating input and requested that the default input be a five rather than a one. Overall, the insight of our beta testers was invaluable to noticing areas of final improvements for our application.

CONCLUSION

This project has given us the opportunity to take part in the entire development lifecycle of an e-commerce website from start to finish, and we ultimately solved our desired problem by connecting patients to nurses with ease on a user-friendly site. Our solution is valuable because it improves the efficiency of hiring medical professionals, reduces the overall cost, and provides patients with a greater selection of medical professionals from which to hire.

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