

## **Frontend Internship Experience: UI Interfaces and Functionality**

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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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## ABSTRACT

In summer 2021, I interned as a frontend software engineer for a technology company called Thumbtack to gain more familiarity with software engineering in the workplace and to increase the contact between professionals and customers.

The projects I worked on spanned multiple areas of the web app's UI. The first involved the filters sidebar next to the search results list, which saw the intended increase in filter engagement in the test phase but overall was not a successful project. Another project involved the profile pictures of professionals' service pages, which had a neutral effect on performance metrics, making it slightly more successful than the first project. The third project, which involved the home page of the web app, and allowed customers to continue previous contact request forms (sent to see if there was availability to complete a task) with professionals. This project was completed but not deployed to production during the time of my internship. Finally, a side project introducing and documenting a new component on the web app was completed, with a goal of providing more structure and organization to the app.

## 1 INTRODUCTION

Many upper-class university students find it beneficial to spend the summer break pursuing their area of study taking summer classes. Alternatively, students may wish to gain experience in a setting other than academia by volunteering, completing personal projects, or pursuing internships.

Thumbtack is an online services company that matches customers with local professionals to complete a service that the customer needs. My internship was with a team called Customer Experience: Find (CX-Find). The team's goal was to improve the matching process to make it a smoother experience for customers. In particular, the internship focused on the frontend side of the codebase and the projects involved building new UI with special functionality on the web app. By improving the UI and adding special

functionality, I hoped to improve customer interaction and contact rate with professionals.

## 2 RELATED WORKS

I had experience with frontend software engineering prior to the internship through designing a small, personal web app as a hobby. Many online resources were used to gain familiarity with frontend-based software engineering. To set up the app online with a URL, I followed a web app tutorial written by the makers of Django (a web app hosting service) [1]. To style the frontend UI of the app, I used multiple CSS (an HTML coding language) styling guides written by W3Schools [2].

While the Django tutorial was not used during the internship (because Thumbtack hosts their app through a different service), it helped to gain a general understanding of how all apps are structured on the internet. The CSS styling guides by W3Schools, however, were revisited multiple times over the course of the internship while designing the UI improvements. Finally, Thumbprint [3], which is Thumbtack's documentation of their copyrighted logos and components, served as a helpful resource during the internship, since it gave information about when I should use certain UI design tools over others.

## 3 PROJECT DESIGN

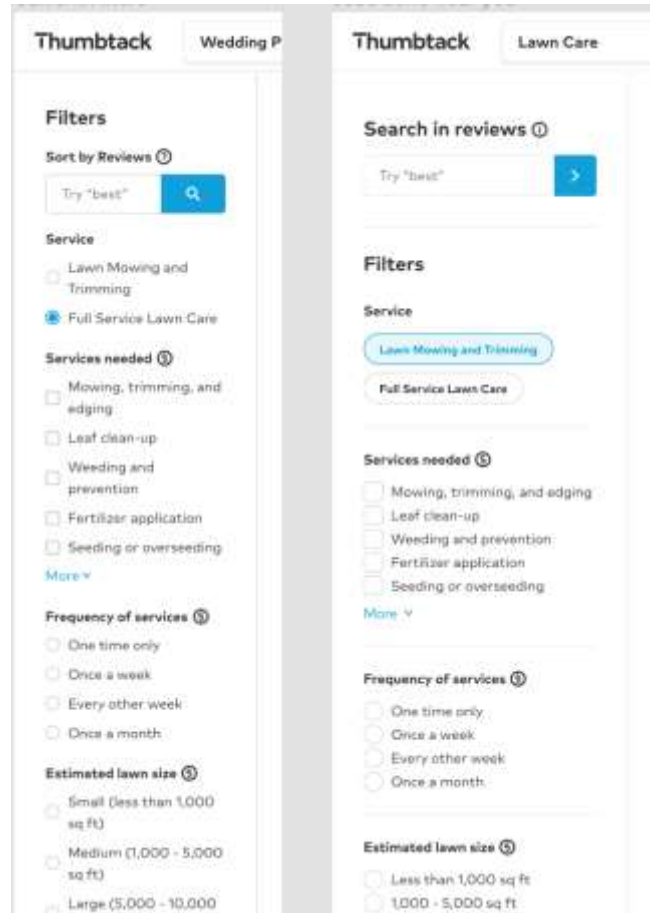
All web apps are comprised of a backend (the server/database side) and a frontend (the customer interaction side). Because CX-Find placed heavy emphasis on the experience of the customers, the projects were focused on frontend related functionalities.

### 3.1 Technical Details

The first few weeks of the internship were intended as onboarding and involved fixing bugs in both the backend (written in Go) and frontend (written in React). This was mainly to gain exposure to the codebase and also learn the Go language and React library, as that was not something taught in university classes.

After the onboarding process, the main internship projects began. They involved creating new components and adding new features to improve the look/feel/design of the apps that the customers used. Primarily, the projects were on the desktop web app, but some projects were cross-platform and applied to the native apps (iOS and Android). Over the course of the 12-week internship, three projects and a side project were completed. The technologies used in all the projects were React (using TypeScript and JavaScript), PHP/Go (for the backend server), and GraphQL, a query language for the client to communicate with the backend. To design new components in the frontend, technologies like StorybookJS (a component design tool) and StubQL (a mock GraphQL query library) were utilized.

The first project was to improve the UI of the filters sidebar that appears alongside the list of professionals after a customer's search for a particular category. Although this project didn't introduce any new functionality, the UI design of the filters was dramatically changed. Radio buttons and checkbox buttons were made bigger, and their shading/border thickness was reduced. One of the radio button filter options was also changed to use chips, which are oval-shaped buttons, instead of the original radio buttons. The overall spacing and size of the filter's sidebar was also modified. The filters were made to be 50% wider and the padding between filter questions was increased by 4 px. Divider lines were introduced between filter questions to allow customers to more easily distinguish filter questions (and selected filter answers) from each other. Finally, the placement and ordering of the different filter questions were rearranged and the filters text search bar was moved to the very top of the filters, as shown in Figure 1.

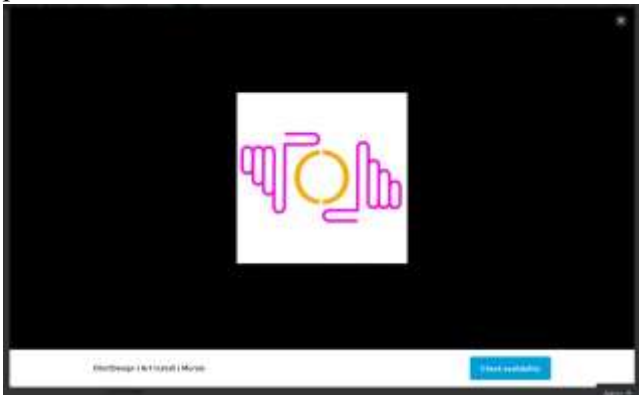


**Figure 1: Original Filters Sidebar vs Improved Filters Sidebar**

The second project shifted from the professional list area of the web app to the individual professional service pages. Users are able to select an individual profile from the list of professionals after a search and navigate to a professional's service page, which gives details about the professional (such as reviews, description, details, etc.) and gives users the option of submitting a project to see if that professional can do the job.

Professionals often upload profile pictures of themselves or their service logo, and this image is rendered and displayed on the service page. However, these images were not interactable. Profile pictures often give customers a unique impression that sets professionals apart from others, so being able to interact with the profile picture would potentially increase contact between professionals and customers, ultimately leading to more revenue.

Therefore, the goal of this project was to make the profile photos in service pages clickable. New functionality was added to the codebase that would render a gallery viewer when the profile picture was clicked on the web app. This gallery viewer displayed a large picture of the profile photo allowing customers to inspect the picture more easily. As shown in Figure 2, below the picture was a footer section that displayed the name of the professional's service and a button that would directly start the request flow to contact the professional.



**Figure 2: Gallery Viewer Example**

The third and final major project done during the internship was allowing customers to pick up where they last left off in contacting a pro. On the service page, when customers choose to send their project to a professional, there is a set of questions that the customer must answer in order to help the professional determine whether they are a fit for the job or not.

The process of filling out these questions before making contact with the professional is called the request flow. Prior to this project, the request flow had to be completed in one session in order for the customer's task to be sent to the pro. Customers who cancelled the request flow, or couldn't complete the request flow in one sitting for any reason, would have to find the professional again at a different session and restart the request flow process. In order to improve the contact rate of customers and professionals, this last project introduced a new section in the home page for customers to pick up where they last left off in the request flow for a particular professional. The customers' answers/progress in the request flow would

be saved in the backend during a session. Then, the next time a customer logged onto the homepage, the frontend client performed a query to see if there were any incomplete request flows. If so, the homepage would display a new section that prompted the customer to continue where they left off in the request flow and ultimately send their task to the professional.

In order to implement this new section in the homepage, a new component was created. This component was called a 'card' component, a small rectangle that displayed the service category and the professional's name, profile picture, and average ratings, as shown in Figure 3. The top of this new card component also displayed the completion percentage of the customer's request flow as a blue bar.



**Figure 3: In-Progress Request Flow Card Component**

The card component was rendered such that clicking the component would direct the web app to the professional's service page. In this special redirect, a customer could press the button to contact the pro, and this time the answers that the customer filled out in the prior session would be pre-filled. There was also a button on the card component to cancel/close the in-progress request flow. This would discard the customer's progress with that professional and not show that request flow again.

While working on these three major projects, I also completed a side project to add a new entry to Thumbprint. By keeping orderly and concise documentation of Thumbtack's coding styles and components, engineers are able to uphold component reusability, understandability, and general conventions and best practices. While I was working on the first project (filter UI improvements), perusing through the Thumbprint documentation revealed that some components that existed in the codebase were not documented at all in Thumbprint. An example of this was the filter chip (Figure 4), a variation of the previously mentioned chip that is used to filter multiple



Figure 4: Thumbtack

options.  
Filter Chip

The filter chip was only documented on Thumbprint for the iOS and Android applications, but not for the desktop app. Through working with the design team, documentation for the filter chip for the web app was introduced and added as an entry to Thumbprint by the end of the internship. This side project was a good way to learn about why documentation exists and also the testing technologies used to test new components, such as Jest, React Testing Library, and Enzyme. Hopefully, this new addition to Thumbprint will have a lasting positive impact with the engineers at Thumbtack.

### 3.2 Non-Technical Details

As a first internship, Thumbtack did a very satisfactory job of introducing not just the technologies used in real-work settings, but also was a meaningful introduction to how companies are set up and how they operate. The company held many educational events that introduced the interns to the different disciplines in the company: ranging from tech talks from the engineers, fiscal lectures explaining equity, design sessions from product designers/managers, and even to progressive LGBTQ panels (during the month of June, pride month). For the interns specifically, Thumbtack also hosted ‘new grad’ talks, which introduced interview preparation and resume creation tips, and even hosted mock interview panels for the interns not just to practice both their technical and behavioral skills, but also receive feedback in real time, which is something that is difficult to come across in a real company interview.

## 4 RESULTS

The filters sidebar project was released to production and monitored for almost a month. Tracking data indicated that the goal of the project was indeed met: filter engagement increased among customers by 5%, meaning that customers noticed the new UI and were engaging with the filters. However, overall revenue and contact rate with professionals slightly decreased.

When the clickable profile photo project was released to production, tracking data was collected for about one week, and results indicated only minimal increases and decreases in the primary metrics monitored. Therefore, the results of this project were neutral/flat. The number of contacts and completed request flows didn’t increase, but they didn’t decrease either.

The third project with in-progress request flows was not able to be released to production during the internship. Although the component and functionality were completely implemented into the web app, the project was still being set up on the native side (by other engineers). I asked the team to keep in touch with the results of this project, so details about the project’s success with customers should be available later this year.

## 5 CONCLUSIONS

The results of the filters UI project were very interesting since increased overall engagement with the web app led to a decrease in revenue and contact rate. The data analysts on the team came to the conclusion that too much filter engagement may actually be a bottleneck for contact between customers and pros and gave customers the impression that there was no professional that could do their tasks. Therefore, the filters sidebar was reverted to its original design. The team is planning to revisit this project in the future, but there was insufficient time for that to happen during the course of the internship.

The team had a discussion for a few days deciding whether or not to leave the clickable profile photos project published on the app, since the metrics revealed no changes in engagement/revenue with the feature on. However, the decision for the project was to remove the feature from production and revisit the project at a

later date, with potentially other features (like the ability to zoom into the photo) added to the gallery viewer.

As the in-progress request flow experiment has not yet been released to production to collect tracking data, none of my completed projects were successful in staying published in Thumbtack's app.

However, Thumbtack was still able to collect valuable tracking data pertaining to customers' interactive habits with the app's UI. It was also a valuable experience for me to learn the process of frontend design and learn that it is just as important to understand customer interaction and have a product sense as it is to write programs and code well.

## 6 FUTURE WORK

Thumbtack still has the tracking data and my projects' code for the UI features, so future projects can refer to these results in order to learn what features have been successful with customers and what features customers did not favor. The CX-Find team is planning to release the in-progress request flow project to production soon, and will make a decision to keep the feature on the app once sufficient tracking data has been collected.

I have received and accepted an offer from Thumbtack to return to the company after graduation. I plan to return to the company with strengthened coding and design skills, so that if CX-Find were to revisit my old projects or start a similar project, I would be able to successfully improve customer interaction and metrics by designing a frontend feature that would be kept in the app.

## 7 COMPARISONS TO ACADEMIA

There are some aspects of university that helped prepare me for the challenges of the internship and other aspects of university that were not as helpful.

### 7.1 Helpful Aspects of Academia

Some courses in the computer science curriculum at the University of Virginia are very beneficial to take before starting an internship. One of those classes is

Advanced Software Development. This course is the most similar to a "real-life" work structure in terms of creating teams with members that take care of different aspects of app development. Learning how to work in these teams and connect all the different areas of the app together to form a cohesive website is vital to having a successful team experience in an internship. Another important class was Algorithms and Data Structures. It also helped prepare me for the internship, but for a different reason. Many technical interviews for software engineering internships include coding challenges that exercise the individual's knowledge of algorithms and data structures. It is crucial to be able to determine the correct data structure or algorithm technique to use in these challenges in order to pass the interviews and receive an internship offer.

### 7.2 Weaker Aspects of Academia

Many of the required courses in the curriculum were not actually used in the internship. The introductory courses to Python, Java, and C++ were good practice for learning a new language and the syntax of these languages, but the internship was written in TypeScript and JavaScript, which are not taught in courses at the University of Virginia. There is also another disconnect in that there is not much being taught about client/server-side relations in the courses-everything is in one mono-repo. Therefore, getting acclimated to Thumbtack's extremely large codebase was a challenge, since it was the first time I was exposed to different repositories that all had different roles in the app. In courses at academia, projects are often all in one folder/repository and rarely exceed 10+ files.

## REFERENCES

[1] Django Project. 2021. Writing your first Django app, part 1. Retrieved from <https://docs.djangoproject.com/en/3.2/intro/tutorial01/>.

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[3] Thumbprint. 2019. Design System. Retrieved from <https://thumbprint.design/>.