



Small Business Owners

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Team Members:

Landen Andra - Graphic Design, Contextual Inquiries, Technical Writing

Parker Cluff - Contextual Inquiries, Graphic Design, App Contents

James Lundgren - Graphics, Technical Writing, Design Layout

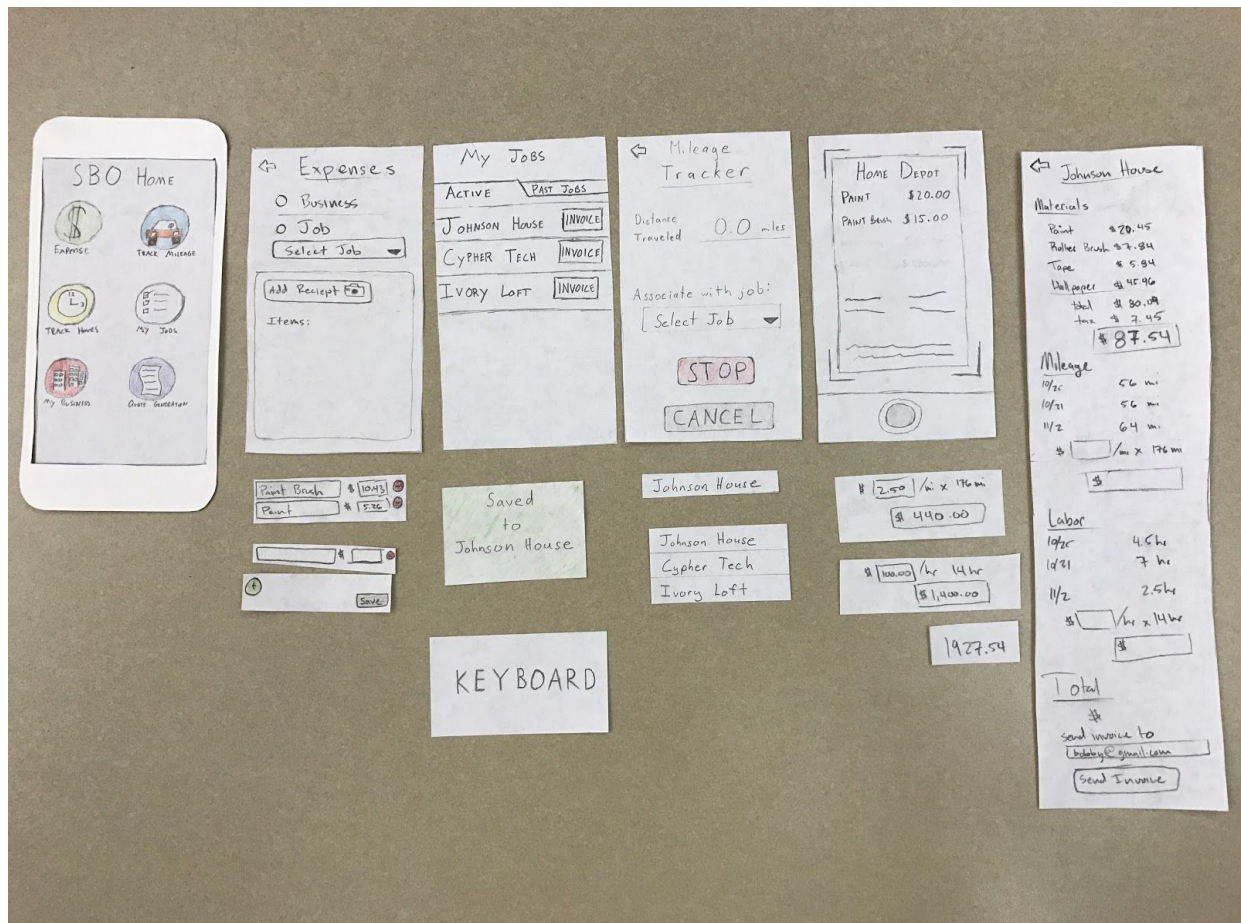
Ryan Welling - Contextual Inquiries, Storyboard, Design Proofing

Problem and Solution Overview

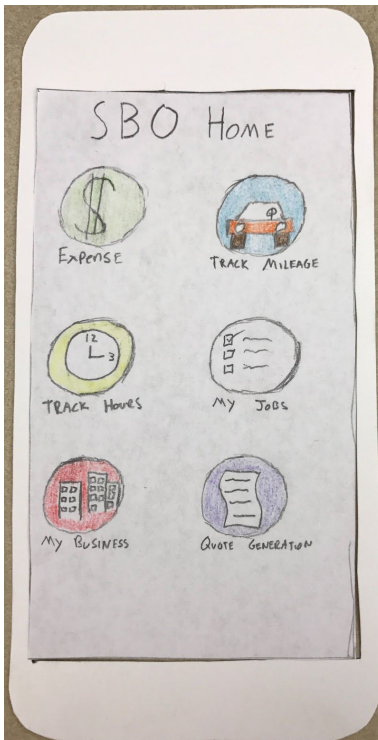
Small business owners (SBO) can have a hard time figuring out what the actual costs of business are, and therefore, what the final price point to the customer should be when accounting for multiple variables. They often do not have a way of keeping track of mileage, material expenses, time, desired profit margin, depreciation etc. in one place. If SBOs could keep track of these things in a single application, they could provide more accurate and consistent quotes to their customers as opposed to haphazardly guessing what they need to charge.

Initial Paper Prototype

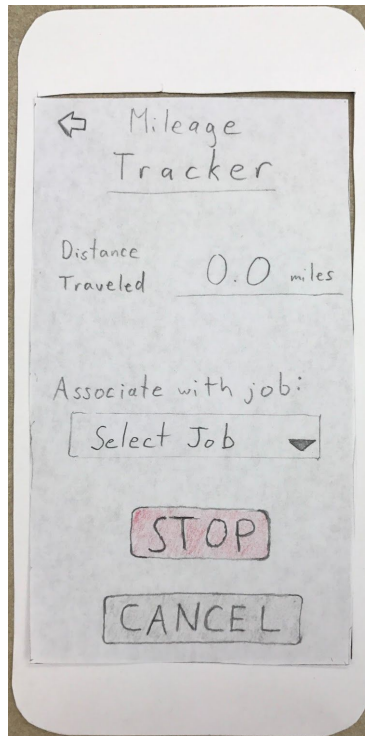
Our initial paper prototype contains everything a user would need to track mileage for a job (task 1), and generate an invoice for a customer (task 2). The invoice generation process includes the functionality required to add material expenses to the invoice, while labor and mileage totals would be pulled in as a result of different tasks.



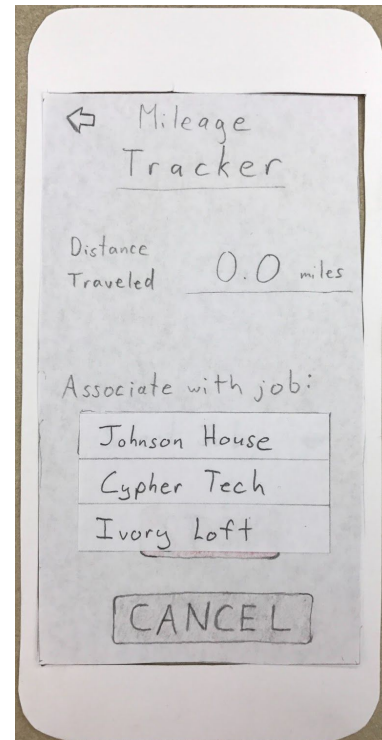
Task 1: Tracking mileage



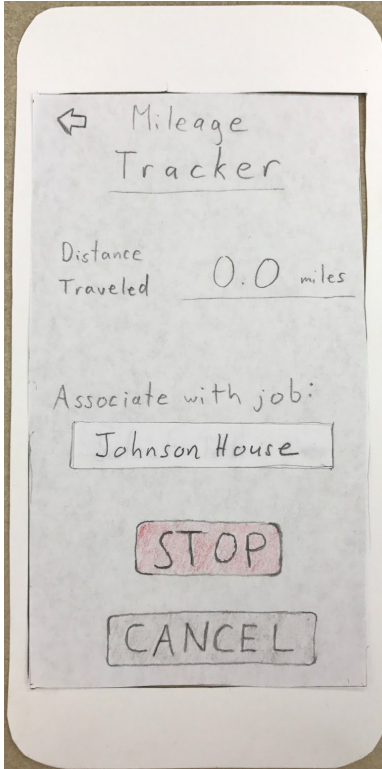
From the homepage, the user can select the 'Track Mileage' icon to quickly start tracking their mileage for a given job.



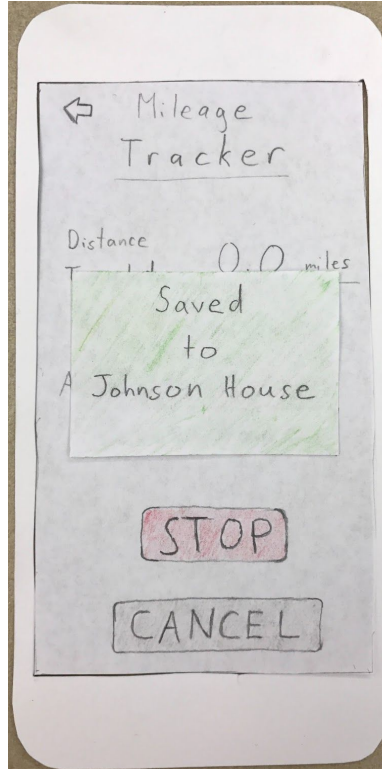
The user will be taken to the 'Mileage Tracker' page where mileage tracking begins automatically, once they select a job to track mileage for.



The user will select a job to associate the mileage with by selecting from a pre-populated list of existing jobs.

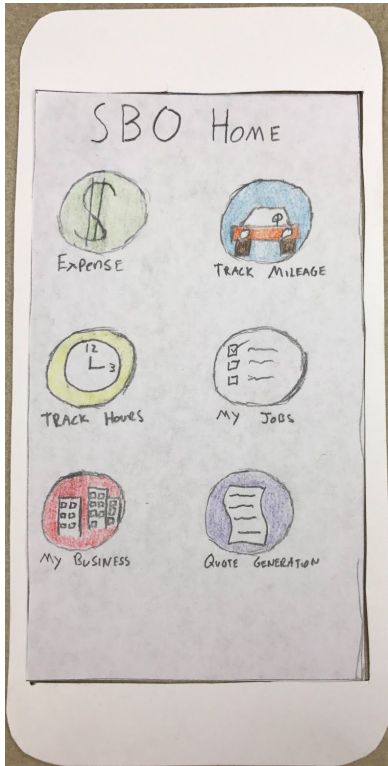


Here, the user has chosen to associate the mileage with the Johnson House job.

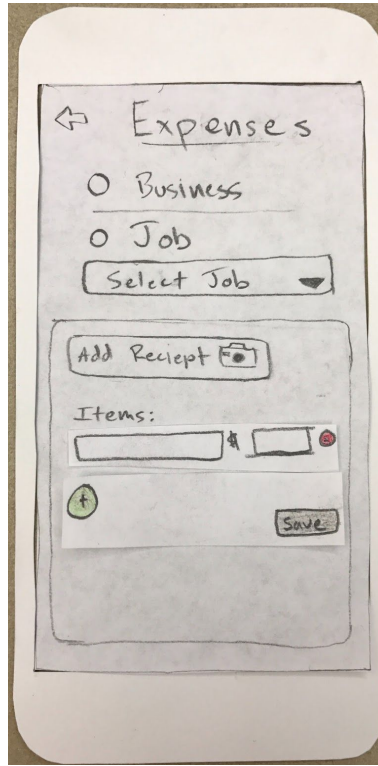


Once the user has arrived at their destination, they can stop the tracking, and the recorded mileage will be saved to the job they previously selected.

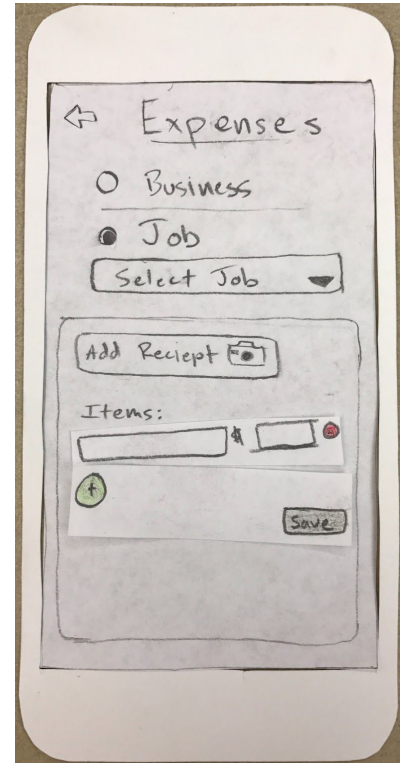
Task 2: Generating an invoice



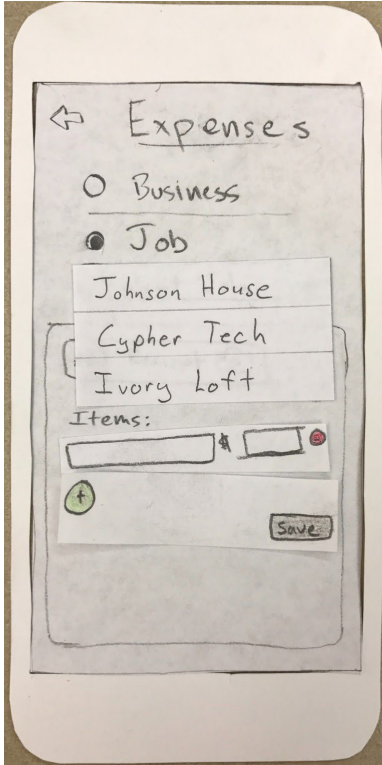
From the home screen, the user can quickly add an expense to a job invoice by selecting the 'Expense' icon.



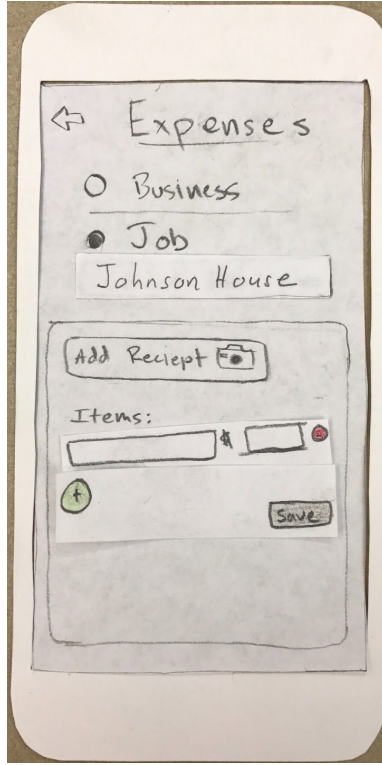
The user will first select whether this is a business expense (insurance, shop supplies, etc.), or an expense associated with a specific job.



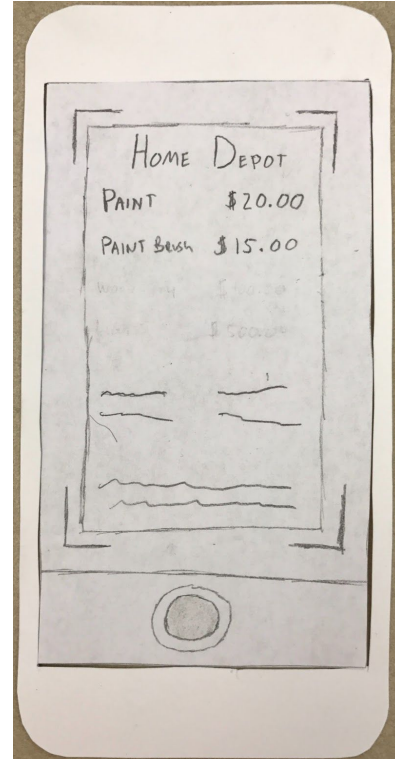
If the user wants to add a job-specific expense, they will select the 'Job' radio button, and the selection menu of jobs will be enabled



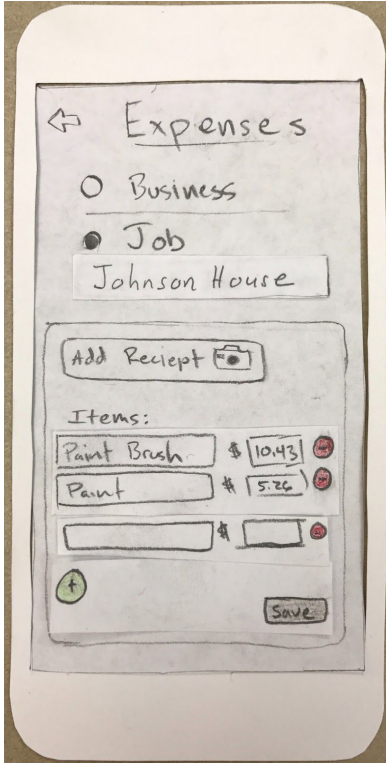
The user can select the specific job to attach the expense to, from the pre-populated menu of existing jobs.



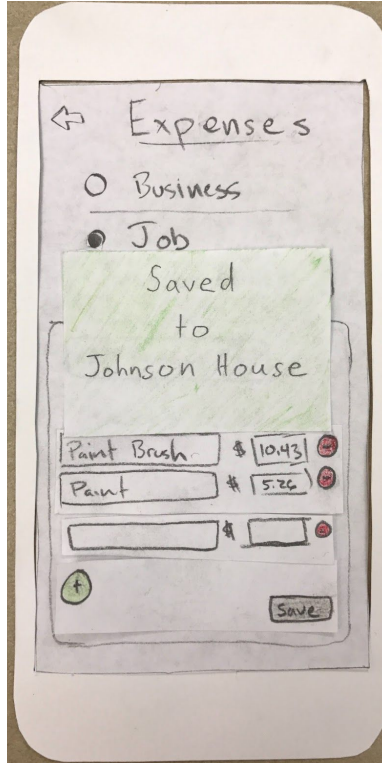
The user can either manually enter in the items and price, or they can utilize the built in receipt analyzer.



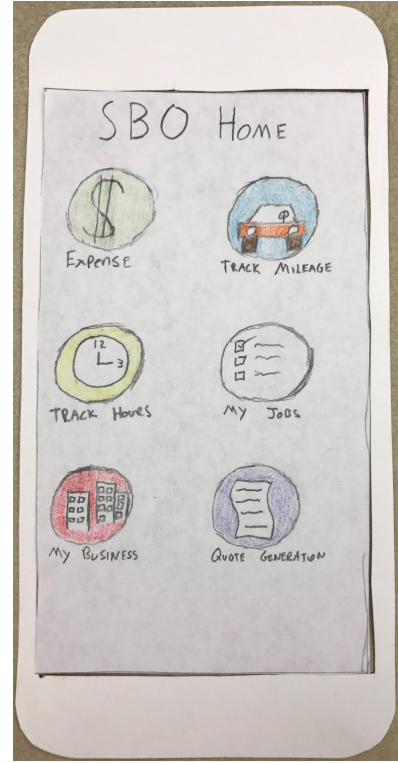
To use the built in receipt analyzer, the user takes a picture of the receipt and each item will be separated and added to the Items list.



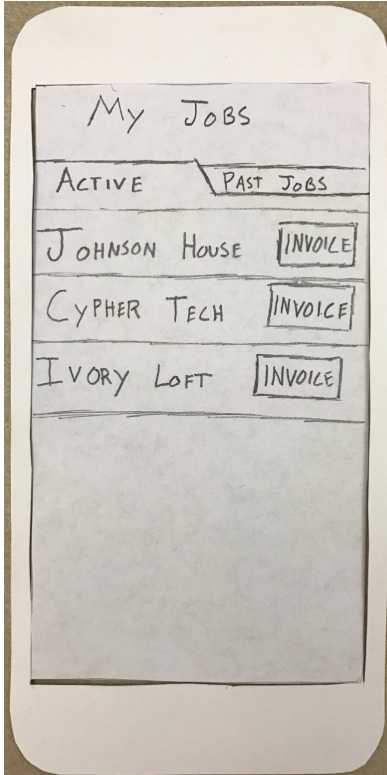
After the user has added the items they wish to charge to a job, they can delete, edit, or add new items before saving.



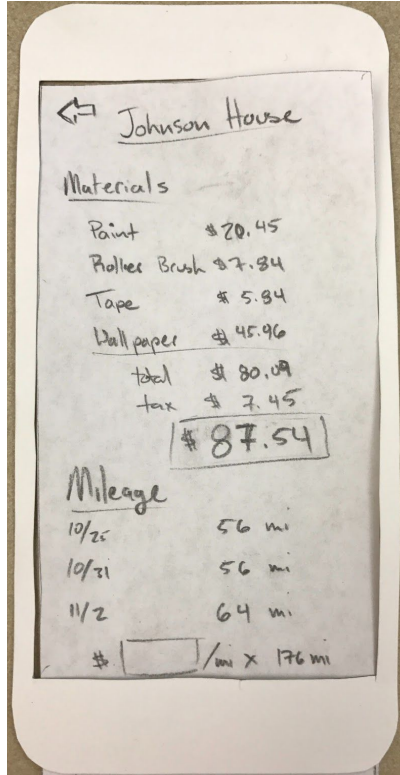
Once the user clicks 'Save', the items will be added to the invoice of the selected job.



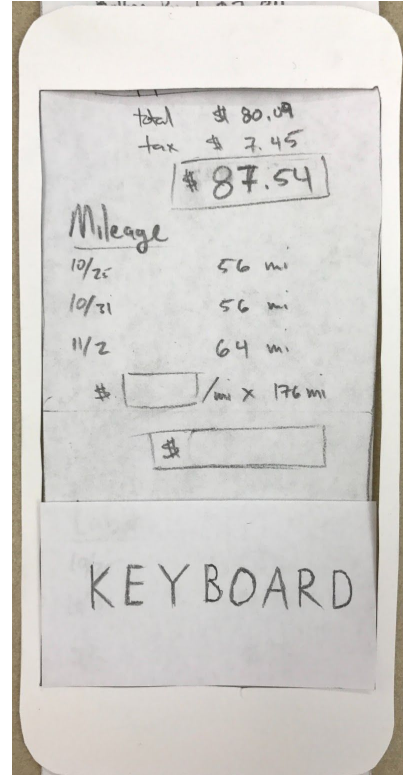
The user can access the most up-to-date version of the invoice by navigating back to the home screen, and selecting the 'My Jobs' icon.



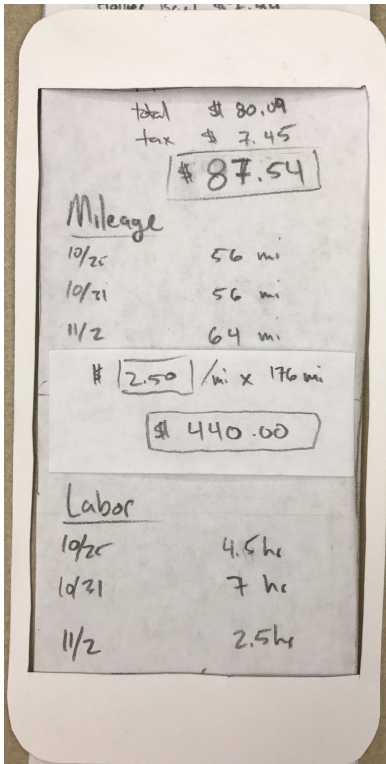
If the user wants to send the customer an invoice, they will navigate to the 'Active' jobs panel, find the job they wish to send an invoice for, and tap the 'Invoice' button.



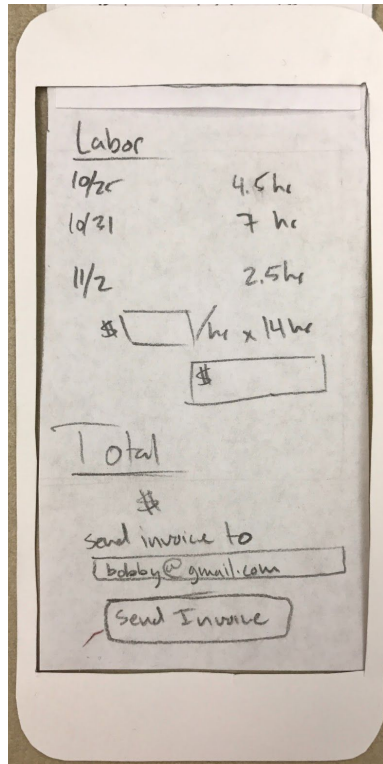
Once the user selects the invoice they wish to send, they can review each of the sections that make up the invoice: Materials, Mileage, and Labor.



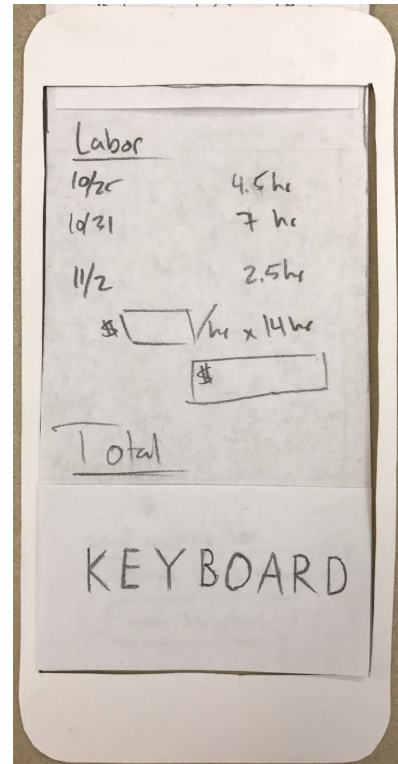
The 'Mileage' section will contain all trips charged to the job since the last invoice was sent. The user will enter the rate they charge per mile, and it will be updated accordingly.



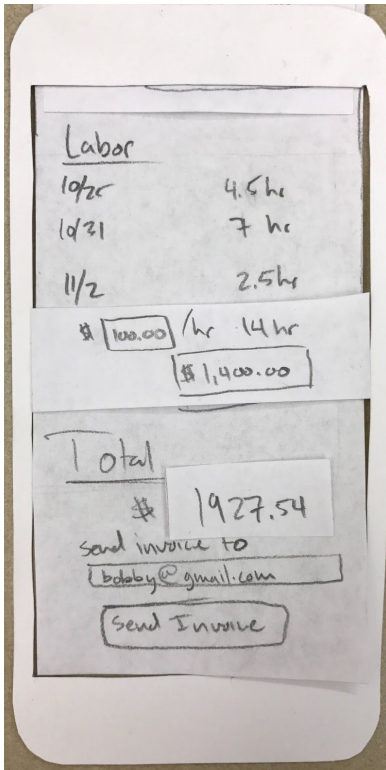
Updated cost for the 'Mileage' once the user enters the rate.



The 'Labor' section functions similar to the 'Mileage' section. The users total hours will be shown, and the user can enter the rate they charge hourly.



User entering hourly rate.



Updated labor cost, and total expense for the invoice. The client's email is pre-populated in the 'Send Invoice' box, but can be changed if needed. The user simply taps the 'Send Invoice' button and the client will be notified of the pending invoice.

Testing Process

When we began the testing process, we envisioned that it would be a very hands-on, engaging experience between us and the participants. At first, the moderator often interacted with the user in an attempt to extract as much information as possible. In hindsight, this appeared to make the user more nervous and she seemed to filter her thoughts more due to the abundance of questions regarding her actions and thought process.

In order to get the most information from our remaining subjects, we decided to be less interactive with our participants and act as more of a guide if they got stuck as opposed to an interpreter as they went through the tasks. To that end, we gave each participant a brief overview of what our application was and what tasks they would be completing. We then explained that any feedback, positive or negative, was welcome and to try and vocalize their thought process as much as they could. We explained that we wouldn't help them unless there was a complete disconnect between the task at hand, and their progress in completing the task.

The first participant in our usability testing was a screen printer named Ginny. We chose Ginny because she represents what we believe to be characteristic of our typical user: part of a tech-savvy generation, operates a small business from her home, and doesn't have the time, resources, or need for more expensive/complicated solutions. We met with Ginny at her house, as this is where she would primarily use the application. For the first test, James acted as the moderator for the tests. Ryan simulated the app, and Parker and Landen took notes.

The second participant in our usability testing was a interior designer named Katniss. We chose her because she does not have a system in place, given that she is just starting out, and we wanted to see if less experience with small business related tasks, in general, would give a different perspective on how the app should function. For the second test, Parker acted as moderator, Landen simulated the app, and James and Ryan taking notes.

The third participant was an independent full stack web developer, name Tyler. We wanted to test with Tyler for two reasons: first, he is a software engineer and has preconceived notions about how UI/UX should work, and second, he has been a small business owner for nearly twenty years, so he is well set in his ways regarding how to accomplish his small business owner tasks. For the third test, Ryan acted as moderator, Parker simulated the app, and James and Landen took notes.

Testing Results

Heuristic Evaluation

The first feedback we received on our paper prototype came from the in-class heuristic evaluation. The majority of the feedback we received pertained to our mileage tracking task. While we aimed to provide a solution that was simple and easy to understand, we missed the target with several key aspects. Aside from not providing an explicit “Start” button, we failed to consider the possibility that users might want to pause the gps recording.

Test 1

There were several critical incidents that arose from our first test with Ginny. These are detailed in Appendix A. The one change that we made to our design as a result of one of the critical incidents was to provide a popup for the user when they hit the Stop button when tracking their mileage. The popup acts as a confirmation that the user wants to end the mileage tracking and saves it to the selected job. From both this test and the heuristic evaluation, we learned that our efforts to streamline the design were sometimes counterproductive and had the potential to produce undesired behavior.

Test 2

As with test 1, there were several critical incidents that came from this test with Katniss. These are detailed in Appendix B. Katniss encountered the same issue as Ginny from test 1 with not knowing if she should tap the Stop or Pause button to end her mileage tracking. In order to make this more clear, we changed the button labels to indicate that you would be either ending the mileage tracking session, or just pausing it in order to resume it later (see Critical Incident #1 in both Appendix A and Appendix B).

At the end of this test, we learned that we had clearly had some tunnel vision when developing the application for the two tasks we chose. While the application did not need to be fully built out, the feedback we received up to this point included things that were indirectly related to the tasks, such as viewing and editing previous mileage tracks. This feedback was ultimately incorporated into the digital mockup.

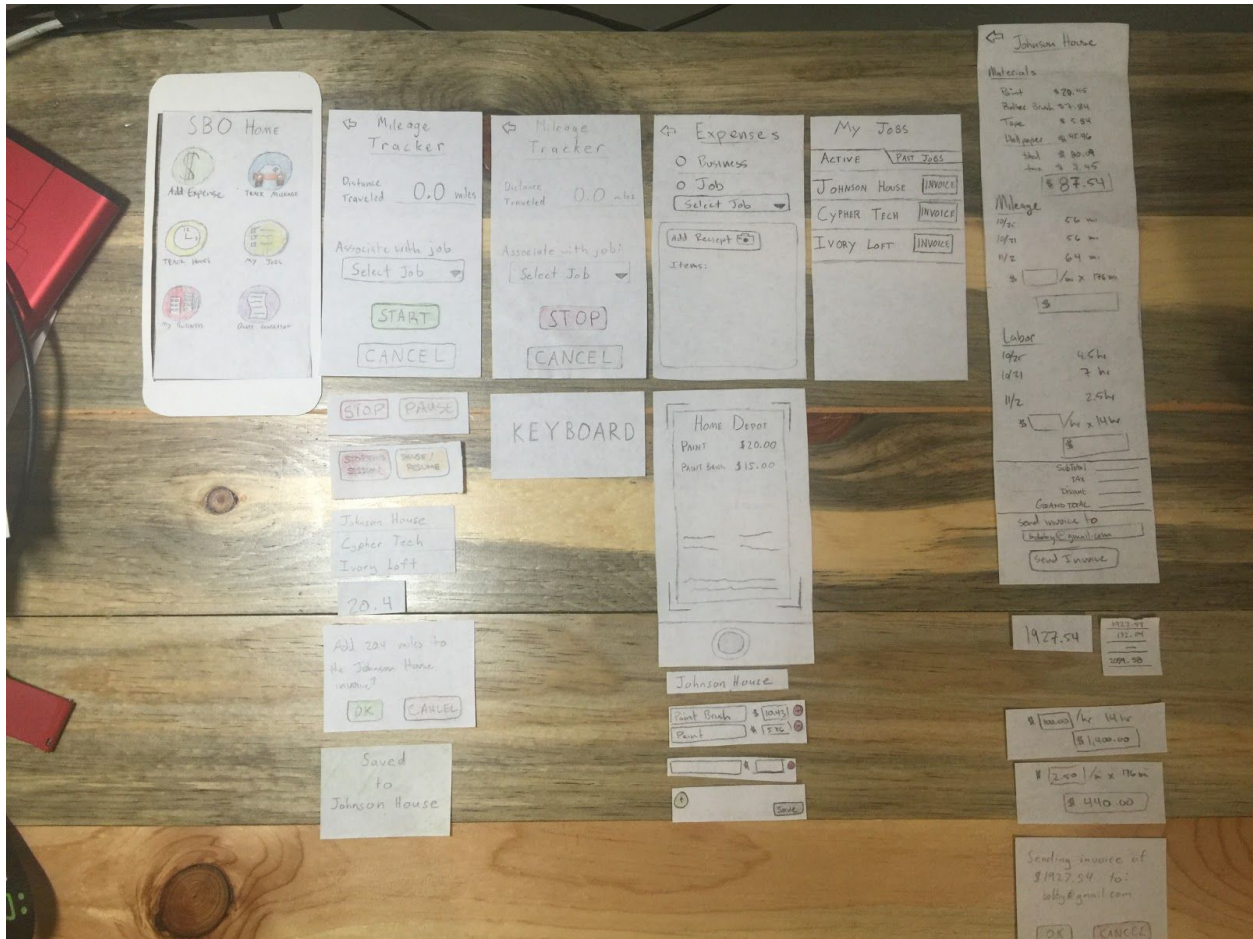
Test 3

We encountered two critical incidents during the test with Tyler. These are detailed in Appendix C. One of them required us to take action and implement a change: we didn’t make it clear to the user how tax was going to be included on an invoice. We modified the invoice screen to include a tax section, which enables the user to check taxes for accuracy before the invoice is sent to the client.

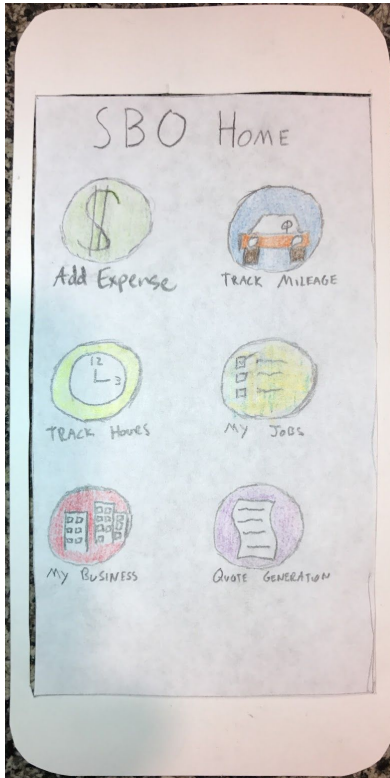
The feedback from Tyler, regarding the breakdown of the tax from the total, seemed simple on its face, but became incredibly important the more we dug into it. We realized that this app is being made for small business owners, and it was being made to allow them the finite control they needed over their business so that they can generate more revenue by controlling their costs better. To not give them access to something that controls such a large portion of their revenue, in the sales tax, was in direction opposition of our stated task for the app.

Final Paper Prototype

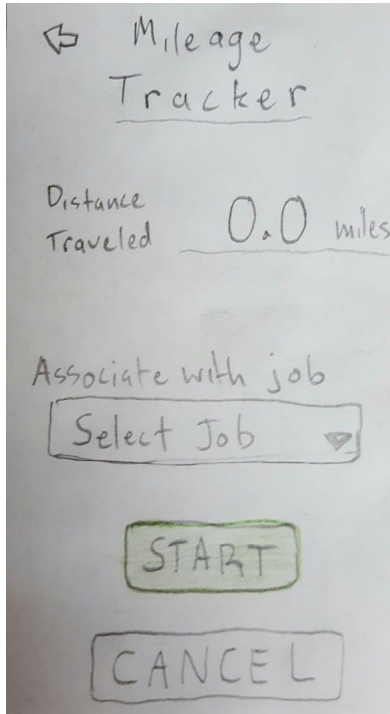
Our final paper prototype retains the key ideas of our initial paper prototype with a few changes as a result of the usability tests. These updates include displaying a breakdown of taxes in the invoice window, as well as showing a notification to the user when miles have been saved to a job.



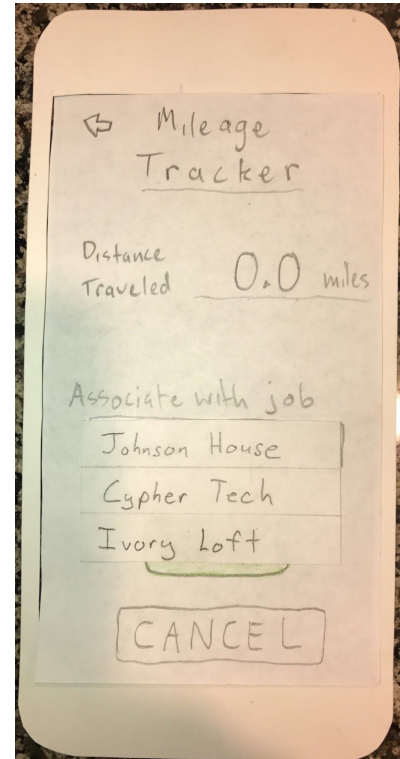
Task 1: Tracking mileage



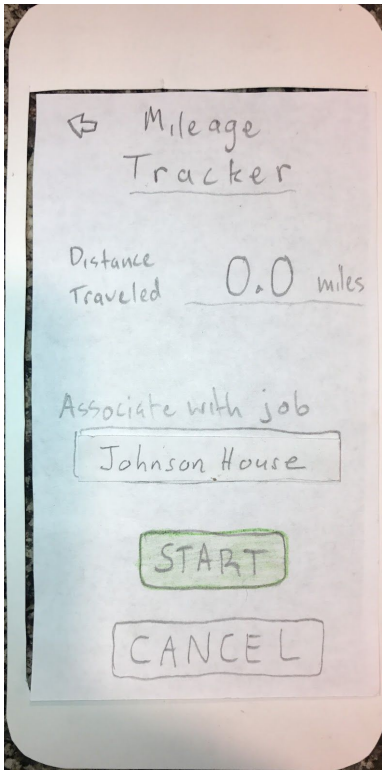
From the homepage, the user can select the 'Track Mileage' icon to quickly start tracking their mileage for a given job.



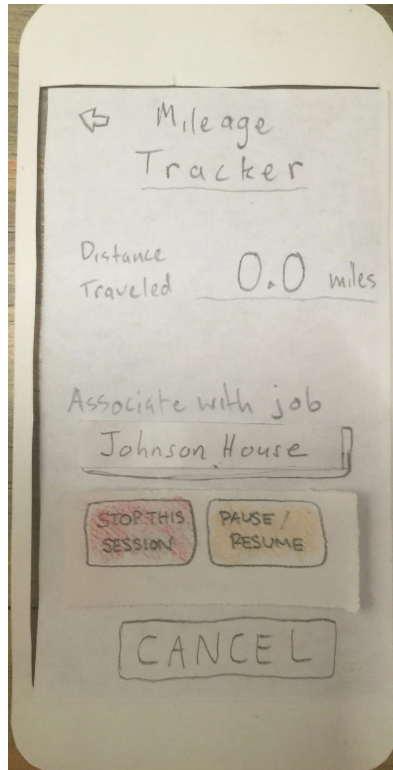
The user will be taken to the 'Mileage Tracker' page where they will need to select the job to associate the mileage with.



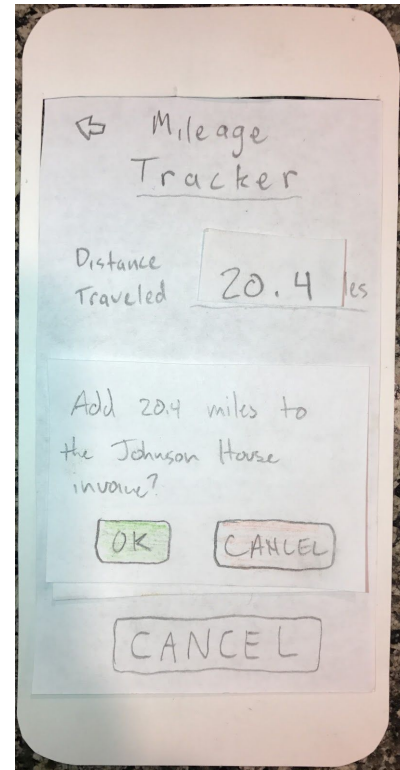
The user will select a job to associate the mileage with by selecting from a pre-populated list of existing jobs.



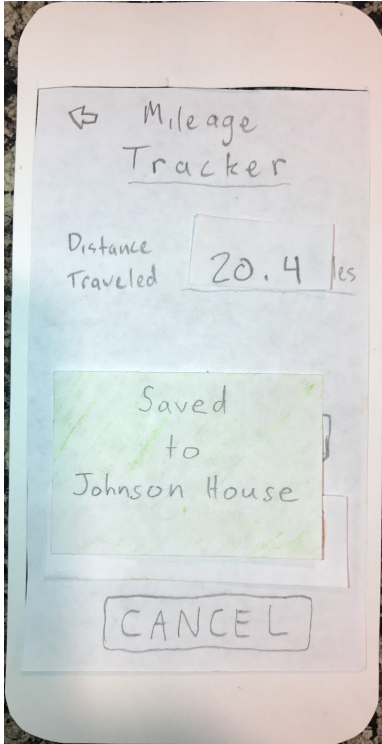
The user starts mileage tracking by selecting the Start button.



After the user clicks Start the button is replaced with a Stop and Pause button and the GPS begins tracking miles.

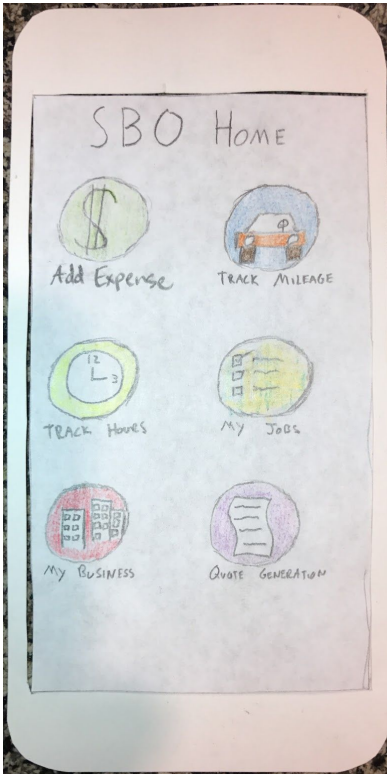


Once the user has arrived at their destination, they can stop the tracking by tapping the Stop button. A confirmation box will appear and if the user will confirm their decision by selecting Ok.

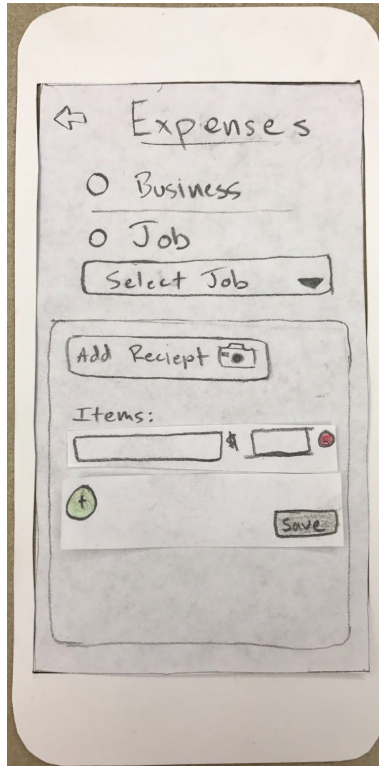


After the user selects Ok, the user will see a confirmation that the milage was saved, and will be taken back to the home screen.

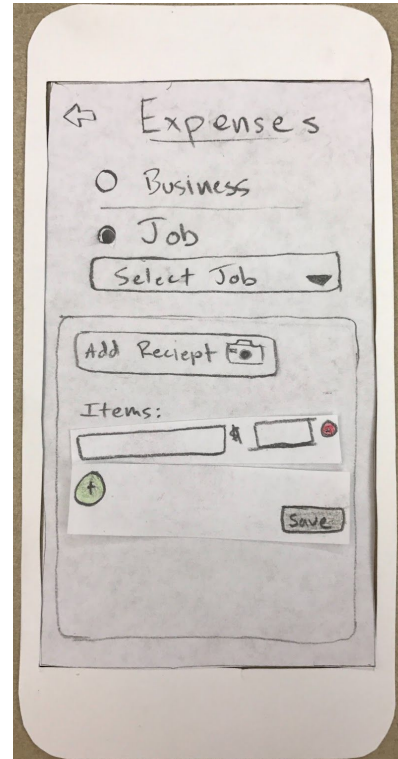
Task 2: Generating an invoice



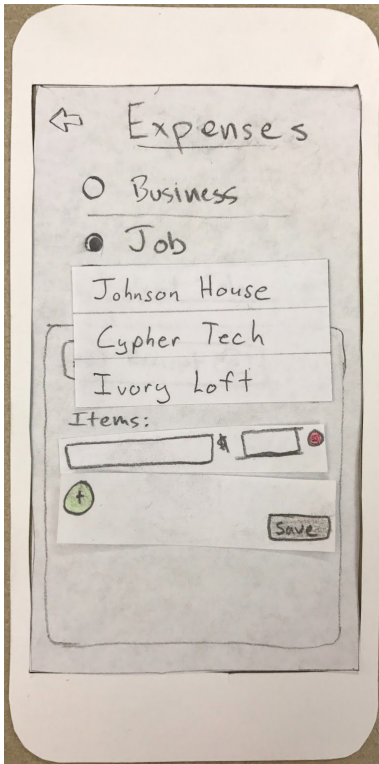
From the home screen, the user can quickly add an expense to a job invoice by selecting the 'Expense' icon.



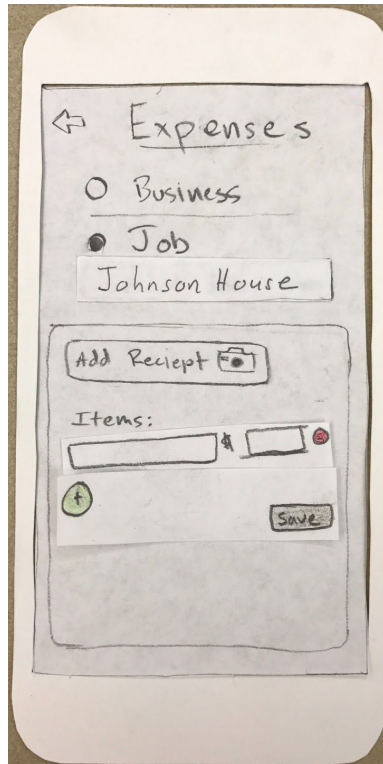
The user will first select whether this is a business expense (insurance, shop supplies, etc.), or an expense associated with a specific job.



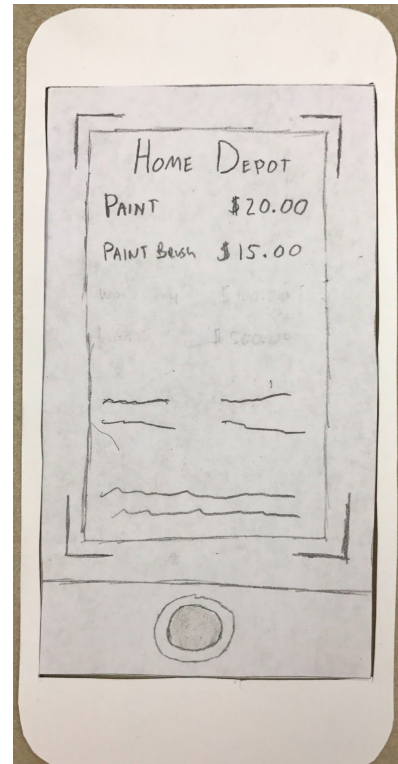
If the user wants to add a job-specific expense, they will select the 'Job' radio button, and the selection menu of jobs will be enabled.



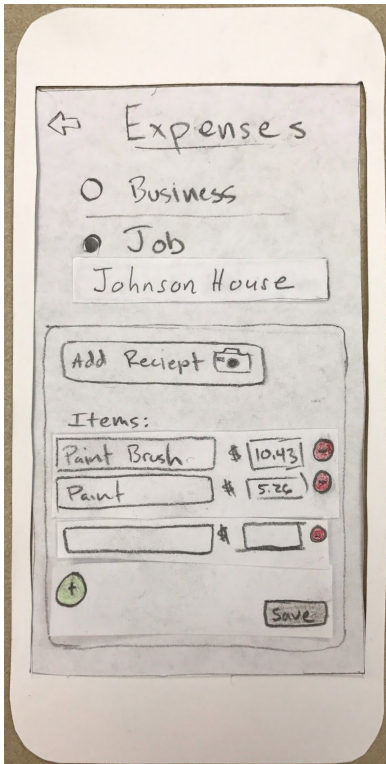
The user can select the specific job to attach the expense to, from the pre-populated menu of existing jobs.



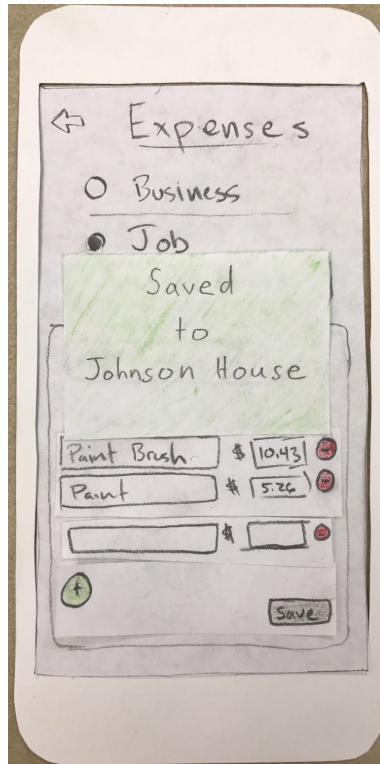
The user can either manually enter in the items and price, or they can utilize the built in receipt analyzer.



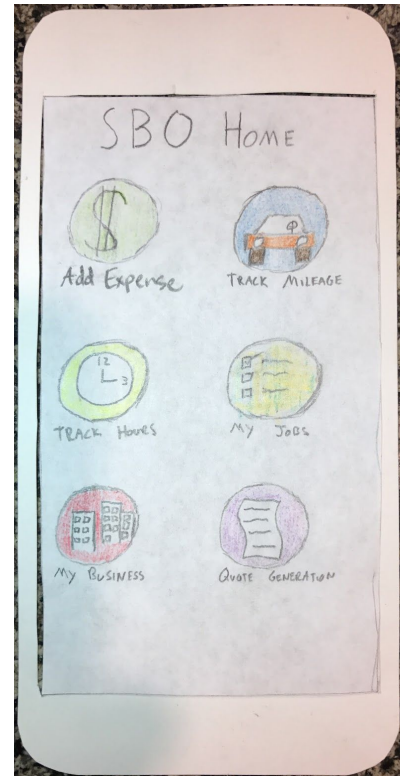
To use the built in receipt analyzer, the user takes a picture of the receipt and each item will be separated and added to the Items list.



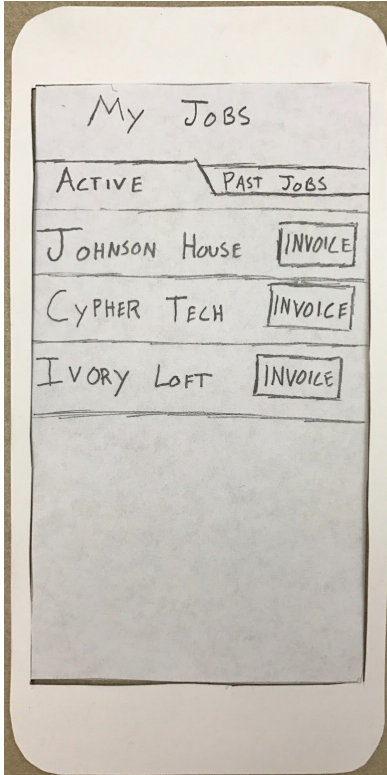
After the user has added the items they wish to charge to a job, they can delete, edit, or add new items before saving.



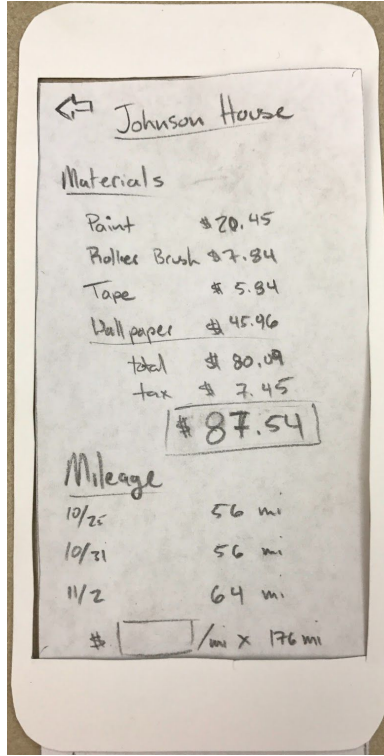
Once the user clicks 'Save', the items will be added to the invoice of the selected job.



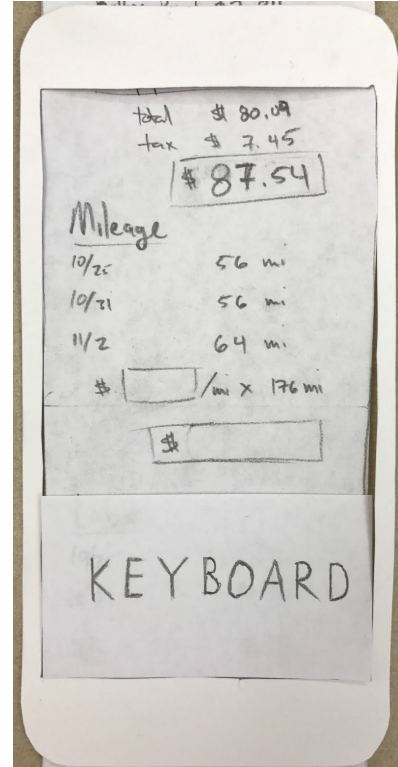
The user can access the most up-to-date version of the invoice by navigating back to the home screen, and selecting the 'My Jobs' icon.



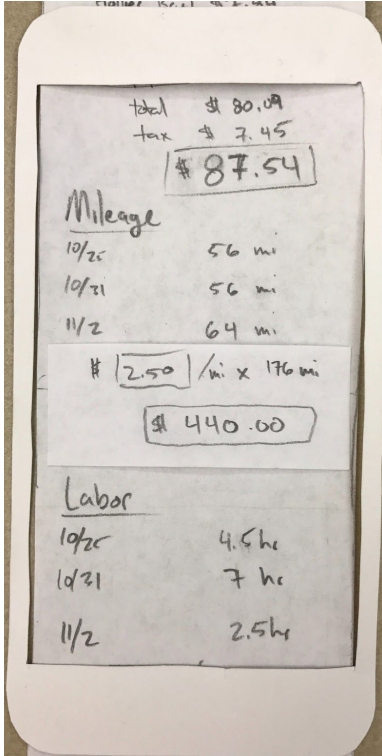
If the user wants to send the customer an invoice, they will navigate to the 'Active' jobs panel, find the job they wish to send an invoice for, and tap the 'Invoice' button.



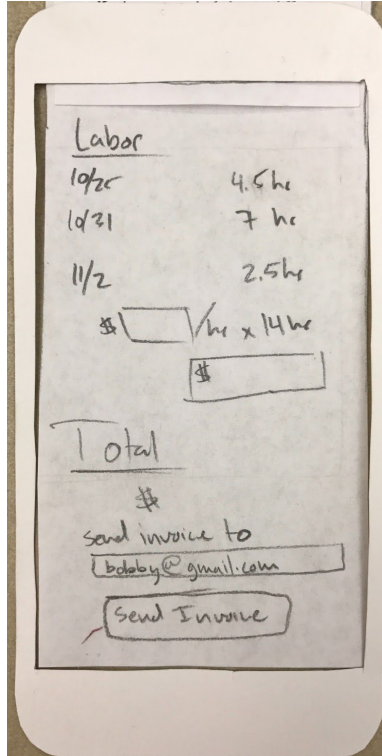
Once the user selects the invoice they wish to send, they can review each of the sections that make up the invoice: Materials, Mileage, and Labor.



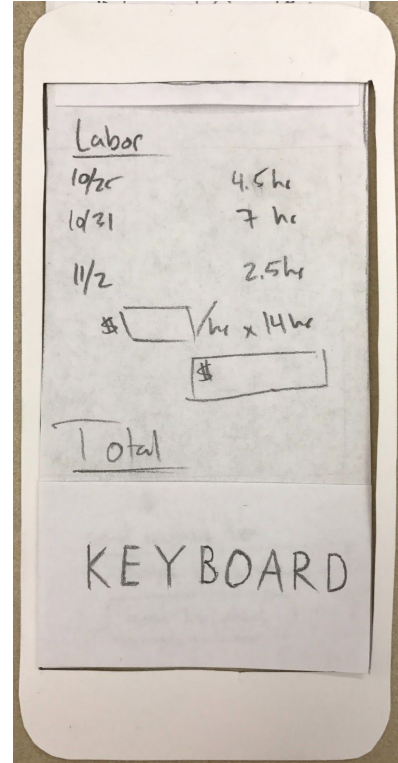
The 'Mileage' section will contain all trips charged to the job since the last invoice was sent. The user will enter the rate they charge per mile, and it will be updated accordingly.



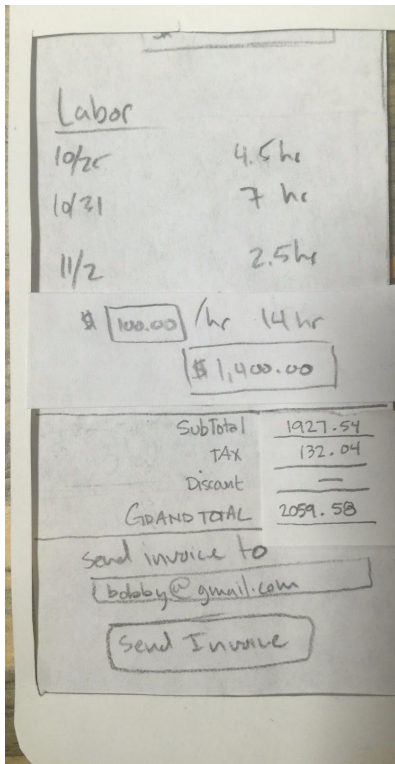
Updated cost for the 'Mileage' once the user enters the rate.



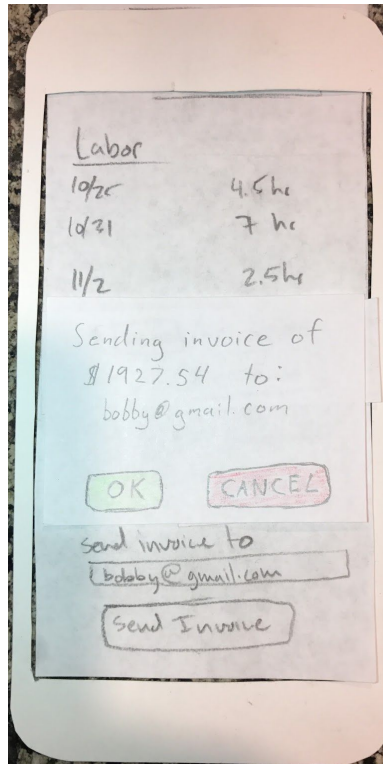
The 'Labor' section functions similar to the 'Mileage' section. The users total hours will be shown, and the user can enter the rate they charge hourly.



User entering hourly rate.



Updated labor cost, and total expense for the invoice. The client's email is pre-populated in the 'Send Invoice To' box, but can be changed if needed.



Once the user taps the Send Invoice button, a confirmation box will appear with the amount and recipient of the invoice. Once the user taps Ok, the user will be taken back to the home screen.

Digital Mockup

As we switched from our paper prototype to our digital mockup, we found that the revisions that we made to our design in between usability tests resulted in a polished prototype that was ready to move to a digital design. One piece of feedback that we received, but had not yet incorporated into our paper prototype because it was not imperative to completing either task, related to how a user would remove or edit items from a job, i.e. mileage, expenses, or hours. In order to make this more clear and self explanatory for the user, we updated the My Jobs screen for our digital mockup.

Our former design (Figure 1) had a list of jobs, and each job had an Invoice button that could be clicked to take the user straight to the invoice. It was not explicitly clear that you could also tap on the job name to be taken to sections where you could then edit mileage, expenses, and hours for the job. The changes we made to our digital mockup (Figure 2) for the My Job screen now has the user select a job from a select dropdown, and then the user can select from four buttons to view or edit mileage, expenses, or hours, as well as go to invoice generation like the former Invoice button did. Additionally, we had overlooked the process of adding a job in the first place, as our tasks assumed the job already existed. To fix this, we added a button that the user would click in order to create a new job.

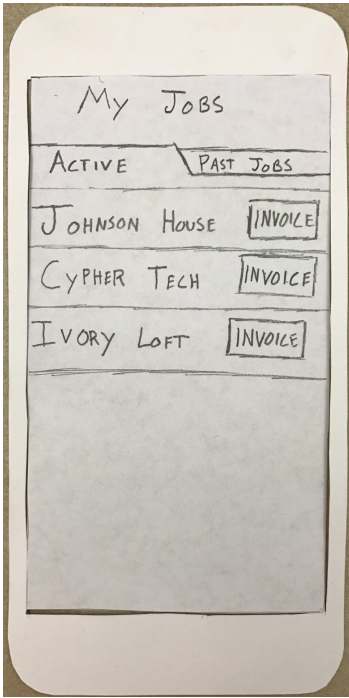


Figure 1 - Former paper prototype

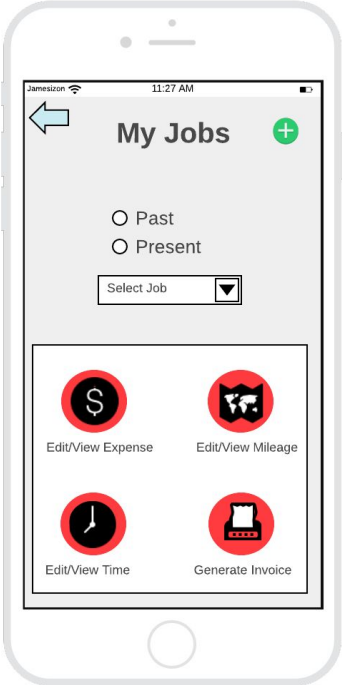
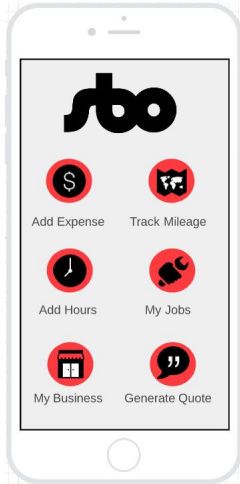
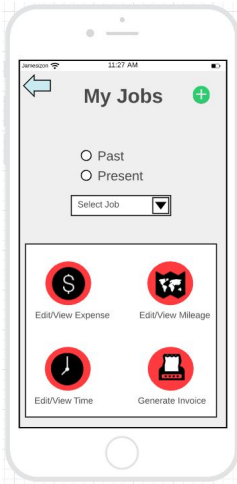


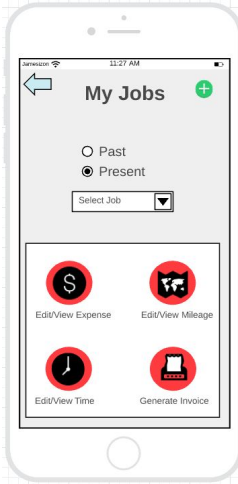
Figure 2 - Updated digital mockup



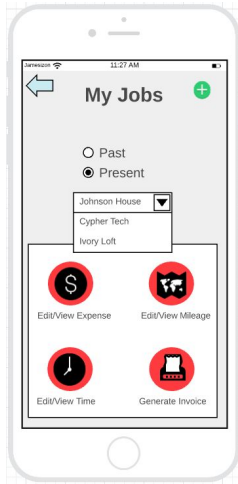
Homescreen



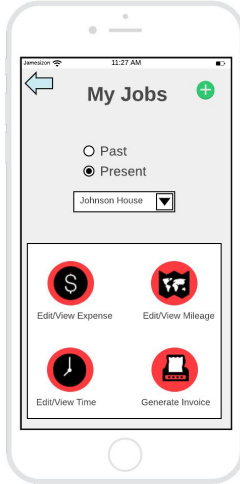
My Jobs - 1



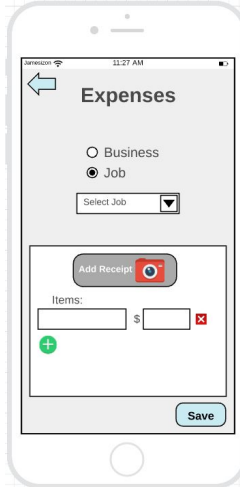
My Jobs - 2



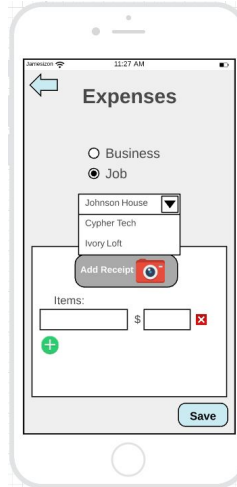
My Jobs - 3



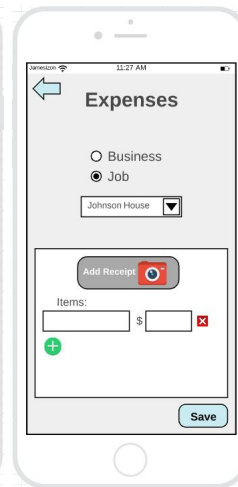
My Jobs - 4



Expenses - 1



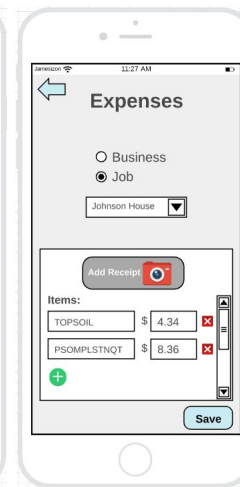
Expenses - 2



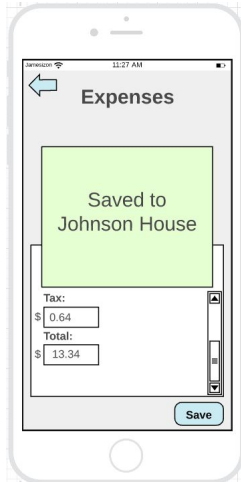
Expenses - 3



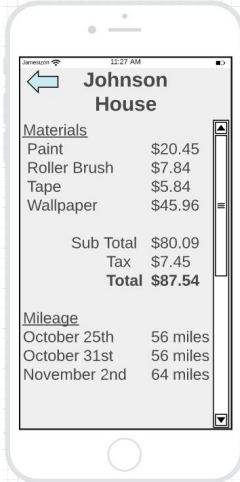
Expenses - 4



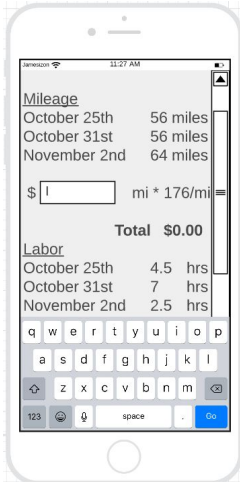
Expenses - 5



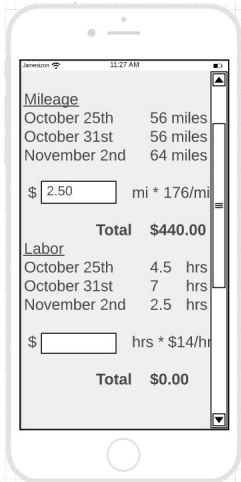
Expenses - 6



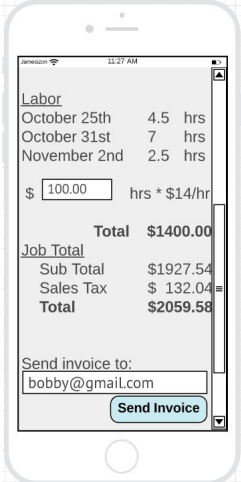
Invoice - 1



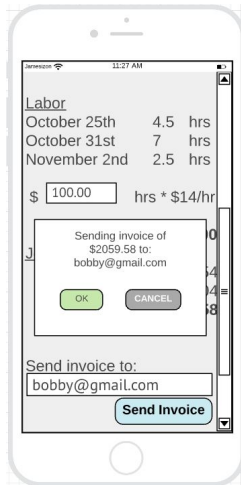
Invoice - 2



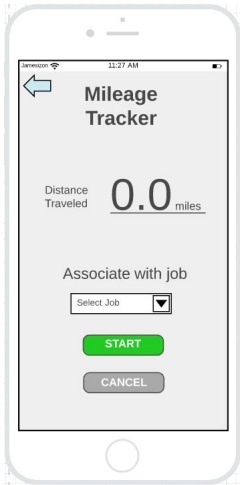
Invoice - 3



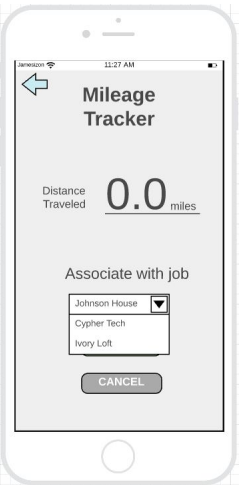
Invoice - 4



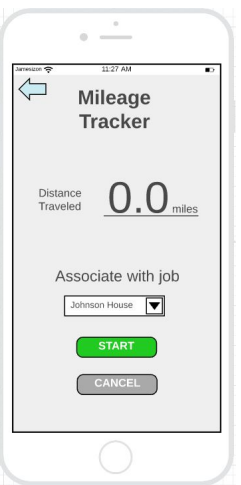
Invoice - 5



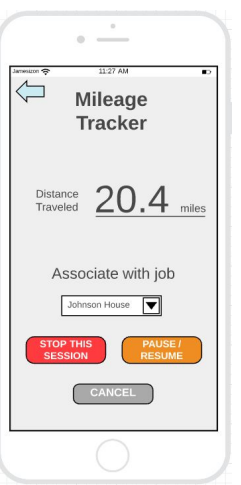
Mileage - 1



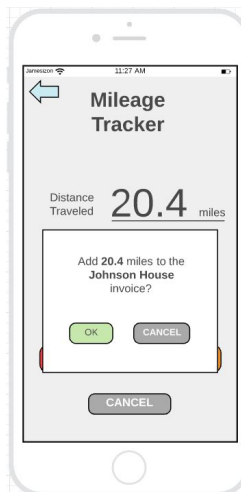
Mileage - 2



Mileage - 3



Mileage - 4

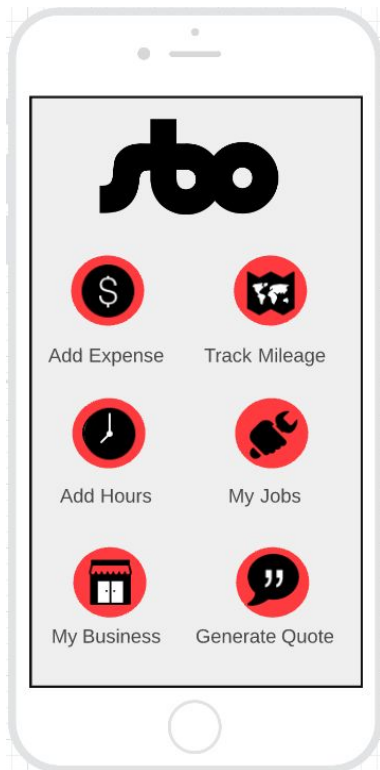


Mileage - 5

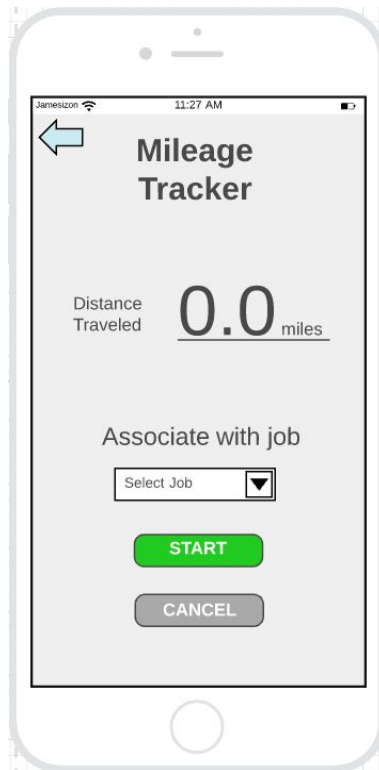


Mileage - 6

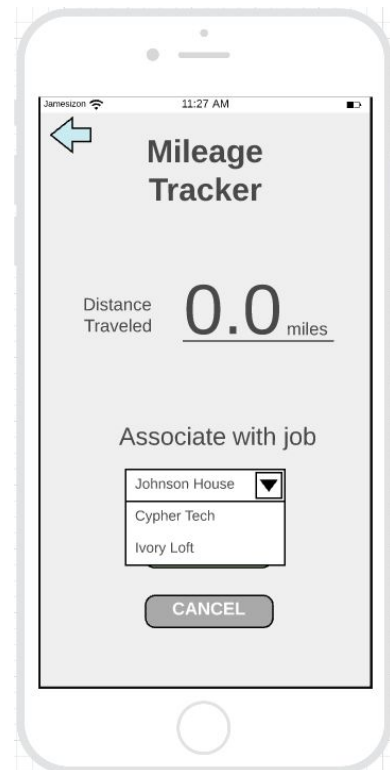
Task 1 - Tracking Mileage for a Job



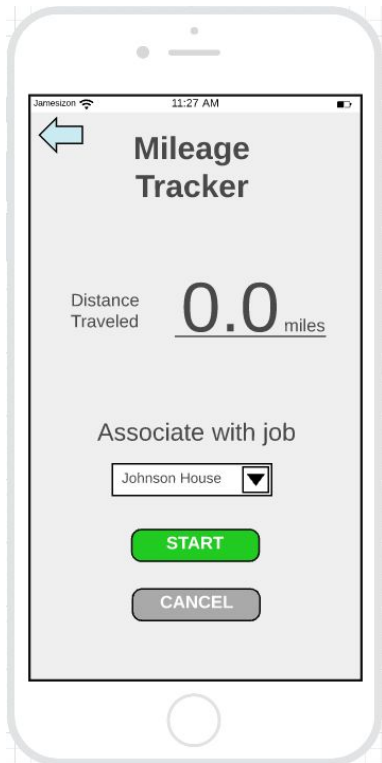
From the home screen, the user can select the 'Track Mileage' icon to quickly start tracking their mileage for a given job.



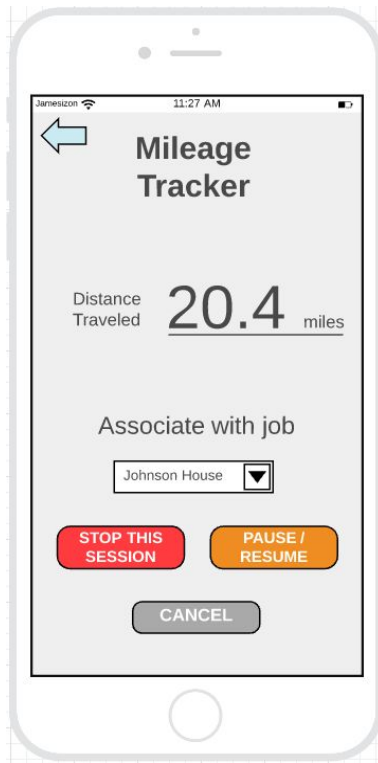
The user will be taken to the 'Mileage Tracker' page where they will need to select the job to associate the mileage with.



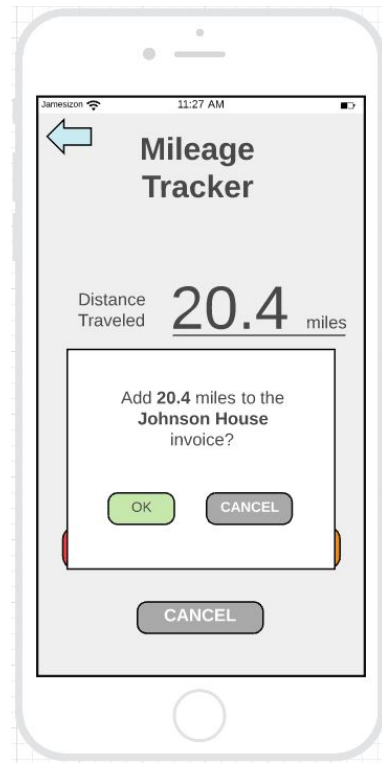
The user will select a job to associate the mileage with by selecting from a pre-populated list of existing jobs.



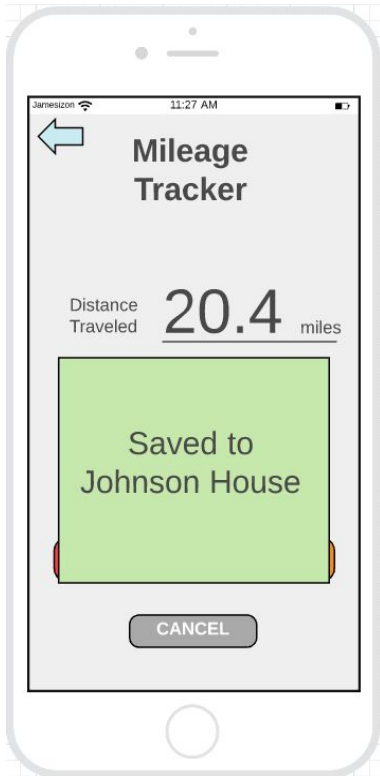
The user starts mileage tracking by selecting the 'Start' button.



After the user clicks 'Start', the button is replaced with a 'Stop This Session' and a 'Pause / Resume' button, and the GPS begins tracking mileage.

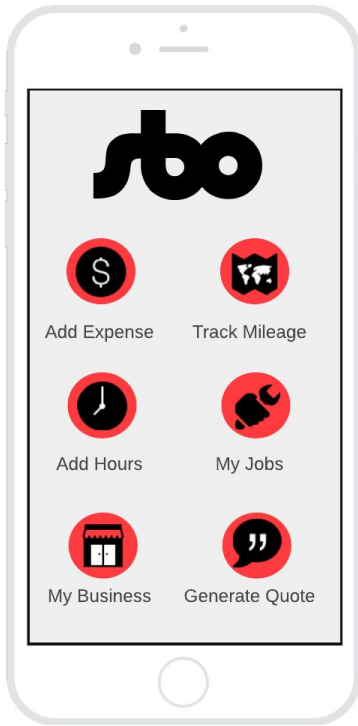


Once the user has finished the route, they can stop the tracking by tapping the 'Stop' button. A confirmation box will appear and if the user will confirm their decision by selecting 'OK'.

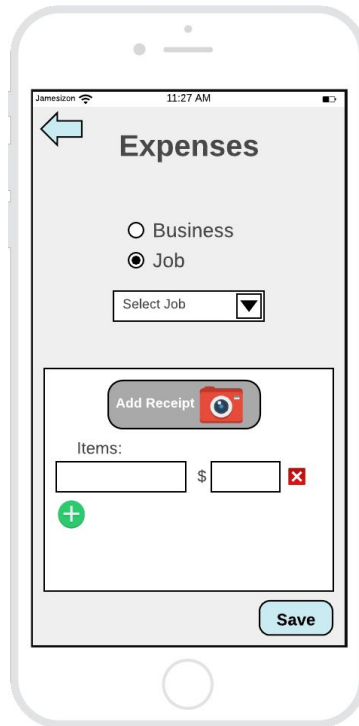


After the user selects 'OK', the user will see a toast confirmation that the milage was saved, and will be taken back to the home screen.

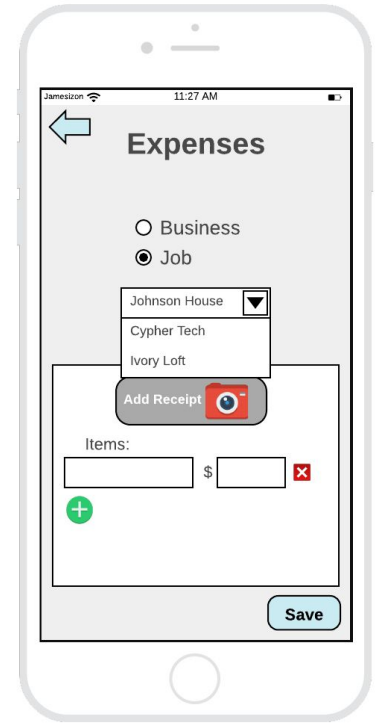
Task 2 - Generating an Invoice



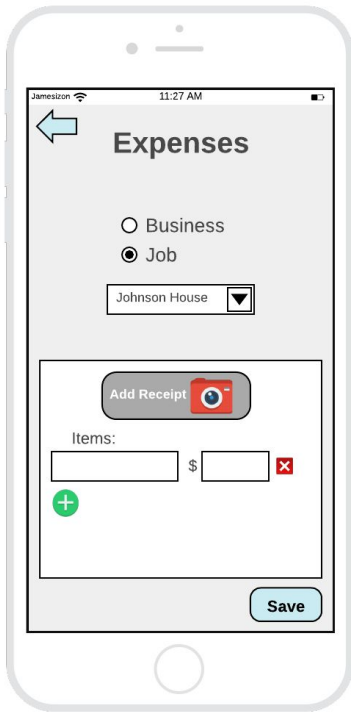
Before the user generates an invoice, they will add expenses to the invoice using shortcuts from the homescreen. If the user wants to add a material expense, they would click on the 'Add Expense' icon.



The user will first select whether this is a business expense (insurance, shop supplies, etc.), or an expense associated with a specific job.



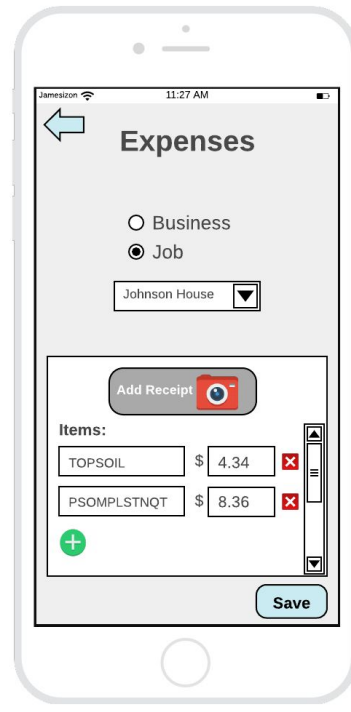
The user can select the specific job to attach the expense to, from the pre-populated menu of existing jobs.



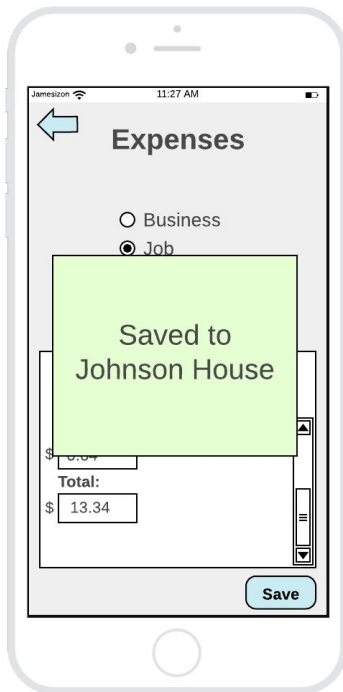
The user can either manually enter in the items and price, or they can utilize the built in receipt analyzer.



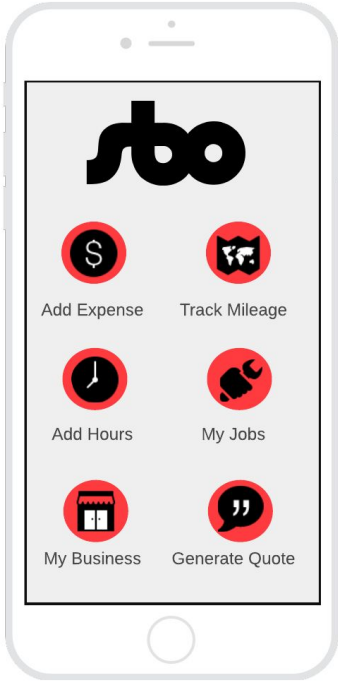
To use the built in receipt analyzer, the user takes a picture of the receipt and each item will be separated, and added to the 'Items' list shown in previous screen.



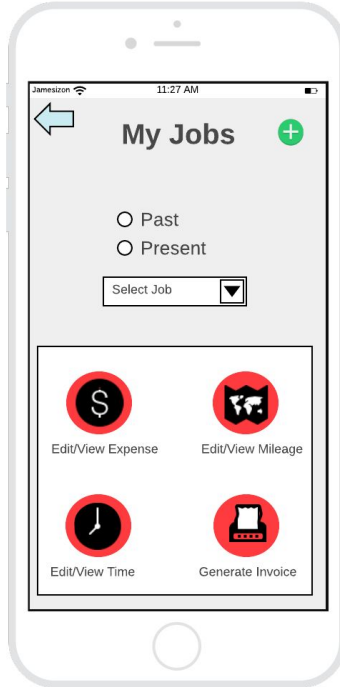
After the user has added the items they wish to charge to a job, they can either delete, edit, or add new items before saving. In addition to the 'Items' section, there will be a 'Tax' section that will be pre populated if the receipt analyzer is used, and can be edited by the user.



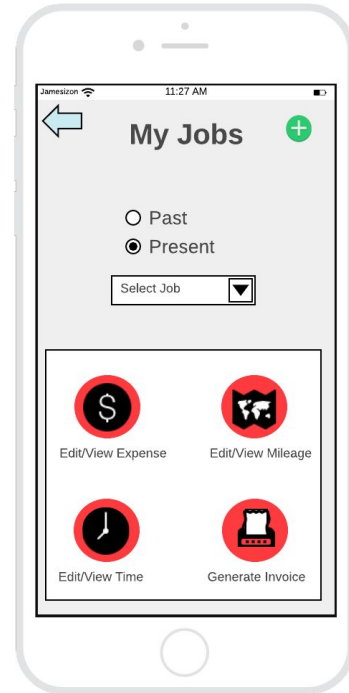
Once the user clicks on 'Save', a toast will appear to notify the user that the expenses have been saved to the appropriate job, and the user will then be redirected back to the home screen.



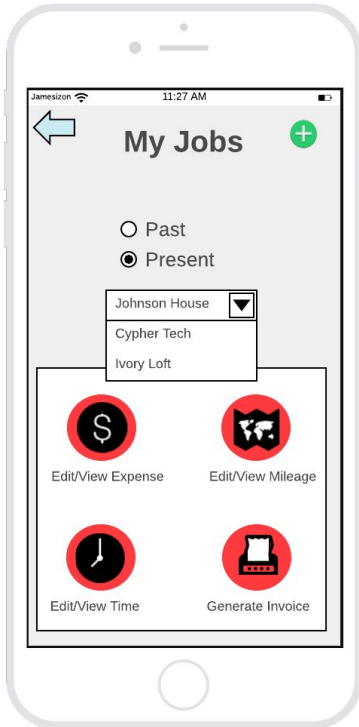
The user can access the most up-to-date version of the invoice by navigating back to the home screen, and selecting the 'My Jobs' icon.



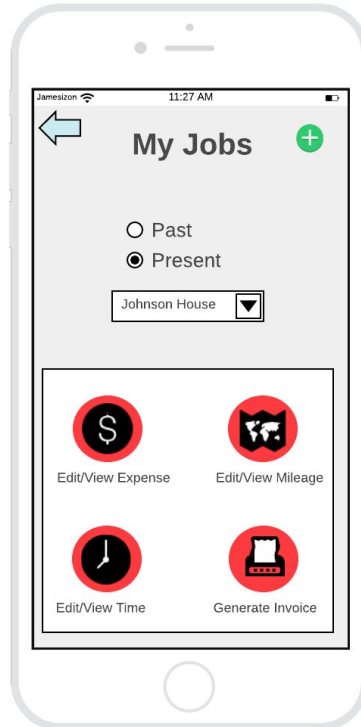
Once 'My Jobs' has been selected the user will be taken to a screen that allows them to modify an existing job.



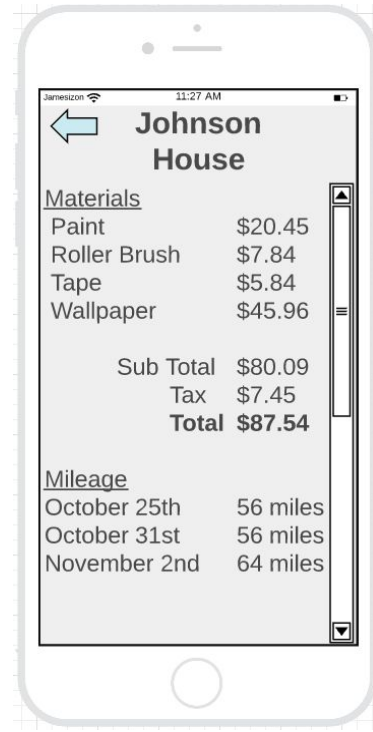
The user can edit/view details for a job that is currently active by selecting the 'Present' radio button.



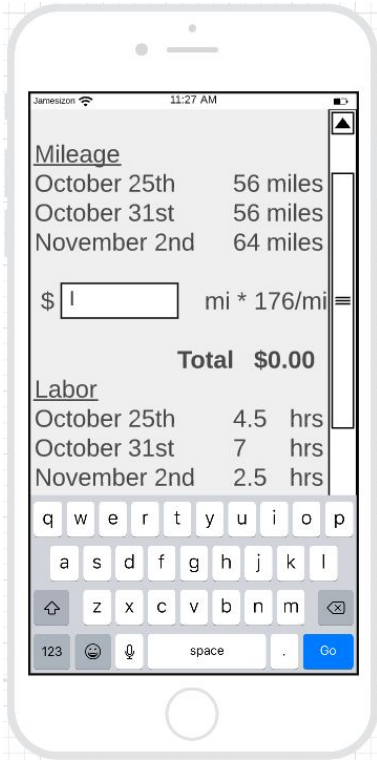
Once the user has selected the radio button, they will be able to choose a job from the dropdown menu.



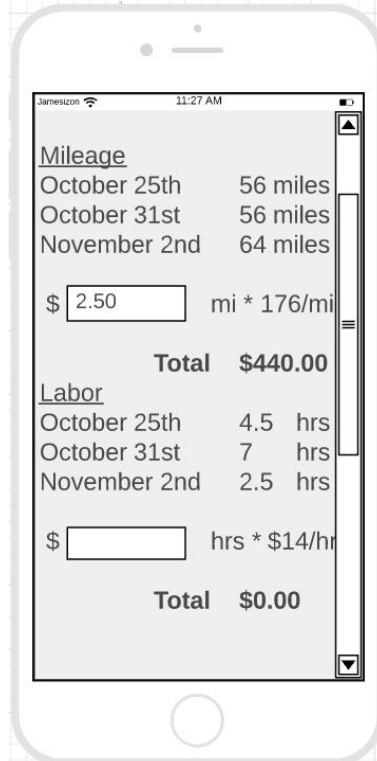
Now that a job has been selected the user can click 'Generate Invoice' to view the current invoice of that job.



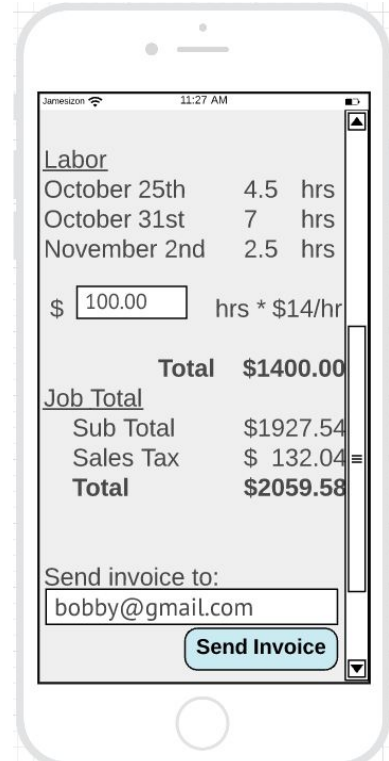
Once the user selects the invoice they wish to send, they can review each of the sections that make up the invoice: Materials, Mileage, and Labor.



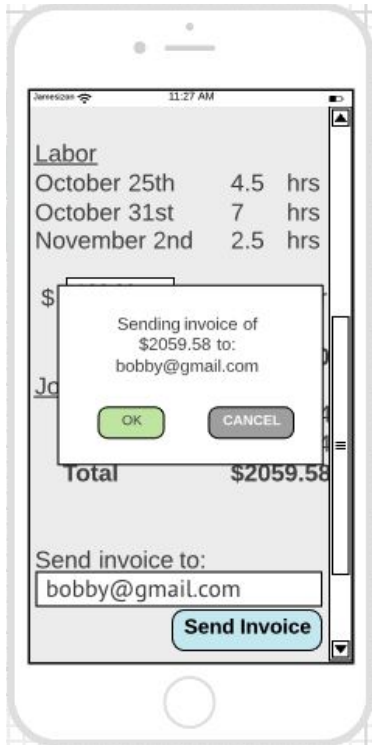
The 'Mileage' section will contain all trips charged to the job since the last invoice was sent. The user will enter the rate they charge per mile, and the total will be updated accordingly.



Updated total for the 'Mileage' once the user enters the rate.



The 'Labor' section functions similar to the 'Mileage' section. The user's total hours will be shown, and the user can enter the rate they charge hourly.



Once the user taps the 'Send Invoice' button, a confirmation box will appear with the amount and recipient of the invoice. Once the user taps 'OK', the invoice will be sent and the user will be taken back to the home screen.

Discussion

What did you learn from the process of iterative design?

The iterative design process proved to be an effective tool to uncover design flaws that were initially unseen. An example of this came about early in the design of our mileage tracking portion of the application. Our team wanted to design a simple and quick solution to tracking mileage. However, after just one iteration of peer reviews, multiple groups had uncovered a major design flaw with how we were performing that task. Uncovering these issues early allowed for a cleaner and more understandable UI.

How did the process shape your final design?

Throughout the iterative design process, our design saw some major changes. We started with an application that catered solely to the steps involved in completing our two tasks. At the culmination of the process, we had a more robust solution that covered things that were indirectly related to our tasks. The two most prominent changes made to our application involved refining the mileage tracker to make it more intuitive to use, and making it easier to navigate between different job-related screens. As noted above, the mileage tracker changed significantly to clearly show how to start and stop the phone's GPS. Originally this was done automatically, but proved to be confusing to the users. The process of modifying individual job details e.g. hours worked, miles tracked, etc. was not clear to some users. The fact that this was even brought up, despite it not being a part of the task, showed us that completeness is important when building out a design regardless of how focused the testing is. Otherwise, the participant spends valuable time trying to understand parts of the system that may not be necessary or entirely relevant to the task at hand. To fix this issue, we added a new view where the user has the option to explicitly modify or view the expenses related to each individual job in order to reflect the realistic functionality of the application as a whole.

How have your tasks changed as a result of your usability tests?

While our two tasks, mileage tracking and invoice generation, did not change as a result of the usability tests, the implementation of the tasks did. In order to clearly convey how the user should generate an invoice, the user would have had to modify other aspects of the job -- add mileage, expenses, hours -- as was noted in TA feedback. To adjust for this, changes had to be made to the UI so that the user can also modify various aspects of the job even though it was not part of the original task.

Do you think you could have used more, or fewer, iterations upon your design?

Allowing for more iterations will always allow for more issues to be found. However, exceeding a handful of these design processes would result in very minor changes that may or may not be crucial to the design. With the amount of iterations that we performed, we were able to uncover the real problematic flaws with how our design was originally implemented. We believe that with more iterations, we may have found other problems, but the severity would be lower than the problems already discovered.

Appendix

A: Usability Test 1 Critical Incidents

Critical Incident #1 - Pause or Stop - Severity: 2

Ginny navigated to the mileage tracking page from the home screen and started tracking for the specified job, all with ease. When it came time to stop tracking, she wasn't sure if she should tap 'Pause' or 'Stop' in order to finish tracking mileage. She had a hunch that she needed to press 'Stop', and did so.

We discussed this incident with Ginny once the testing was complete. She was confident that once she knew what both buttons did, she would not have any issues remembering their intended functionality. We decided leave them as-is to see if other users would have the same issues.

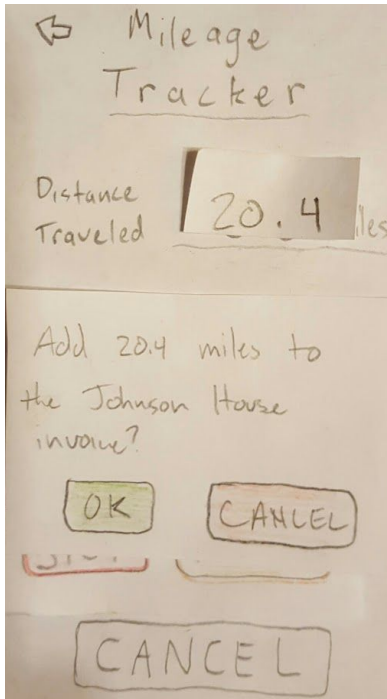
Revision: None

Critical Incident #2 - Confirmation - Severity: 3

Ginny expressed a desire to have a confirmation alert box pop up in case she accidentally hit 'Stop' before she meant to.

This issue has the potential to frustrate users if they inadvertently stop tracking a route. Given that the original design automatically saved the route whenever the Stop button was pressed, the user would not be able to easily correct this mistake.

Revision:



User confirms whether mileage is correct or not before it is submitted.

Critical Incident #3 - Where to close out an invoice? - Severity: 2

Ginny successfully added some material expenses to an invoice for a job, but once she returned to the homescreen and needed to close out that invoice, she was unsure of where to go. She attempted to click the Generate Quote button, thinking the invoice might be tied to the quote. Since we did not have that screen mocked up, we explained the intended functionality of Quote Generation. She then tapped the My Jobs button and continued completing the task.

This incident was similar to incident 1 in task 1. Ginny thought that the name could be more obvious -- have a distinct Invoice button -- but felt that once she knew where to go, it wouldn't be an issue. We decided to keep it as is for the time being and see if other users struggled with the naming as well.

Revision: None

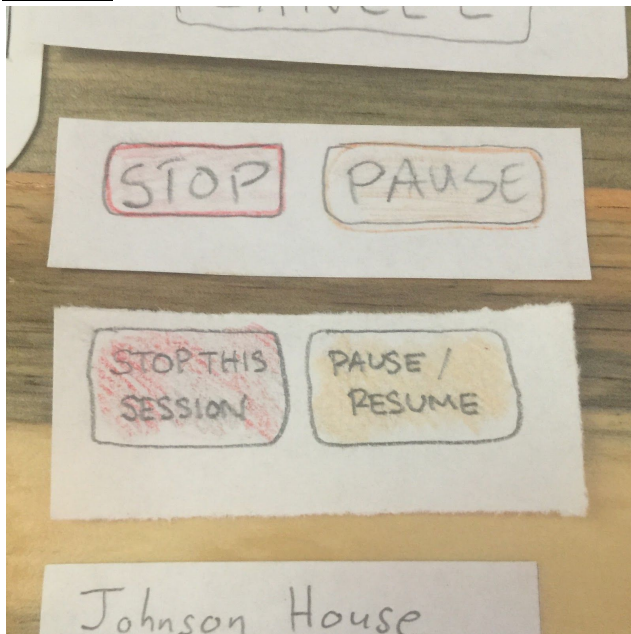
B: Usability Test 2 Critical Incidents

Critical Incident #1 - Pause or Stop - Severity: 2

Katniss navigated to the tracking page from the home screen and started tracking for the specified job. When it came time to stop tracking, she wasn't sure if she should tap 'Pause' or 'Stop' in order to finish tracking mileage. She had a hunch that she needed to press 'Stop', and did so.

Much like the incident with Ginny, she was confident that once she knew what both buttons did, she would not have any issues remembering their intended functionality. However, in this case, because two users had now expressed difficulty with the app at this point, we decided that we needed to make a revision to the flow.

Revision:



Buttons now contain more detail in regards to their intended functionality.

Critical Incident #2 - Reset - Severity: 3

After simulating mileage tracking and successfully saving the track to the "Johnson House" job, Katniss expressed that she expected to stay on tracker screen, as opposed to being taken to the home screen. She felt that it was expected behavior to have the mileage reset for a new track if needed, and would simply press the back button if it was not needed.

We had approached this app with the thought that when the owner gets to a destination, they would need to use the application for other functionality, such as logging time, before tracking mileage again. Their whole point of the mileage tracking was to not have to hit start and stop at intervals along the route, nor should they have to enter in addresses for each and every stop. We figured that once the owner was done with the mileage of the job, they would be done

and want to move on to other scenarios. With that in mind, the only revision needed if we did decide to incorporate this feedback would be to show the same screen the user would see once they selected the Track Mileage button instead of taking them back to the home screen. As we feel this feedback does not add significant value to our application, we did not make any revisions.

Revision: None

Critical Incident #3 - Positive UX Flow - Severity: 4

After sending an invoice, the user was taken back to the job list. After the test was done, Katniss agreed that this was intuitive behavior and specifically commented that this was one place where the app made the most sense to her, as if the app were anticipating her next move. She appreciated that, and said that it made the app feel more polished.

Revision: None

C: Usability Test 3 Critical Incidents

Critical Incident #1 - Should I Stay or Should I Go - Severity: 2

When adding expenses to the tracker, Tyler finished up, hit 'Save', and was then taken back to the main screen. He expressed dismay with this, and explained that he had expected to stay on the 'Add Expense' screen after hitting 'Save', and that he didn't believe that the user should be dragged along without their consent.

This made sense to us, but not for the reasons he mentioned. We realized that perhaps there are multiple jobs that need expenses added to them, but given that we already have a dedicated back button, we simply changed the flow to leave the user on that screen instead of taking them back to the beginning. No UI changes were needed.

Revision: None

Critical Incident #2 - Taxation Without Representation - Severity: 4

When adding up the invoice, Tyler mentioned that he didn't see a breakdown of the totals on the invoice, and questioned whether that was something that was being sent to the customer, or if they just saw the total like he did.

Tax, and the tracking there of, is very important to a business. Regardless of whether or not we had intended to include tax in the invoice, it is something that should be included on the invoice screen for the user to see as it is a cost nevertheless. Transparency is important to our design; we need to allow the user to feel like they are in control.

Revision:

