

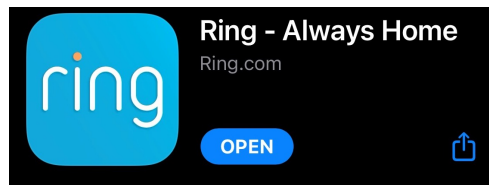
# HCI Project

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## 1. INTRODUCTION

I chose to redesign the Ring app. Ring is a home security company that offers a variety of smart devices for the home including doorbells, security cameras, locks, smart lighting, and thermostats. Their most well-known product, and the product whose mobile interface I will be discussing, is the doorbell. The doorbell is a security camera that attaches by the front door of a house or apartment. It has a button that visitors can press that will make a noise and trigger an app notification to alert the residents. From the app, users can see a live view from the doorbell to see who is at the door.

To get a feel for the app, download “Ring” from the app store, as shown in *Figure 1*. Open the app and create a free account. If you have a ring camera, you would set it up now and it would appear on the main screen along with the default view. Scroll around the homepage and the side navigation to familiarize yourself with the content. If you have a Ring camera, select it and watch the live view.



*Figure 1*—Ring app on the app store.

By default, there are ten shortcuts across the top of the homepage, but only two of them will have any content unless the user has another type of device, like the light or lock, and has set it up. The edit shortcut allows the user to choose which shortcuts to display. With a doorbell set up, the front door camera will appear below the shortcuts. Below that there is a section of promotional material that a user can swipe through but not remove. At the bottom, there is a section the user can tap to set up a new device. Unlike the promotional section, the section for setting up a new device has an “x” in the corner so that the user can minimize it.

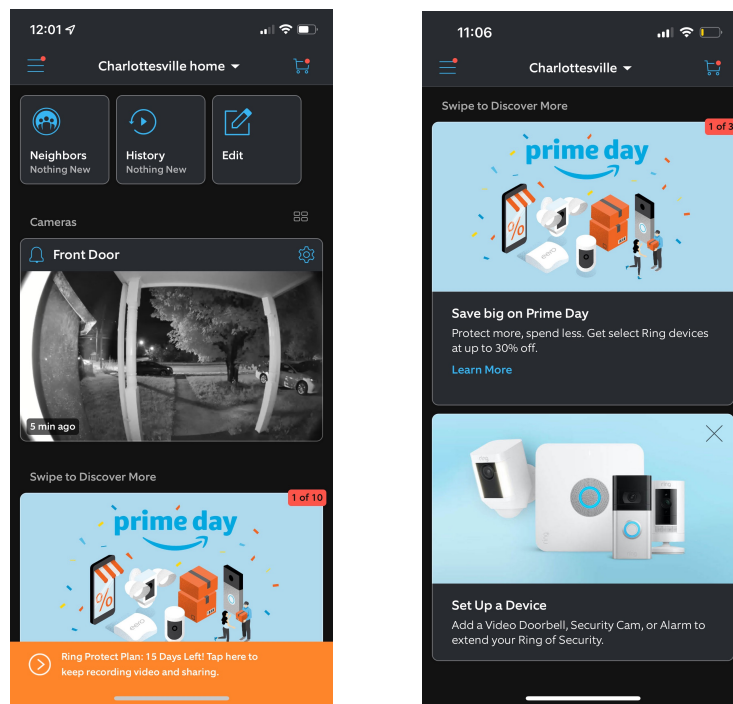


Figure 2—Left: Ring app with camera set up. Right: Bottom of the home page has promotional material and “Set Up a Device.”

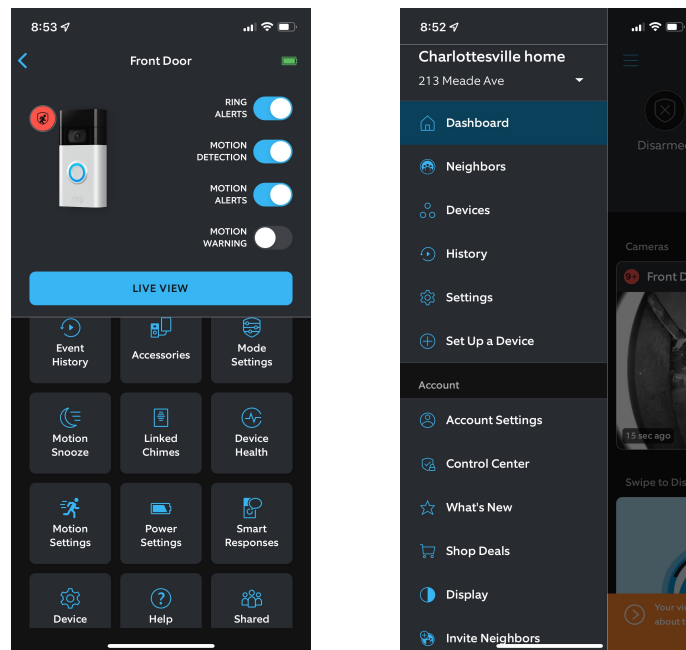
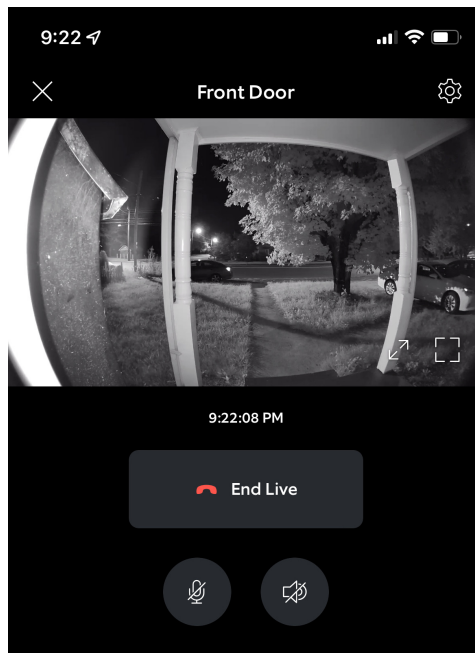


Figure 3—Left: Settings menu. Right: Side navigation.

Tapping the three parallel lines in the upper left will bring the user to the side navigation, which allows the user to navigate through the main screens in the application, as seen on the right in Figure 3. Tapping the gear to the right of the

camera will bring the user to the settings menu, seen on the left in *Figure 3*, which allows the user to navigate through the main camera actions and settings. Tapping the camera itself from the homepage will bring the user to the live view of the camera. On the live view, the user can pinch and drag the screen to manipulate the view. The microphone icon controls whether the user can transmit sound from the camera, and the speaker icon controls whether the user can hear the sound from the camera. See the live view in *Figure 4*.



*Figure 4*—Camera live view.

## 2. INITIAL NEEDFINDING

### 2.1. Needfinding plan

For initial needfinding, I will conduct interviews with five Ring users of various experience levels (ranging from one month to over 6 years of experience) recruited from among my family and friends. I will take notes during the interviews in order to more readily analyze results. I will first ask the participants the following general questions to answer a few data inventory questions.

- How long have you been using the Ring app? (Who are the users?)

- How often do you use the Ring app? (Who are the users?)
- Where do you use the Ring app? (Where are the users?)
- When do you use the Ring app? (What is the context of the task?)
- What are your most common activities on the Ring app? (What are their tasks?)

Next, I will ask the participants to share their phone screen and to walk me through their most common activity on the app. After, I will ask them the following questions. This will give me more insight on the users' goals, needs, and sentiment.

- What was your goal and were you able to accomplish it? (What are the users' goals?)
- Were there any points in which you were confused or didn't know how to proceed?
- Are there any tasks you wish you could accomplish via the Ring app that you are not able to accomplish? (What do they need?)
- What do you like about the app?
- What do you dislike?

## **2.2. Needfinding results**

Full notes from the interviews can be found in *Appendix: Needfinding notes*. The main takeaway is that the main application interfaces and flows need to be simplified. The interviews taught me that it is common for users to be away from the house and engaging in other activities when they are using the Ring app. Because users' attention may be occupied by another activity concurrently with their use of the Ring app, the app should focus on simplicity to help reduce the cognitive load on the user while their attention is split. To this end, users need their main screens and flows to be clutter-free.

One frustration that came up more than once was with the side navigation and settings menu. Users felt that the organization of the items in the side navigation and settings menu didn't make sense and expressed general confusion. One example given was that the "Notifications" under settings is only for email and not for app notifications, which are under "Public Safety." Overall, I think the side navigation and settings menus can be more effectively organized. Some instructional text or informative icon could even be added to the settings to help the user understand what each settings menu item contains.

I learned that one common activity is checking the camera on an ad-hoc basis to check the current view. One frustration that multiple participants reported was that the homepage view of the camera looks like it is a live view, but it's not. The homepage view of the camera is the latest saved shot the camera took, which could be hours in the past. So to accomplish the goal of checking the camera on an ad-hoc basis, users have to open the app, click into the camera, and then click "Tap to Go Live" in order to see a live view. This flow should be simplified, especially given the first takeaway that simplicity needs to take priority to address the need of the multitasking user.

Another common goal for users is to check a camera as a result of a notification about an event, usually detected motion. Participants reported two related issues with this activity. One participant reported that sometimes the loading times on the app are so long that by the time they respond to an alert, the person has already left. Another participant reported that sometimes the camera says it's "processing" the event recording when they respond to an alert rather than taking them to the live view. Users need to be able to immediately view the event they are notified about. If the event were something dangerous or malicious, the user would need to know right away. Any delay between the user responding to the notification and viewing the event keeps the user on edge that much longer than necessary. If the event has concluded, the user needs to be taken to the recording. If the event is still in progress, the user needs to be taken to the live view. This necessitates an improvement in app response times, plus an improvement to the existing flow to direct the user to the appropriate view when responding to a notification (recording or live view).

### **3. HEURISTIC EVALUATION**

The homepage does not work well since it is full of clutter and thus violates the simplicity principle. As shown in *Figure 2*, about a third of the homepage real estate is devoted entirely to promotional material that cannot be dismissed. The user has no say in what content they are shown here, and the content may have no relevance to the user, so it is clutter. The top widgets also take up a disproportionate amount of real estate for their utility and are the first thing in the interface, even above the cameras. The contents of the widgets are readily available from the side menu and are likely not the first thing you want to see when opening the app. Emphasizing clutter of the promotional material and

widgets over essential content increases the cognitive load on the user, so that the user focuses on the interface rather than the task, preventing the homepage from becoming invisible. This also decreases the usability of the application, especially in situations that require the user's attention, such as driving or exercising.

One thing that works well and is immediately invisible is the live view. Because the live view shows a video of a physical space the users recognizes as the owner of the camera, the user will immediately have a strong mapping between the live view and the physical space it is showing (see *Figure 4*). The strong mapping allows the user to identify the space they are viewing and the location of the camera from which they are viewing it. The live view also successfully incorporates direct manipulation by allowing the user to pinch the screen to zoom and swipe to drag the camera view from one side to another. This allows the user to feel like they are interacting with the camera itself, rather than a visual representation of the camera. Finally, the live view incorporates familiar icons that are consistent with those across the industry. For example, it uses an icon of a microphone to control whether the camera is transmitting sound, and a speaker icon to control whether the audio from the camera is transmitted. The use of mapping, direct manipulation, and consistency makes the live view interface immediately invisible so that the user feels like they are interacting with the camera itself rather than the interface.

The side navigation does not work well in aiding the user in understanding the structure of the application. The side navigation groups everything into two buckets: things relating to your Ring devices, and everything else, which is thrown under the "Account" section (see *Figure 3*). For example, "What's new" is included under the "Account" section even though it contains nothing about the user's account. Instead it contains everything from what's new about the user's devices, to what's new about the application itself, to what new products are available from Ring. This violates the structure principle, which states that the interface should be organized in ways that helps the user's mental model match the actual content. The side navigation violating the structure principle makes the application more difficult to learn because it hinders the user in forming a useful mental model of how the application is structured.

The settings menu also does not work well. It does not do a good job of describing what types of functions are available beneath each option, making the available functions difficult to learn (see *Figure 3*). As a result, there is a large gulf of execution for actions and tasks located beneath the settings page. The app hides functions beneath settings options that are not descriptive, violating the principle of discoverability, which states that relevant functions should be made visible. This makes it more difficult for the user to identify what they can do and how to accomplish their goal. For example, if a user is continually missing notifications for events, such as a package delivery, the user has the ability to adjust the sensitivity of their camera. However, a novice user may have difficulty identifying the intention to make this adjustment because the setting is not readily visible. And even if they do know they can take this action the lack of discoverability makes it difficult to identify actions and execute in the interface. From the settings interface, the user has to be able to identify that the sensitivity of the camera is under “Motion Settings” rather than any other settings menu options such as “Device Settings,” “Mode Settings,” or “Power Settings.” Because of the lack of discoverability creating a large gulf of execution, it will take more time for the user to learn how to use the app, decreasing the rate at which the user learns (shallow learning curve) and increasing the amount of time needed for the interface to become invisible.

#### **4. INTERFACE REDESIGN**

The first screen I redesigned is the “Homepage” screen. See *Figure 2* for the existing design and *Figure 5* for the redesign. I removed the clutter below the cameras and instead filled the screen with the main content, the cameras themselves. I renamed the screen to “Cameras.” Instead of the cameras showing the most recent still shot, they show the current live view. The user can tap the name or live view of a camera. The selected view will then fill the screen and can then be pinched and dragged to zoom and adjust its view. There will be an “X” in the upper right corner to bring the user back to the main screen.

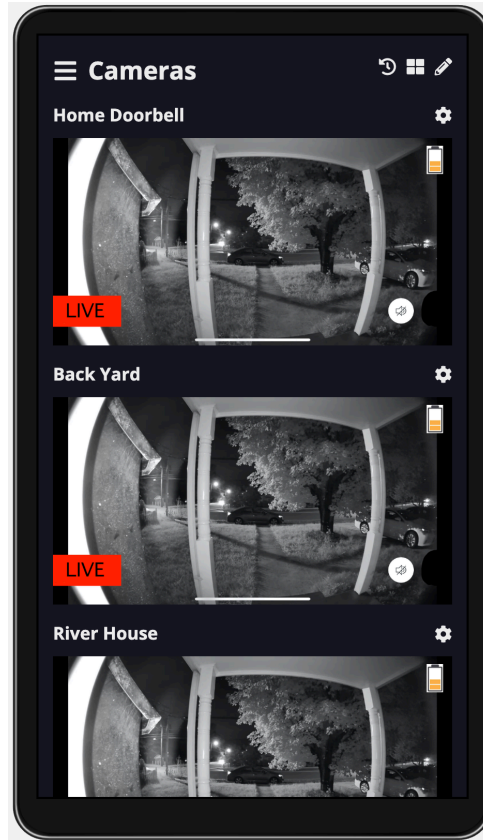


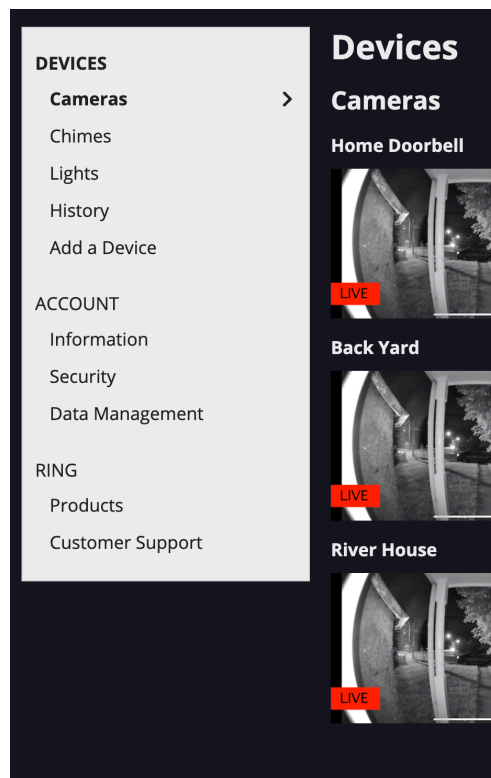
Figure 5—“Cameras” screen replaces the current “Homepage.”

The three parallel lines to the right of “Cameras” text will open the side navigation (See *Figure 6*). The back icon to the right of “Cameras” text will bring the user to the event history, the icon with four squares will condense the view of the cameras to display them in two columns rather than one, and the pencil icon will bring the user to an edit screen where they can rearrange the order of the cameras, as well as remove and add available cameras. The gear icon to the right of the camera name will bring the user to the settings page (See *Figure 7*). The icon in the upper right of the live view shows the battery percentage of that camera in red/amber/green according to whether the percentage is low, medium, or high. The “Live” banner indicates that the view is live, and the icon in the bottom right toggles whether sound from the camera is played.

The next redesign is the side navigation, which will be available throughout the app by tapping the icon of three parallel lines in the upper left hand corner. See the existing design in *Figure 3* and the redesign in *Figure 6*. I reorganized and



renamed the options. One main difference is moving the options to select a different device type from the “Homepage” to the side navigation. Only the device types that the user actually owns and uses will be available on under “Devices” in the side navigation, along with “History” and an option to add a device. The “Account” section will hold all the options related to the user’s account: information, security, and data management. The “Ring” section will hold all the options related to the company itself: products, and customer support. The name of the interface that the user is currently on is bolded and has an arrow icon in the side navigation. When the user makes a selection, the menu will collapse to the icon of three parallel lines and the selected interface will appear.



*Figure 6*—Redesign of the side navigation screen.

The final redesign is the settings page. See the existing design in *Figure 3* and the redesign in *Figure 7*. I simplified the top banner by removing the “Live View” button, the red icon, and the settings in that top section. I added the camera status and enlarged the camera name. The settings on the top banner in the existing design would move under “Motion Settings” in the redesign since

they have to do with motion detection, warnings, and alerts. I reorganized and renamed the settings options so that they are more conceptually cohesive and useful. I also added textual descriptions of each setting option, plus relevant icons.

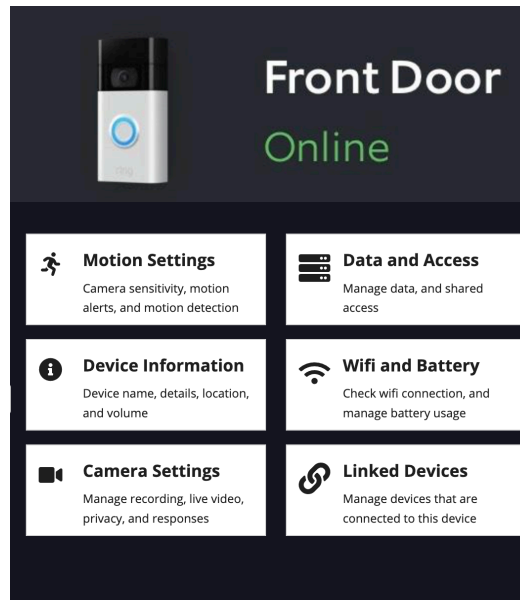


Figure 7—Redesign of the settings screen.

## 5. INTERFACE JUSTIFICATION

The redesigned homepage (now “Cameras”) firstly addresses the criticism expressed by interview participants that the screen should show the live views of the cameras rather than the most recent still shots, which are often hours in the past. The redesign replaces the outdated captures with a live view from each camera. This saves the user at least two taps each time they check the live view of the camera, which was identified as a particularly common task in needfinding. Because the user is able tap the camera to enlarge the view and have the existing live view experience with its use of mapping, direct manipulation, and consistency, the redesign still preserves the positive elements of the existing interface.

I used recognizable icons on the “Cameras” screen, leveraging consistency with applications across the industry to make the available actions immediately identifiable to the user. This allows more actions to be immediately discover-

able to the user without cluttering the screen with too much text, maintaining the simplicity of the screen. Additionally, I removed the clutter from the screen by eliminating the promotional material and moving the widget functionality out of the screen and into the side navigation. The redesign addresses the main weakness of the original screen identified in the heuristic evaluation, which was the clutter and resulting lack of simplicity. The redesign adheres to the principle of simplicity, reducing cognitive load on the user, which is particularly important since needfinding revealed that users are often out of the house and splitting their attention when using the app.

For the redesign of the side navigation, I focused on creating the most logical and useful groups. The redesign addresses the main weakness of the original screen identified in needfinding and the heuristic evaluation, which was the poor organization and resulting violation of the structure principle. The redesign of the side navigation adheres to the structure principle to create a representation of the organization of the application, allowing the user to create a mental model of it. The highest-level groups together encompass all of the functions of the application. The “Devices” group contains all the devices the user has set up, the history of events for the devices, and the action to add a new device. The “Account” group contains account information, security, and data management. The “Ring” group contains a catalog of Ring products, and customer support. These groupings reflect the main categories of activities available in the application, in accordance to the structure principle. Displaying the groupings in the side navigation will teach the user the structure of the application and create a useful mental model of the application for them.

For the redesign of settings, I again focused on creating logical and useful groups, according to the structure principle, as well as removing clutter, according to the simplicity principle. However, I also included some explanations of what types of actions and settings are available for each item to address the lack of discoverability identified as a weakness of the interface in the heuristic evaluation. In the original design, users have to tap into each settings item in order to understand what each one contains. As mentioned in the heuristic evaluation, this decreases the learnability of the application and broadens the gulf of execution. The inclusion of instructional text increases the discoverability of the actions and settings available in each settings option, as well as adheres to the documentation principle. It is not self-explanatory what each item

in settings means or contains, so the additional informational text allows the users to identify actions from settings, decreasing the gulf of execution.

## **6. EVALUATION PLAN**

Since the redesign is iterating on the existing design and is relatively mature, I will evaluate it empirically. The control condition will be the existing Ring application interface. The experimental condition will be Ring application redesign described above. I will seek to answer whether the redesign increases the efficiency of checking the live view and adjusting the camera sensitivity. The independent variable is the design of the application. The dependent variable is the efficiency, quantified by the time to complete the task of checking the live view of the camera and adjusting its sensitivity. The null hypothesis is that the Ring application redesign does not increase the efficiency. The alternative hypothesis is that the Ring application redesign does increase the efficiency. Efficiency will be measured by the time it takes participants to check the live view of the camera and adjust the sensitivity.

I will recruit 25-50 participants to participate in the evaluation from among the public, family, and friends. I will use the within-subjects method to increase the amount of data gathered, and to allow comparison of the interfaces on the same individual. Each participant will experience both the control and experimental treatments. The order in which participants see the treatments will be determined randomly to avoid bias from assigning a certain kind of person to experience one treatment before the other.

For both treatments, the participants will be instructed to check the live view from their camera and to adjust the sensitivity of the camera. In the control treatment, the participants will use the existing Ring app to complete their task. In the experimental treatment, the participants will use the new Ring app design to complete their task. After the first treatment, participants will take a five minute break, then they will complete the remaining treatment. I will time each trial, generating interval data. I will compare the times to complete the different treatments using a student's t-test to see if there is <5% chance the difference could have arisen by random chance. If so, the alternative hypothesis will be accepted and I will conclude that the redesign is more efficient than the existing design.

I will do my best to make sure that variables beside the redesign of the interface are limited as much as possible. Otherwise, differences in the treatments unrelated to the design of the application could account for the observed differences in efficiency. For example, if the response times are slower for the redesign than we might not accept the alternative hypothesis assuming the slower time is due to the design when, in reality, it is due to the slower loading times. To prevent this, the redesign prototype will be fully functional and as consistent with the existing interface as possible. The fidelity of the prototype will match that of the existing interface. Response times will be as similar as possible. Differences in accessibility or stylistic choices could also be lurking variables so options like font, color palette, button size, and contrast will also match the existing interface.

## **7. APPENDIX: NEEDFINDING NOTES**

- How long have you been using the Ring app?
  - Participant 1: One month
  - Participant 2: 6 years, started with doorbell then expanded
  - Participant 3: 5 years (hard to find this info)
  - Participant 4: since 2016
  - Participant 5: One month
- How often do you use the Ring app?
  - Participant 1: Couple times a week (whenever I get notifications)
  - Participant 2: daily because I get alerts
  - Participant 3: 3-4 times a day for a couple of seconds (average 41 seconds)
  - Participant 4: every day
  - Participant 5: every day
- Where do you use the Ring app?
  - Participant 1: Whenever I'm away from the house
  - Participant 2: Away from home, maybe at the gym, doing a different activity like exercising
    - Tend to look when someone rings the doorbell
  - Participant 3: Away from home

- Participant 4: usually at home, but whenever I get an alert I check it. I'm actually more concerned about an alert when I'm home because I get scared.
- Participant 5: usually at home because I work from home, but also on vacations
- When do you use the Ring app?
  - Participant 1: more likely at night
  - Participant 2: any time of day whenever I see the alerts
  - Participant 3: whenever I get a notification
  - Participant 4: afternoon because that's when deliveries happen
  - Participant 5: mostly during the day when I get a notification and am awake to notice it
- What are your most common activities on the Ring app?
  - Participant 1: Check the Ring camera. Would rather not use the app for anything else actually.
  - Participant 2: Reviewing video footage of motion alerts, seeing who's at the door
  - Participant 3: check who's walking in/out of the house or dropping things off
  - Participant 4: I check to see who's at my door. Couple time it's helped me because I didn't know there was a hole in my fence and my dog got through. Sometimes there's a community feature and I get notifications for those but usually ignore because they'll report gunshots but it's never gunshots.
  - Participant 5: I check the alerts

Next, I will ask the participants to share their phone screen and to walk me through their most common activity on the app. This will give me more insight on the users' tasks, subtasks, and needs. After, I will ask them the following questions.

- What was your goal and were you able to accomplish it?
  - Participant 1: I was, but it was difficult because I failed to set up the camera once and there's a whole other tab for the failed setup.
  - Participant 2: I click on an alert and can see my wife is backing out of the garage, I also look at footage from earlier on the history view

- Participant 3: I was able to check my camera. I had to switch to view all cameras.
- Participant 4: Typically to see what movement is at the front and yes, I am able to accomplish it because I get a clear view into what happened. I don't know if Ring has zones, but it would be nice to tell me if something is a person vs an animal.
- Participant 5: I was able to check the alert by clicking on the notification
- Were there any points in which you were confused or didn't know how to proceed?
  - Participant 1
    - Yes, it was difficult to find the location with the camera. The app added two locations with the same address and it was very difficult to navigate to the other location. I only found it because I noticed the small arrow by the address on the side menu.
    - You would think that the camera is a live feed, but it's not. You wouldn't know unless you read the small print in the lower corner.
    - Also the buttons on the live feed that both expand the camera are not intuitive that one expands horizontally and one expands vertically.
  - Participant 2
    - Adding a device is extremely easy. I wish that the view of the camera would update more often. You have to click in to get the camera to update
  - Participant 3
    - Wifi issues with the Ring: sometimes you would click into the notification and the camera would not be connected
      - Hard to troubleshoot where the issue is
      - Wifi, camera, app
  - Participant 4
    - When it says there's an event and I click on it but then it says it's processing that's confusing. Why doesn't it take me to the go live?
  - Participant 5
    - Not really

- Are there any tasks you wish you could accomplish via the Ring app that you are not able to accomplish?
  - Participant 1
    - I would like to hide the widgets
    - I would like to delete the location that was added by accident
    - I would like to get rid of the neighbors functionality
  - Participant 2: No
  - Participant 3: yes! I don't want the Ring to chime when I'm leaving my own house
  - Participant 4: I don't think so. It does what I need it to do
  - Participant 5: Have the home page show the live view
- What do you like about the app?
  - Participant 1
    - If you are on the camera view, it is the first thing on there
    - History organization makes a lot of sense
  - Participant 2
    - I like the alerts that let you know there was motion, that's what drives me to the app
  - Participant 3: It shows me who is at the door, but I could get that from any other service. It shows both cameras at once.
  - Participant 4: It helps me feel safe in the house
  - Participant 5: It's fairly easy to check the cameras and view events
- What do you dislike?
  - Participant 1
    - The widgets should only show up if you have them
    - Hate the "Discover more"
    - Edit should let you add a device
    - Have to view every single product to get rid of the notification
    - General confusion over settings:
      - Why is there a control center and account settings?
      - Can't change preferences for neighbors under neighbors
        - Actually you can, but this is called "customize neighbors" which sounds like adding neighbors
      - Can't change anything about my data under general privacy, I have to go to data



- Third party service providers contains cookies settings? Why?
  - Notifications is only for email and not for app notifications, those are under public safety
- Don't know how to get rid of red notifications throughout the app
- I hate how the shop button in on the top right
- Device details under health doesn't make sense
- Why is there a red dot by the device? Makes me think there's something wrong
- Participant 2
  - Doorbell is overly sensitive. The tree moving will trigger an alert specifically on the doorbell. The other cameras are much better.
- Participant 3
  - Loading times: by the time I open the notification the person is already gone
- Participant 4: Community notifications
- Participant 5: I don't like that it is so hard to find settings. I think there is a lot of clutter on the navigation and settings menus. And the categories and organization of settings don't make sense to me.