

Smartphone Navigation on the Appalachian Trail: A Usability Test on
the mobile application *FarOut*

by

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Abstract

This report details a usability test on *FarOut* (formerly Guthook), a mobile app widely used by long-distance hikers for trail navigation and information. The objective of this test was to identify key issues with the usability of the *FarOut* app, while simultaneously discovering what about the user experience makes *FarOut* widely successful in the thru-hiking community, and what can be improved in the app to make it more useful to hikers in the future.

The test was designed to collect both quantitative and qualitative data. Qualitative data was collected using a series of survey instruments and interviews. Quantitative data was collected while users completed scenario-specific tasks. The results showed that time—and thus technologies designed to save hikers time—was significant to thru-hikers and must be considered in future iterations of the app. Recommendations include an improved layout with more precise organization and labeling of buttons and pages, a permanent (off-line capable) tutorial system, the addition of a new page that locates all options for trail information, making all links and phone numbers clickable, and correcting zoom functions in map views. These changes will positively impact the user experience by reducing users' time spent on the app, clicks necessary to perform functions, and mental energy spent learning how to use the app—all of which will help users reach their goals of completing long-distance trails with more ease and convenience.

Introduction

The father of the Appalachian Trail, Benton MacKaye, was an avid outdoorsman born in 1879 who sought out to catalog the entire world (Hanson, 2014). From an early age, MacKaye surveyed the woods of northern New England, blazed trails, and encouraged various trail clubs in the state to link their trails together to form a network. When health problems slowed his stride, MacKaye became more of an “armchair” trail advocate and would develop an idea for what we know today as the Appalachian Trail (A.T.) (Hanson, 2014). In his proposal for the A.T, he stated that “Life for two weeks on the mountain top would show up many things about life during the other fifty weeks down below (MacKaye, 1921).” MacKaye’s utopian vision of the trail included three different kinds of communities: community camps or small clusters of private homes for “recreation, recuperation, and for study,” food and farm camps, and agricultural settlements along the trail (Hanson, 2014). His proposal to develop the A.T. acknowledged the benefits of human connection with nature and its essentialness to healthy human life. MacKaye believed that establishing a continuous trail from Georgia to Maine could function as a remedy to the stress of a rapidly developing society and help people come back to themselves and reconnect to one another.

The Appalachian Trail means something different to everyone who steps foot upon it, and today, some three million people attempt the trail or visit parts of it each year (Appalachian Trail Conservancy, n.d). Navigating the wilderness is no easy task; this is especially true of the A.T., where guidebooks and maps are essential to a hiker’s safety. More recently, trail navigation has become more accessible with the popularization of smartphones. My research centers around the leading mobile application for long-distance hiking called “*FarOut*” (formerly “*Guthook*”). *FarOut* is an application (app) that provides information to hikers as they hike the trail. Not only

is the information more in-depth than typical guidebooks or maps, the app is loaded to a smartphone, which almost all hikers must carry, adding no additional weight to a pack. *FarOut* dominates the market and is an undeniably useful tool, but presents critical usability issues that should be fixed. This thesis details the results of a usability test that tested key features of the app and user satisfaction in order to determine if there was room for better development in future iterations. Usability tests are commonly conducted on digital products, but anything can be usability tested: websites, software, and new phones or devices. Testing the usability of this particular application was important to promote greater accessibility of the A.T. and to ensure hiker safety.

Background

What is usability testing?

Usability testing is a popular UX (User Experience) research method. It is a reliable and productive way to bring humans back to the center of our technical systems. Usability is defined as “a measure of how well a specific user in a specific context can use a product/design to achieve a defined goal effectively, efficiently and satisfactorily” (Interaction Design Foundation, n.d.).

In a usability-testing session, “a researcher (called a facilitator or a moderator) asks a participant to perform tasks, usually using one or more specific user interfaces. While the participant completes each task, the researcher observes the participant’s behavior, listens for feedback, or times tasks (Moran, 2019). Usability tests aim to identify problems or pain points in the product’s design, discover opportunities to improve, and to learn about the target user’s behavior and preferences (Moran, 2019). Usability testing is important because the ways developers map a wireframe (overview of a page structure, layout, user flow & intended

behaviors [Hannah, 2021]) doesn't always reflect the way a user would navigate the app. This can result in user frustration and therefore impacts user uptake and use.

Brief History of Usability & Technical Communication

Technical communication is a field that aims to make specialized information more understandable to people who need the information to solve a problem or complete a task. Technical communication can include communicating about specialized topics, communicating through technology, or providing step-by-step instructions about how to do something (Society for Technical Communication, n.d.). The act of communicating technical information exists alongside any technology (or tool) invented or used. Neanderthals teaching one another how to sharpen flint during The Stone Age were practicing technical communication, but technical communication did not become a critical practice until the first and second Industrial Revolutions.

Complex, new technologies and machines operated by the working class required technical instruction and the codification of technical information. Technical writing emerged as a way to distribute specialized information to non-technical audiences. This period of time introduced new genres of technical writing, like operation manuals for the steam engine (Hoblyn, 1842), service manuals for the Model-T (Ford Motor Company, 1927) and descriptive manuals for the telegraph (Shaffner, 1859).

Still, technical communication was not formalized and officially recognized as a profession until the 1940s and 1950s. The technologies of war used during World War I, II, and later the Cold War, Korean War and later Vietnam War, required significant exchange of technical information (Kimball, 2016, p.6). After World War II, when technologies used during

wartime (like herbicides, flu vaccines, and computers) were mass produced and new technologies that catered to a consumer market proliferated, technical writing became even more important (O'Hara, 2001, p. 503). Military specification documents, memos on flu precautions (U.S. Medical Department, 1918), training manuals for tanks (U.S. War Department, 1943), and field regulations for soldiers conducting operations (U.S. War Department, 1939) serve as examples of documents that introduced new genres of technical writing.

Historically, in those eras, technical communicators “ focused on efficiency, expediency, and streamlining processes, not the human experience” (Jones, 2016, p.344). Modern scholars in the field argue that a turn towards social justice is necessary in order to create practices “beyond the technology and toward the social contexts and processes . . . that positively impact the mediated experiences of individuals” (Jones, 2016, p. 344). Taking a humanistic approach to technical writing and usability studies places value on the individual and their experiences that was absent in the historical roots of our field. This approach helps us understand that our work is never neutral or objective, but always imbued with the values of which our field began (Jones, 2016, p. 345). Using this approach when usability testing is a way that technical communicators can work to ensure that we are “including end users in the design of information and communication technologies” and in turn, designing technological interventions that are more justice. Technologies that are more human-centered and meaningful are most usable (Putnam et.al, 2016, p. 447).

Usability & Mobile Apps

Mobile applications are ubiquitous and they have forever changed the way that humans use their phones. Mobile apps are constantly being created and updated to solve users' problems.

Want to find out how often you snore at night? No problem; there's an app for that. Want to track your menstrual cycle? No problem; there's an app for that. *42 Matters*—an app intelligence and analytics company that provides products and services for mobile businesses—uses their software to illustrate the data that there are 2.04 million apps currently on the market in the Apple App Store, with an average of 855 apps being published per day (42 Matters, 2022a). Every week, 23% of the top 1000 mobile apps are updated at minimum once per week and 72% of the top 1000 are updated at minimum once per month (42 Matters, 2022b). Conversely, 3.36 million apps are currently available on the Google Play app store, with 2,916 apps published per day (42 Matters, 2022c). Similar statistics surrounding updates exist for Google Play apps, with 28% of the top 1000 apps being updated at least once a week, and 63% of the top 1000 apps being updated at least once per month (42 Matters, 2022d). Updating apps is critical to supporting existing features, introducing new ones, and increasing user engagement (Oragui, 2018). But determining what needs to be improved in an already-designed app is more complicated. In order to figure out what needs to be updated, app developers must understand what issues users face and how they can solve users' problems while also maintaining brand integrity and reliability of use. Usability testing offers a low cost, highly efficient way to “get inside the habits of the users in order to be able to understand the cultural norms that are operating there” (Pope-Ruark, 2019, pp. 444-445).

Usability testing mobile apps is the “least expensive option to verify ideas at any stage: prototyping, pre-release, or post-release” (Kalinin, 2020). When a usability test is conducted *before* an app is launched, it can help resolve design issues that would otherwise complicate the user experience and be costly to fix down the road. Companies want their apps to be user-friendly and users want to easily navigate through their apps.

I chose to study this particular app because there is a lack of usability research on mobile long-distance hiking apps. I found it particularly interesting that the leading app for this purpose, *FarOut*, had little research done on its usability. I discovered a case study where a UX designer created a competition app for *FarOut* called *Traverse*. The designer incorporated many of *FarOut's* elements into what they described as a less clunky, more refined design (McMahon, n.d.). However, this case study did not focus on the specifics of *FarOut* nor test its usability—instead, they tested their own prototype that was based on *FarOut's* design. I also discovered the portfolio of *FarOut's* previous Director of User Experience, which led me to the only discoverable example of a formal usability test done on the app (Symon, 2020). Symon made impactful changes to the app during her time with the company that greatly impacted its' usability, like the categorization of an otherwise overwhelming icon system. But, two years have passed since then and good design is iterative; the overarching goal of usability testing is to continuously improve the design, not just tweak its weaknesses (Nielsen, 2000). So, I aim to open the conversation back up about *FarOut* and investigate ways to make trails more accessible and usable using mobile apps.

Usability & Hiking

Recreational hiking trails are for all people: people of different backgrounds, interests, and experiences. Trails are meant for all people, so they must be usable. Considering hiking trails through the lens of technical communication, it's necessary to point out that trails are not neutral; they are more accessible to some groups (like the physically fit, people with off-road vehicles or expensive hiking gear) than others (people with disabilities, communities without trails nearby).

In the view that trails are not neutral, I maintain a humanistic approach that places values on the individuals who trails are not as readily available to and their experiences hiking (Jones, 2016, p.345). It's important to address these social contexts in the turn towards social justice in technical communication due to the lack of this consideration in the historical formations of our field.

According to the U.S. Department of Agriculture (USDA), “a useful trail must be easy to find, easy to travel, and convenient to use” (USDA, 2007, p. 10). The USDA has even published specific guidelines called the Forest Service Trail Accessibility Guidelines (FSTAG), an example of a technical document, in order to help hikers “recognize and protect the environment and the natural setting while integrating accessibility where possible” (USDA, 2007, p.10). According to a 2021 study with mobile hiking app *AllTrails*, the number of individual hikers in the United States using the app in 2020 increased 134.7% compared to 2019 with over 1.3 million users (Ronto, 2021). Given the substantial number of people who hike, it is crucial that our trails are accessible and trail-related applications are useful and intuitive.

First, it is important that hiking trails are usable, or easy to use/access, so that people have the ability to reap the benefits of being in nature. Though people have many different motivations for hiking, one of the primary reasons people spend time in nature is to find clarity in a world of chaos and overstimulation. Other reasons include exercise. Beyond its cardiovascular benefits, hiking also strengthens bones and muscles and improves balance and heart conditioning, and is known to improve mental health and relational health. In fact, a 2013 study in Japan found that:

Walking in the forest environment may promote cardiovascular relaxation by facilitating the parasympathetic nervous system and by suppressing the sympathetic nervous system.

In addition, forest therapy may be effective for reducing negative psychological symptoms (Lee, et. al., 2014).

It is important that hiking trails are accessible and maintained because trail usability promotes environmental conservation. Hiking trails allocate space to enjoy the outdoors but they also preserve the natural environment. Accessible trails “provide necessary links between fragmented habitats and tremendous opportunities for protecting plants and animal species” (American Trails Staff, 2013). Acting as a buffer between built and natural environments, trails promote conservation by enhancing the value of open space to the public, functioning as an environmental classroom for all, and providing safe options for transportation which reduces air pollution (National Parks Service, 2008). Additionally, greenways prevent soil erosion and filter pollution caused by agricultural and road runoff, guarding the lands along rivers and streams from man-made environmental stressors (Connecticut Department of Energy and Environmental Protection, 2018). A usable trail means that a habitat has been preserved.

When trails are created, the trail designers think about its potential users as well as how the trail may affect that area’s natural environment. The USDA suggests that when a new trail is designed, it must be designed sustainably. Sustainable trails are those without tread (to protect water quality, the natural ecosystem, and to combat erosion). Trails meet the needs of their intended users, provide a positive user experience, and do no harm to the natural environment (USDA, 2007, p.5). The USDA continues that “the trail crew’s task is to keep water off the tread and keep the users on it” (USDA, 2007, p. 6). Trail creators consider that users of the trail will take the path of least resistance when hiking– meaning they will create their own trail if they see an easier route for whatever reason (USDA, 2007, p.10). If there is an apparent shortcut, say a

visible way to cut a switchback, trail creators may put rocks around the switchback so that users are not tempted to get off the trail and so that the soil is protected from erosion.

Finally, it is essential that hiking trails are usable for purposes of hiker safety. Trail markers, paper maps, and guidebooks have been enduring tools for trail usability and hiker safety. Trail markers are typically blazes of paint on a tree, symbols chiseled into a tree or rock, or cairns (a stack of rocks) that help hikers stay on the right path (Wachtel, 2012). The quality and consistency of trail markers may, however, vary in different hiking locations and depend on the expected users of the trail. While some trails are extremely well-marked, others can be tricky to navigate which can lead to hikers losing their way on the trail.

Paper maps and guidebooks have been long-time tools to promote usability of hiking trails. Paper maps are a reliable resource of trail information that often show hikers the topography of the trails they hike. Studying and having access to topography help hikers understand the land's terrain and slopes, ridges, and valleys. Guidebooks are another reliable tool that help hikers—especially for long-distance hikers. Guidebooks provide useful information about water sources, campsites, shuttles to town, and more. In recent years, though, mobile hiking apps have emerged as a new (and, ostensibly better) tool for hikers, one that combines the best affordances of paper maps and guidebooks with new real-time features like Bureau of Land Management (BLM) overlays for free camping on public land, closures, and cautions.

The Rise of Mobile Hiking Apps

Ten years ago, mobile hiking apps like *AllTrails*, *OutdoorActive*, *FatMap*, and *FarOut* recognized an opportunity to build upon smartphone GPS systems to bring hikers an improved navigational experience. These hiking apps offer new features to hikers that were not previously

possible with physical maps, such as: up-to-date information on trail conditions, real-time GPS tracking, the ability to record personal statistics during treks, and emergency contact capabilities without phone service.

We use our phones for guidance in many ways: for directions to a new friend's house, to wake up on-time in the morning, to set reminders to take medication. I grew up in the information age—by the time I was seven, I had decided that making PowerPoint presentations sounded a lot more fun than Polly Pockets. Growing up, smart-phones were ubiquitous; I grew up right alongside the iPhone. We have been accustomed to having information at our fingertips, information that improves our lives and is easy to use, which is why such apps are popular. With paper maps, some knowledge on map-reading is necessary. Guidebooks require a dedication of time for reading through (sometimes dense) material and memorizing certain tips and tricks. With mobile apps, the information is immediate and requires little expertise other than learning where certain functions and features inside the application are and how to access them. Yet, like any technology, hiking apps are not perfect. Issues include problems of reliability and distraction. Relying on electronic devices in hiking contexts, but especially deep-forest contexts, presents several dangers: devices run out of battery, they get dropped in creeks, and their information is not always accurate.

Ill-equipped hikers get lost at least once a week in the White Mountains of New Hampshire and call the New Hampshire Fish and Game Department to rescue them. A conservation officer that works in the office said, “They try to follow a trail on their phone, which takes them into the woods, and they get themselves so lost” (Lukpat, 2021). Similarly, Mountaineering Scotland reported that “a number of people in the country have been injured after following hiking routes they found online” (Lukpat, 2021). Trimble, a spokesperson for the

American Hiking Society, explained that, “a lot of information on the internet is crowdsourced, so there isn’t necessarily any input from land managers or parks or trail organizations” (Lukpat, 2021). Some also worry that a large part of the experience of hiking, like the satisfaction of navigating the wild without aid and truly connecting with nature, is lost with the use of hiking apps. One avid hiker and outdoors blogger agreed with the rangers. “No longer are we exploring and leading our own way through the woods; we are now simply following” (Zagrodnick, 2022). Cell Phones—especially of intense emotion like nature, concerts, and the beach—can tend to induce moral dilemmas. Often, I feel it’s a result of nostalgia for a time without the need to check your notifications or even take a photo. Despite these factors, the utility of apps makes them worthwhile; more specifically, the hiking apps that can help more people access the outdoors than ever before. The consolidation of maps and guidebooks into one virtual space provides a usefulness that is hard to ignore—especially for those spending extended periods of time on a trail.

While hiking apps may be useful to anyone who wants to navigate outdoor trails, this study focuses on a hiking app catered to people who set out to complete the entirety of the Appalachian Trail (2,190 miles) in one trip. These hikers have needs, motivations, and experiences unlike any other hikers and I chose this sample to usability test the app because a two-thousand mile hike will test the affordances and limitations of the app in ways shorter hikes/novice hikers would not.

What is thru-hiking?

There are several different classifications of hikers who enjoy the Appalachian Trail, but thru-hikers set out to complete the entirety of the A.T., end-to-end, in one hiking season or within

a period of twelve months. I chose to test thru-hikers for this study because they would test the app in unique ways and provide real-time experience about how the app works on the trail.

Methodology

Ethnographic Research

Last year, I spent time conducting ethnographic research on thru-hiking culture on the Appalachian Trail for a semester-long project in an intercultural communication course. My method for this work was compassionate listening: a non-traditional, yet honest and revealing method greatly influenced by professor Dr. Patti's teachings. I also modeled my work after professor Lisbeth Lipari, where I hoped my listening to hikers would come across as "an invitation—a hosting. . . I [didn't] have to understand, although [they] may [have felt] understood" (Lipari, 2010, p.350). I spoke with three veteran thru-hikers with the intention to give them an open space to tell their stories without bounds, no probing, no leading, just listening. My major findings of my study work were as follows:

1. Many thru-hikers are using the A.T. as a form of escape: from a job, from a relationship, or from not knowing what to do next in life. Regardless of one's reasoning for thru-hiking, everyone sets foot on mile-1 searching for something in the thru-hiking experience that they aren't getting in their off-trail lives.
2. The decision to thru-hike automatically enlists them in a community and they feel an immediate sense of comradery with other thru-hikers; they have decided that they are better off with one another and nature than wherever/whomever they were or were with previously.
3. Thru-hikers take on a new identity on the trail that does not exist the same off the trail.
4. Despite the vast wilderness, you're never really alone.
5. The mantra: Hike Your Own Hike (H.Y.O.H.)

A new name, or a “trail name” is just one small factor that shapes a newfound identity of a thru-hiker. Who we are is largely who and what we surround ourselves with; once you’re on the trail, it all seems to fade into the forest. New skills, relationships, instincts, and thought processes slowly cultivate until they realize they are living entirely differently than as the person before. I’ve found that all the thru-hikers I’ve spoken with have experienced some degree of this. I’ve also gathered that there’s an unspoken magic of enduring the trail together, whether you are strangers or not. I spoke to one thru-hiker that tried to sleep alone many nights; even when he tried to stay away, he couldn’t help but make a friend and have a good time with another thru-hiker. A categorizing factor of A.T. culture is a new willingness and ability to immediately trust others and that there’s more likely than not—some good inside of them. Countless spoken and unspoken traits of the trail and the people that hike it have contributed to the mantra, H.Y.O.H. Some use it as a way to defend their choice to walk slowly or perhaps stop at a hippie commune along the way, while others use it to diffuse arguments about whether you can be considered a thru-hiker if you don’t hike every inch of the trail. It means something a little different to everyone, but also a blanket term that connects various people, situations, and experiences. To my understanding, it’s an acknowledgement and appreciation of the privilege that you get to thru-hike anyways; everyone hikes differently, but we all enjoy it relatively the same.

I learned from this research that thru-hiking is not something you can easily quantify or qualify—you have to experience it to understand it. The peace of mind and community that thru-hiking fosters is not something that can be fully explained; it can only be felt. As a technical communicator, I wondered what we *could* understand about the thru-hiking experience, especially as it related to the technology thru-hikers used on their 2,910-mile journeys. In the early stages of my thesis, I reached out to the participants of this original study. I spoke with

them about tools they used on the trail that made their journeys easier. Two of my contacts assured me that *FarOut* was exactly what I was looking for, as it was used or known by everyone on the trail. Though many have conflicting opinions on the assistance of a mobile app on a thru-hike, *FarOut* prevailed as the go-to tool for hiking the Appalachian Trail.

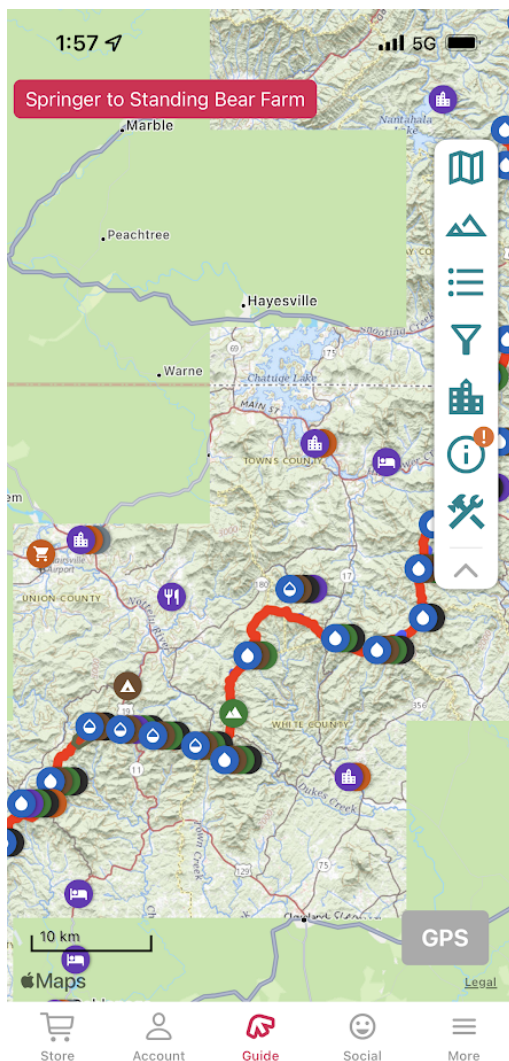
Researching the App

FarOut was created by thru-hikers Ryan Linn and Paul Bodnar and today, several other thru-hikers work as a part of their staff to keep the app running. In a podcast called *Mighty Blue on the Appalachian Trail*, Linn explained his motivations for creating *FarOut* were prompted by his inherent interest in collecting and distributing trail information. He explained that existing guidebooks all had great information, but none of them had *all* of the information hikers needed (Adams, 2018). The earliest version of the app included a guide for the Pacific Crest Trail. This guide was created using Linn and Bodnar's personal notes and experience and *FarOut* was the result.

This is a common way to design applications but the problem with this design method is that the solution reflects the designer's values, attitudes, beliefs, and preferences, not necessarily the end user's needs. If it's true that thru-hikers "Hike Your Own Hike (HYOH)," then usability testing is critically important to an app like this one. According to Conway's law, the structure of software is bound to mirror the structure of the organization that built it (Gilson, 2021). Though *FarOut* was created by thru-hikers for thru-hikers, not all hikers access or use information the same way and so usability testing is important to test developer's assumptions and find ways to customize the app in meaningful ways.

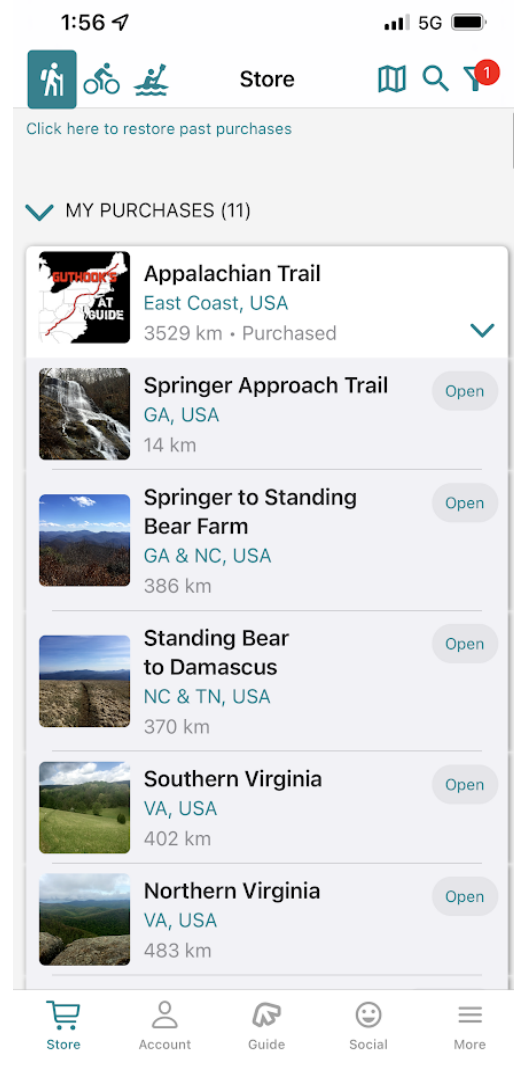
FarOut's Design

FarOut offers 89 different guides for long distance trails across the globe but one of their most important resources is the guide for the A.T., which also happens to be its most expensive guide (\$59.99). Given that I am not a part of the intended user group for the app (because I'm not a thru-hiker) and had no prior knowledge of the app, I turned to an online community on Reddit to learn more about the user's experience with *FarOut*.



FarOut's main page which displays trail guide, access to waypoints, town guide, tools, elevation map.

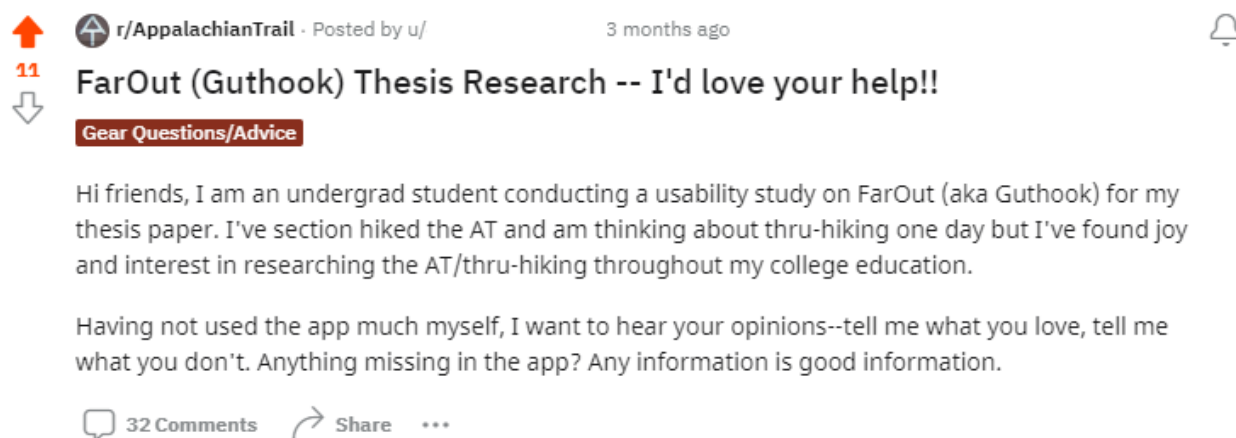
Red line helps users stay on the trail.



FarOut's store page which displays user's current purchases and other guides available for purchase.

Reddit Research

To gather background, I posted to the subreddit, *r/AppalachianTrail*, asking members of the community for their opinions on *FarOut*. My post received several responses that would later help me create the specific tasks I asked my participants to perform. The comments on my post helped me gain a better understanding of what features hikers were using, why they used the app, and what about the app needed improvement.



Findings from the Reddit rhetorical analysis were these:

Why people use FarOut/what it does well:

- The critical mass of users is what separates *FarOut* from competitors
- Links backcountry maps with a trail information database
- Crowd-sourced information for things like water sources and shuttles
- Comments on waypoints helps to avoid someone's previous mistakes
- Takes guesswork out of planning distances and town stays

Where FarOut needs help/frustrations:

- Creates hikers who are too reliant on following the "red line" (GPS route)
 - App fosters loss of navigational skills

- The app should teach people how to read topographic maps, has had the opposite effect
- No ability to see friends locations, despite the capability to follow other users
- Pay barrier: without the app, you do not have the best water information
- Aesthetics and usability need improvement
- Too many waypoint icons
- App resets with GPS background tracking off on trail
- No copy text functionality
- Hikers cannot create their own waypoints for others to see
- Town waypoints out of date or incorrect
- Comment sections are flooded with businesses promoting their services

I noticed that multiple commenters on my Reddit post suggested the addition of features that already existed in the app. Specifically, the ability to mark favorite locations along the trail, to create personal waypoints on the app, and to mark where they sleep every night on the trail. This meant users couldn't find key functions in the app, a significant problem of use.

I continued to search in online communities for user feedback on *FarOut*, which generally resulted in similar comments. I did not find many complaints that the app didn't complete its basic functions; instead, I found that the bells and whistles, like adjusting waypoints and switching between different modes, were lacking. Studying the app more, I began to create tasks that related to online user feedback and the organization of the app.

Test Type and Moderating Technique

The goal of this study was to test participants in real-time as they used the *FarOut* app on their A.T. thru-hike. In order to accomplish this, my chosen testing method was unmoderated remote usability testing (Babich, 2019). This method involves the test administrator supplying participants with tasks which they complete in their own environment, using their own devices,

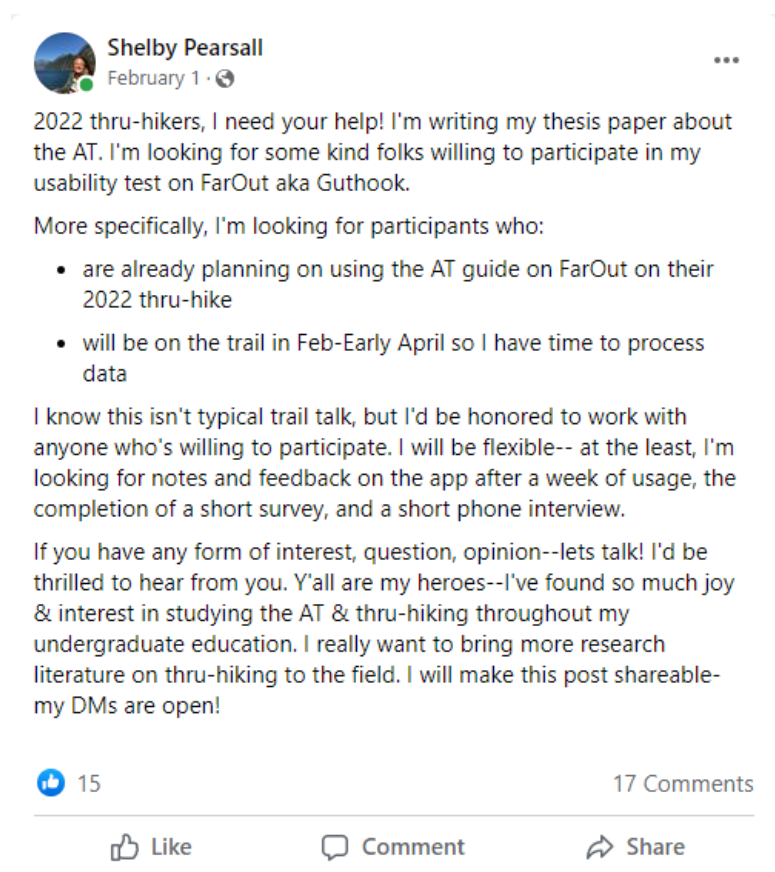
without a moderator present. This method leads to the product being used naturally (Babich, 2019). Remote testing can increase the pool of potential participants, lower costs, and be particularly valuable when users are dispersed across a wide geographical area (Gardner, 2007, p.64). The participants of this study were intended to be people in the current process of thru-hiking the A.T., so remote testing was the best option. Best practice suggests that the time and location of testing sessions are convenient but because thru-hiking is a highly customized, individualized experience that everyone does a little bit differently, determining when was best for users proved very difficult.

I intended for participants to take an online survey that pinpointed specific questions about the tasks once their tasks were complete. Once the survey was completed, I would schedule an interview to implement retrospective probing and gather participants' concluding thoughts on their experiences having used the app frequently. Retrospective probing "requires waiting until the session is complete and then asking questions about the participant's thoughts and actions" (Bergstrom, 2013). This moderating technique was the most feasible given the test structure and the unpredictable nature of contacting thru-hikers.

Recruiting Participants

In order to qualify for this test, participants needed to meet two requirements: to be thru-hiking the A.T. this spring (2022) and to already be planning to use the *FarOut* app on their hike. I also needed hikers who would start the trail in early February-March, so that I could have enough time to conduct and analyze the tests so that I could meet deadlines associated with this project. This significantly narrowed the pool of potential participants because many thru-hikers begin the trail in mid-early April or May.

I first reached out to my contacts from my ethnographic research, but none met the requirements for participation in the study. Given the engagement of my Reddit post, I continued to use social media as a way to connect with thru-hikers and call for participation in my usability test. I joined a Facebook group called “Appalachian Trail Hikers 2022,” which has nearly 60,000



members.

In my post, I briefly explained my purpose of testing the usability of *FarOut*, participant requirements, and what participating in the test would entail. According to Jakob Nielsen, “the best results come from testing no more than 5 users and running as many small tests as you can afford” (Nielsen, 2000). Five is a magic number for usability testing because once insights are collected from the first user, you’ve already

learned almost a third of everything about the usability of the design. Additional users will add new, actionable insight by smaller and smaller increments. By the fifth participant, observers find almost no new data (Nielsen, 2000). I decided to recruit more participants than necessary as a precaution.

Test Design

The design of this test included four separate phases:

1. Participants complete a preliminary survey (see Appendix B).
 - a. Demographics, experience with hiking/app, contact information
2. Participants are sent an optional pre-trail usability test & post survey
3. Participants are sent main usability test & post survey
4. Participants are interviewed by the moderator via phone call

First, participants were sent a preliminary survey. In the recruitment process, it was already determined that the participants were a part of the target audience for the app and the test. The preliminary survey first focused on demographics, so that I could later assess diversity and inclusion in terms of usability of the app. I aimed to gather qualitative data by asking for participants' thoughts on *FarOut*'s cost, value, as well as the hikers' experiences outdoors and with technology intentions with the app.

In the preliminary survey, participants were asked if they would be willing to partake in a pre-trail usability test of *FarOut*. This test was designed to assess their knowledge of the app before using it on the A.T. to give me a baseline of comparison. Estimated time necessary to complete the tasks was also included in order to avoid overwhelming the participants. However, I realize that doing so might also bias results by impressing the participant fallacy upon them that if they weren't completing tasks within the time frames, they weren't "doing it right." I urged them on any appropriate occasion that this could never be the case because with usability testing, any feedback is valuable feedback.

The pre-trail tasks were as follows:

1. Download Waypoint Photos, TopoMaps, USCS National Maps, and USGS Satellite Map for Springer Approach Trail
2. In the TopoMap view, use both the “pinch & scroll” and “double-tap” method to zoom in on the map
3. Switch your offline map from TopoMap to National Map. View the National Map on the guide. Then, switch your offline map from the National Map to the USGS Satellite Map. View the Satellite Map on the guide.
4. Switch to the Elevation Map. Then, use both the “pinch and scroll” and “double tap” method to zoom in on the map
5. Use the Elevation Map to gauge the elevation gain of a climb on the Springer Approach Trail
6. Turn your phone on Airplane mode (or turn off cellular data) and determine how much distance lies between two water sources of your choice
7. Customize your waypoints. Check out and alter (if applicable) which waypoints you would like to view or hide on your map
8. Change the trail guide from Springer Approach Trail to Springer to Standing Bear Farm.
9. Search waypoints for “Barefoot Hills.”
 - a. Launch their website link from the waypoint description.
 - b. Launch their website link from commenter “katiwind” (not the description link).

Although *FarOut* revolves around being used on-site of long-distance trails, the pre-trail tasks were designed to be achievable being off-site so that I could test their knowledge of the app before ever using it on the trail. Using my previous research on *FarOut*, I created the tasks to test both the most common and complained about features of the app such as offline mode, zoom, elevation gain, waypoints, and launching links. I also designed these tasks so that participants would have to take multiple different navigation steps throughout the app so that I would be able to survey the users about the user interface and ease of navigation.

Designing the Trail Tasks

This usability test was intended to understand how real users interact with the app by testing them on features they would likely already use on their hike, such as: navigation, waypoint, comment, and social features. Testing these features would provide information about the navigation of the app, users' needs beyond what is in the app today, and how *FarOut* plays a role in users' goal of thru-hiking the A.T.

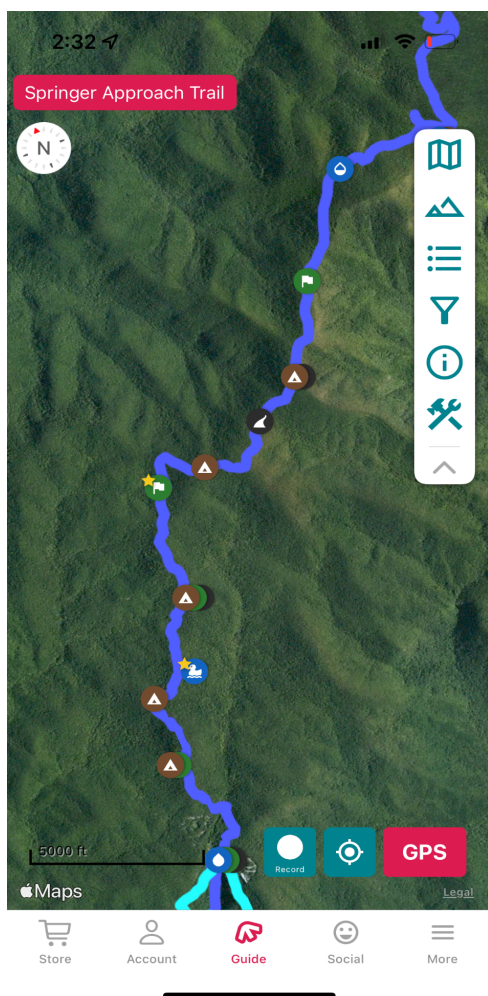
Navigation Tasks

First, I chose to create tasks that dealt with using the app's navigational features (GPS, location services, etc.). *FarOut* would not be the valuable tool that it is without its mapping and navigational abilities, so it was important to address their usability in the test. Two of the navigation tasks, (1) Turn off and on your location & (2) Let *FarOut* run in the background while the phone is on home screen, were inspired by the research I did pertaining to user feedback on the app. There were comments claiming that these functions were difficult to locate or did not perform correctly, so I found it necessary to test these features in the task to determine their usability. The next task asked participants to use the "record" feature for a section of their hike, so that I could determine the relevance and value of this feature. Finally, participants were asked to try out all of the different maps that the app offers—Topographic, Satellite, and National—so that I could assess the function and priority of these maps to each participant.

Waypoint Tasks

Next, a task requiring participants to use waypoints was necessary. Waypoints are a feature that make *FarOut* unique as a thru-hiking app and, perhaps to many, worth the download.

Waypoints are small icons that appear on the app's map and elevation profile that inform hikers about a wide variety of things along the trail, such as: water sources, overnight shelters, hostels, outhouses, viewpoints, and camping sites. These waypoints make much of the information that is written in various A.T. guidebooks more accessible with the ability to compare them with your direct location, rather than pulling out a book or memorizing its contents. When waypoints are clicked on by the user, an individual detail page with photos, descriptions, and comments is displayed. Users are then able to read the comments, add their own, and make judgments about that particular waypoint based on their findings. See the figures below for an example of how waypoints can be viewed along the trail line and how they display information when clicked on.



While the waypoint system alone is a strong factor of what makes *FarOut* so popular, I became curious in my screening process about how users interact with them. There are 43 different waypoint icons which all signify different meanings; I was intrigued to see how intuitive these icons are for users. Next, I collected user feedback from my Reddit post that displayed there was a confusion for some users about how to operate waypoints. Some commenters proposed the idea of the app allowing users to create their own custom waypoints along the trail—a feature which in fact, already exists. This led me to believe there was a disconnect between design and user with how to use this function. These comments, and the organization of the

waypoint system as a whole, presented a necessity to test waypoints with users. In order to investigate these issues further, participants were asked to create a custom waypoint, then view it on the map. By including this task, I intended to assure that participants would be familiar enough with waypoints in order to share their thoughts about both the navigation of the waypoint system and the value of waypoints as a tool on their thru-hike.

Commenting Tasks

The ability to comment on waypoints presents an opportunity for crowdsourcing information about the trail, which makes *FarOut* valuable to users and again, offers something that guidebooks and paper maps cannot. Reddit comments and reviews on the app store suggested that the ability to comment on waypoints and upvote/downvote comments is a strong source of satisfaction for several users. For instance, comments on waypoints may help users know if a marked water source is actually dry or if a campsite only sleeps a certain amount of hikers. This information can help users plan their hikes in ways that were never possible with guidebooks. While guidebooks could tell you where to find water, they could not tell you if the creek had run dry.

Browsing through waypoints, I noticed that some of the comments were not very up-to-date—some waypoints had not been commented on in years. While there is great information to be found within the comments, there is no real incentive or reward system within the app to encourage users to leave a comment on a waypoint. Interested in the reliability, value,

and relevancy of waypoint comments to users, I asked participants to publish a comment on a water source waypoint to either validate or invalidate its status. I also included tasks that tested the functionality of certain comment features, like the “sort” function, the refresh button, and the copy function for phone numbers and links to further investigate how useful, reliable, and easy-to-navigate these functions are.

Social Tasks

Finally, I tested users on the social features of the app. *FarOut*'s incorporation of social aspects into their app is a relatively new addition. Given the omnipresence of social media in our society, social functions could have the potential to promote the user experience ten-fold—that is, if the users are interested. I included social tasks in order to determine if the updating of social media aspects within the app would be something to promote their user experience.

I reached out to *FarOut* employees via LinkedIn, hoping to engage their interest with this study and perhaps offer incentives in exchange for my results. This was not able to be arranged; however, their marketing officer shared that an area that *FarOut* is particularly curious about is the “Social Check-In” feature. The feature launched a couple of years ago and they are interested to see *if* people are using it and *how* people are using it. In order to discover the intentions and value of this function with users, I asked participants to use this feature and send a check-in. I would later ask participants if they found this function useful; if so, I would ask if it were more useful to use with other hikers or with friends and family.

The “share your location” function is strikingly similar to the “send a check-in” function, so I also included this as a separate task. The “Send A Check-In” can be accessed in several

different pages of the app, but it requires that the user have followers on the app. This feature gives users the ability to add a personal message and notifies the user's followers of their location. The "Share Your Location" function requires that the user click on the icon that marks their current location on the map and can only be accessed this way. This feature allows users to share their current location via text message, e-mail, social media platform, etc. By including both tasks, I aimed to discover whether or not users could differentiate between the two features' locations within the app and their respective purposes. Asking that the participants complete social tasks would later assist in uncovering the value and potential for social media features within the app.

Sessions

All sessions were conducted remotely without a moderator. Participants were instructed to complete the tasks on their own time at their own rate. This meant that participants could complete tasks over days or weeks without the pressure of a facilitator. A limitation of this testing method however, is that metrics like time on task could not be recorded, participants' memory of completing tasks would significantly degrade over time, and there was no sure way to know whether participants were completing tasks or not. No screen recordings were conducted or shared from these sessions because that wasn't feasible given levels of connectivity on the Appalachian Trail.

Designing the Surveys

According to Usability.gov, best practices for developing online surveys include keeping surveys as brief as possible, providing participants with an estimate of completion time up front,

and a mix of open-ended and closed-ended questions (Usability.gov, n.d.b.). I aimed to limit the amount of typing participants had to do so that they would not lose motivation to finish the survey. For example:



Q4

At this moment, how would you describe your relationship with FarOut?

- I'm still pretty confused about how to navigate the app.
- I've figured out the basic features that I'll need to use.
- I've figured out the basic features that I'll need to use, but I want to learn more about the others.
- I am confident using the app and all of its features.
- Other

While this is an open-ended question, I provided example answers in order to reduce the mental energy that participants had to use to complete the survey and therefore hopefully garner better participation. .

Respecting participants' time is considered best practice (Mortensen, 2021). Doing so improves participation and quality of feedback (Mortensen, 2021). Therefore, I created a 10 minute survey instrument that could be completed anytime, anywhere and scheduled a 10 minute follow up interview.

The majority of the questions asked in both the surveys and the phone interview were designed to collect qualitative data like time spent on tasks and ranking the order of various concepts relating to the tasks and the user experience.

Interview Structure

After participants completed the trail tasks survey, I intended to interview them by phone.

Best practice says that participants should always be treated with respect so that they can feel comfortable (Usability.gov, n.d.c). Given this unusual case for a usability test, I considered participants' unpredictable schedules as thru-hikers and inability to know in advance when they will have phone service or internet access in the scheduling process.

These interviews were intended to take place individually. Individual interviews allow for a greater understanding of participants' beliefs, desires, and experiences (Usability.gov, n.d.a). Behind survey screens, this kind of understanding of the user and their experience isn't as accessible. To stay in line with ethical practices, permission was requested from participants to record the session before the interviews began (Usability.gov, n.d.a).

Interview Questions

Interview questions were designed to encapsulate participants' significant takeaways by giving them an opportunity to explain in their own words their experience with the app. The majority of the interview questions were open-ended with the goal of collecting rich qualitative data. Open-ended usability questions allow for more detailed feedback from participants which accelerates the test's goal of understanding the totality of the user experience (Babich, 2019). Still, some close-ended questions were incorporated to work jointly with open-ended questions in order to pinpoint issues with distinct features.

As the moderator, it was important that I follow best practices in designing the interview in order to preserve the integrity of the test. It was important to avoid leading questions that prime the user by inadvertently suggesting a response, so that I could elicit rich, unbiased answers (Pernice, 2018). I also needed to build rapport with the participants before the interview in order to make them feel relaxed, and therefore more likely to remember, talk, and let their

guard down (Pernice, 2018). Asking enough probing questions was essential so that I could gain in-depth information about the motivations and rationale behind participants' certain behaviors, attitudes, and perspectives (Fessenden, 2011). In order to do this, I intended to continuously ask “why” after participants answered questions. However, I realized that this might feel intrusive or uncomfortable for participants, so I planned additional follow up questions that would probe them without it feeling awkward. Finally, I remembered to pay attention to participants' voice inflection and tone so that I might gain more insight on how participants feel about a specific question rather than paying attention to their words alone, which might not have otherwise prompted follow up.

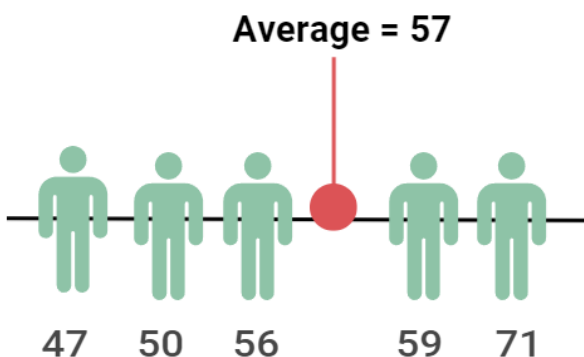
“Plan A” Results

Screening Survey

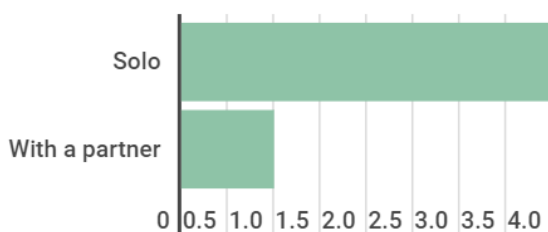
The screening survey received five out of six responses from the participants who initially agreed to participate in the test. From the data gathered, I determined that the pool of participants was comprised of adult males who were planning to thru-hike the Appalachian Trail.

| | Start Date (2022) | Have you thru-hiked the A.T. before? | Have you used FarOut before? | Learning style | Hiking experience | Main reason for using FarOut |
|----|-------------------|--------------------------------------|------------------------------|----------------|------------------------|--------------------------------|
| P1 | April 1 | No | No | Visual | Slightly experienced | Navigation |
| P2 | February 16 | No | No | Kinesthetic | Moderately experienced | Navigation |
| P3 | March 2 | No | No | Kinesthetic | Very experienced | Navigation |
| P4 | March 26 | No | No | Visual | Moderately experienced | Navigation, trail information, |
| P5 | March 14 | No | No | Visual | Moderately experienced | Trail information |

Participant Age Range

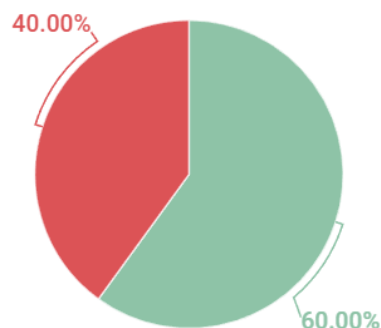


Are you hiking the trail solo or with a partner?



How would you describe your relationship with technology?

I generally have no trouble using and understanding new technology (2 participants).



I can figure out the basics, but don't pay much attention to bells and whistles (3 participants).

1

Participants discovered the app in various ways: one participant had the app recommended by a friend or colleague, one participant discovered the app on a blog or publication, and three participants discovered the app on social media. Some answered that the app's cost was slightly too high, but the results indicated that participants thought the app was generally fairly priced. It was found that hikers had varying opinions on whether or not *FarOut* changes the thru-hiking experience: one participant disagreed, 2 did not agree or disagree, one agreed, and one chose the "other" option and wrote that the app makes thru-hiking safer.

¹ One participant indicated that they had attempted a thru-hike of the A.T. in the past, but did not succeed and did not use *FarOut*.

Additional reports from this survey can be found in Appendix B.

Participant Fall through

While all five participants completed the screening survey, only one of them continued to participate throughout the remainder of the test. This participant provided the only data for the usability test as it was originally planned; they completed some of the tasks, part of one survey, and a phone interview.

Obviously, this was disappointing because it invalidated the study. Communication efforts with other participants were also unsuccessful. Participants viewed the task sheets, but there were no further responses or attempts to reach me. There was a final attempt to contact the thru-hiker participants in hopes that they still had interest in the test, but given the time constraints of my thesis, I was forced to redesign my test for new participants. The modified methodology, tasks, surveys, and interviews are explained in detail under heading “Plan B.” For the purpose of comparison and value of the real thru-hiking experience, I have decided to include the results from the one original participant. Although this data cannot be compared to other thru-hikers’ data as planned, it can be compared to the participants of the new test which will show similarities and differences of the user experience both off and on the trail.

Pre-Trail Test & Survey from Plan A

One response was received for this survey from a male participant, age seventy-one. The survey indicated that the participant was able to complete all pre-trail tasks with the exception of Task 9. This task asked participants to “Search waypoints for ‘Barefoot Hills.’ Then, launch their website link from the waypoint description. Next, launch their website link from the commenter

'katiwind'." The participant left a note in the survey that read "couldn't launch from the comment but it's probably just my illiteracy," blaming himself for what would be discovered as a major usability issue with the app.

They specified that the most useful & most download-worthy (for offline use) features were the elevation map, waypoint comments, and waypoint descriptions. This information tells me that the user is mostly using the app for features that will help them foresee certain specific situations on the trail, such as how steep a climb is or where they can find a ride to town.

The survey results indicated that the participant had a somewhat easy time completing the tasks and found that *FarOut* did a moderately well job of providing information and guidance within the app to complete its functions. Using a scale that measured intuitiveness, they ranked *FarOut* an 8 (1=not intuitive at all, 10=extremely intuitive) and they answered that layout of the information and features on the app are neither clear nor unclear. The participant also indicated that they would benefit a good amount from in-app tutorials of how to use the features within the app.

Trail Test & Survey

The participant did not respond to the survey that corresponded with the trail tasks.

Interview

The interview took place on 30 March, 14 days after the participant completed the pre-trail survey. After some getting-to-know each other, the participant explained that he hadn't

followed the task sheet entirely but had several observations he wanted to share. The following thoughts and observations highlight the main points of our interview session using direct quotes from the participant:

“The app shows you what it can do, but not how to do it.”

The participant’s primary concern with the app was that they could see that it had several capabilities and features, but they could not figure out how to use them. A specific example is provided as they explain their experience using the social check in feature. When they click social, it leads to a screen that says “Invite a Contact.” However, it is unclear to the participant how to trigger people to follow them. They have tried using the “Invite a Contact” link, but said their recipients have trouble following the links. They wished that the “GPS” button on the main screen would automatically drop a pin to his followers, which they said would be their partner and daughter.

My experience with FarOut has been really limited to figuring out how far I am from the next location I’m looking for. I don’t find it intuitive to try to do some of the other things.

Although *FarOut* has a wide variety of features and functions, the participant has only found it easy to use this one navigational function. They share that they prefer using torn out pages from an A.T. guidebook for planning instead, because it gives them the same information of distance between points in a more readily visible format. They do not like having to scroll and search through the map on the guide to find a certain waypoint they are looking for, when that information is already printed and ready from the book pages.

I’m kind of jealous of my time; and the time that I do have, is gonna be spent on camping basics—like setting up and having dinner. And then number two would be contacting

friends and family via text or trying to call. Devoting extra time to an app—doing something of questionable value—would be so low on my priority list that it wouldn't even rank.

P1 reveals that apps with complex organizational interfaces are problematic for general users and perhaps especially for thru-hikers because of how valuable time is on the A.T. The participants wanted easy tutorials within the app, which they thought would greatly benefit their experience using *FarOut*. The participant said that they knew tutorials existed on Youtube, but they would not have the time or motivation to watch long videos after a long day of hiking. They said that if nothing else, tutorials on the *FarOut* website would be useful, but they did not find the sort of instruction they were looking for on the website/

Discussion of Plan A

Plan A failed to deliver data for a formal usability test, but it succeeded in studying and discovering the behaviors of a member of a highly specific user group. The results and data obtained from this test came from a single participant who was only able to complete portions of the tasks, one of two surveys, and a phone interview. Given this outcome, the usability of *FarOut* cannot be sufficiently evaluated using this test model. These results would not comply with the accepted standards and practices of usability testing. However, given the fact that data collected from participant 1 of any usability study typically yields at least one-third of the available insights to be uncovered (Nielsen, 2000), this information should not be thrown out.

Plan B

Modified Method

When it became apparent that it was not possible to continue the test with the original thru-hikers, I modified my plan so that *FarOut* could be tested locally in Boone. The new

participants were not thru-hikers, but they were local members of my community who share an interest in backpacking and hiking. Though this test would not test A.T. thru-hikers, the app's primary audience, I could still test how easily/difficult users completed tasks and interacted with the app.

This test design was nearly identical in design but I chose to moderate the test. I conducted the test using the same methods and instruments: screening survey, pre-trail tasks/survey, trail tasks/survey, and interview. Moderating the test came with certain affordances: I could now measure time-on-task, task completion rates, record participants using the device during sessions, and map haptic responses (which fingers and gestures users used to navigate the interface). Access to such data would better measure the effectiveness of and efficiency of the current iteration of the app and offer insights that were not possible with the previous test design.

Given the constraint of time, participants were recruited quickly. The only requirement to participate was that participants had an interest in hiking. All participants were college students at Appalachian State, ranging in age from 21 to 23. Based on the participants' preferences, the sessions either took place in my home or in their home. This concession was given so that I could make participants feel comfortable and therefore improve the chance of participation and test completion.

Once participants understood the purpose and definition of the test, a consent form was signed and they were prompted to complete the screening survey. Once the screening survey was complete, participants were handed a hard copy of the pre-trail task sheet that was identical to the original testing copy. Participants were instructed that there was no right or wrong way to complete the task and that if they felt they wanted to stop attempting a task for any reason, they

could². In this test, participants were prompted with scenarios for each task so that using the app would feel more natural. Participants were timed and recorded with a camera that captured their screens, hand motions, and vocal responses as they completed the tasks. As I observed participants, I took notes about the patterns and methods they used to complete their tasks. Once participants completed tasks, they were asked to complete the pre-trail survey, trail survey, and then concluding interview. Retrospective probing remained the major technique for this interview session.

Modified Tasks

Pre-trail Tasks

Scenarios were added to correspond with each task that were verbally read to the participants at the start of a new task. I felt that scenarios became necessary in this test design because the participants were not completing these tasks with the same intention of using them on a thru-hike. So, these scenarios helped provide context so that participants would be more inclined to engage with the interface and pretend to be using these tasks for the purposes of a real thru-hike (McCloskey, 2014). Implementing scenarios helped me stay on top of accurately timing the tasks, while also helping the app feel a little more familiar to the participants, who were all first-time users of the app. The scenarios for the pre-trail tasks were as follows:

1. Imagine that you are getting ready for your thru-hike and want to make sure you have all of the maps for the first trail downloaded so you can use them offline. Download waypoint photos, topographic maps, satellite maps, and national maps for the springer approach trail.

² [1] It is best practice for humans subject testing to inform participants that they may withdrawal from testing at any time without penalty, loss, or providing a reason (University of Nevada, 2021).

2. You are curious about how steep some of the hills are on the first section of the trail. Find the topographic map and zoom in on an area using both the “pinch and scroll” and “double tap” zoom methods.
3. You are curious about what sort of information the National Map will tell you. Switch your offline map to the National Map. Then, check out the Satellite Map.
4. Next, you are curious about how many miles uphill you are gaining on a climb on the Springer Trail, so switch to the Elevation Map. Find one hill you will have to climb and figure out how many miles you will gain walking up this hill.
5. You’re concerned that you won’t be able to find water with the app without phone service. You want to test this, so turn your phone on airplane mode and then determine how much distance lies between two water sources of your choice.
6. There are some waypoints that are really helpful to you, but some that you don’t care about. Customize your waypoints and choose which ones you would like to view/hide on your map based on your hiking preferences.
7. You want to be prepared to change the guide on the trail when you finish the Springer Trail. Change the guide from Springer Approach Trail to Standing Bear Farm.
8. You want to know how to find lodging and hostels using the app, so you’re prepared when you’re on the trail.
 - a. Search your waypoints for “Barefoot Hills.”
 - b. Launch their website link from the waypoint description
 - c. Find the commentor “katiwind” and launch the link in her comment.

Trail Tasks

The original tasks were designed to be completed after having at least a week's experience using the app on the trail. Although this was no longer possible, I decided to include the pre-trail tasks in this test so that participants would still have some prior experience using the app before completing this series of tasks. Although on a much smaller scale, this choice allowed for time and experience with the app to be considered as a factor that affects the app's usability.

To help better emulate the user experience, scenarios were created for the participants to follow as if they were thru-hikers on the A.T. The scenarios were as follows:

1. You're on the trail and aren't going into town until tomorrow morning, but it's only 10 A.M. and your phone battery is almost dead. Turn off your location to save battery. Then, turn it back on.
2. You don't know which map you prefer the most to guide you on your hike. Switch around between the different maps and see which one you would prefer while hiking.
3. You want to know how many miles you are hiking today and at what rate so that you can stay on track with your goals. Use the "record" feature to start recording a section of your hike.
4. Imagine that you want to mark your exact location so that you can come back to this spot and visit another time. Create a custom waypoint for this location, then view it on the guide.
5. Find a waypoint of your choice and sort the comments by date.
6. Imagine you are looking for a hotel/hostel waypoint so that you can spend the night in town. Find a lodging waypoint with a phone number and link in the COMMENTS. Copy and paste that phone number/link.
7. Refresh the comments for updates.
8. You just got into town and have an internet connection, but the online map is not on the map you like. Change your ONLINE map from to the map of your preference.
9. You want to let your followers know that you're in town. Send a check-in.
10. You want to let your family know your location. Share your location with them on a platform of your choosing.

Modified Surveys

The original versions of surveys were copied and modified to better fit the new participants. No additional questions were added to the surveys and irrelevant questions were deleted. For example, in the screening survey questions like *Are you hiking Northbound or*

Southbound were deleted. No changes were made to the pre-trail survey. One change was made to the trail test survey, deleting the question that asked about the deleted task.

Modified Interviews

The interview questions remained the same with the exception of one question that was deleted because it was irrelevant given the new testing conditions. The interviews took place immediately after tasks and surveys were completed..

Plan B Results

Results showed that *FarOut*'s design was unclear to new users. The navigation is unclear; participants had to spend too much time and too many clicks to find basic features of the app like map choices and location sharing. The app lacks guidance and direction, leaving users confused and needing to spend time getting familiar with the app in order to use it properly. Buttons are uninformative and users could not retain which buttons completed which functions. Some features—instead of being difficult to use—did not function at all, like double-tap zoom and hyperlinks. Despite these issues, participants deemed *FarOut* a valuable resource they would use on their thru-hike due to features like waypoints and comments, social functions, and the ability to function completely offline.

This test provided new and different data sources for each participant: three surveys, one recorded interview session, two recordings of task sessions, time spent on each task, completion of task, and notes from my observations while moderating the test. I first created a demographic profile for my participants. Then, I analyzed quantitative data collected from the survey using the time-on-task recordings. The task times helped diagnose usability issues as often,

time-consuming tasks are caused by problems with the interface (Sauro, 2011). I took special note of outliers – times when a participant took a noticeably shorter or longer time to complete a task compared to the average and, where possible, tried to account for these differences. Next, I reviewed the recorded task sessions and analyzed them, paying special attention to finger paths and the buttons they clicked or attempted to click as they tried to complete a task. Finally, I watched the task videos, read survey responses, and listened to their interviews.

Participant Demographics

The remainder of this report will refer to participants as the following: P1, P2, P3, P4, and P5. The participants included three women [P1 (Age 22), P2 (Age 21), and P4 (Age 21)] and two men [P3 (Age 22), P5 (Age 23)].

| | P1 | P2 | P3 | P4 | P5 |
|---|-------------|-------------|-------------|-------------|-------------|
| Employment | Student | Part-time | Part-time | Part-time | Part-time |
| Learning style | Visual | Kinesthetic | Visual | Kinesthetic | Auditory |
| What would be your main reason to use this app? | Information | Navigation | Information | Navigation | Information |
| Is this app valuable to regular hikers? | Yes | Yes | Yes | Yes | No |



All participants have completed some college and used an iPhone to complete the tasks. None of the participants have attempted or completed a thru-hike of the A.T. or any long-distance trail; no participants have previously used *FarOut*.

Pre-Trail Test

Task Completion Rates

Task completion rates (or success rates) are a strong method of identifying problems with usability. Tasks are based on the users' goals; if participants cannot complete these tasks, then users cannot complete their goals. For instance, no participants were able to complete tasks



Success Metrics

Participants are depicted in numerical order to illustrate who completed which tasks.

P1 P2 P3 P4 P5



Completion

% participants that completed task



Failure

% participants that did not complete task



Task 1:
Download Waypoint Photos, TopoMaps, USGS National Maps, and USGS Satellite Map for Springer Approach Trail



Task 2:
In the TopoMap view, use both the "pinch & scroll" and "double-tap" zoom method



Task 3:
Switch offline map from Topo to National > view, then from National to Satellite > view



Task 4:
In Elevation Map, use both "pinch and scroll" and "double tap" zoom method



Task 5:
Use the Elevation Map to gauge the elevation gain of a climb on the Springer Approach Trail



Task 6:
In Airplane Mode, determine how much distance lies between two water sources



Task 7:
Customize your waypoints. Check out and alter which waypoints you'd like to view and hide on your map.



Task 8:
Change the trail guide from Springer Approach to Standing Bear Farm.



Task 9:
Search waypoints for "Barefoot Hills." Launch their website link from both the description & a commenter.

Summary Data

Completion Rates by Participant and Task

| | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 |
|----|----|----|----|----|----|----|----|----|----|
| P5 | | | | | ✓ | ✓ | ✓ | ✓ | |
| P4 | ✓ | | ✓ | | ✓ | ✓ | ✓ | | |
| P3 | | | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| P2 | | | | | ✓ | ✓ | ✓ | | |
| P1 | | | | | ✓ | ✓ | ✓ | | |



Highest success rates:
Tasks 5, 6, 7



Highest failure rates:
Tasks 1, 2, 4, 8, 9

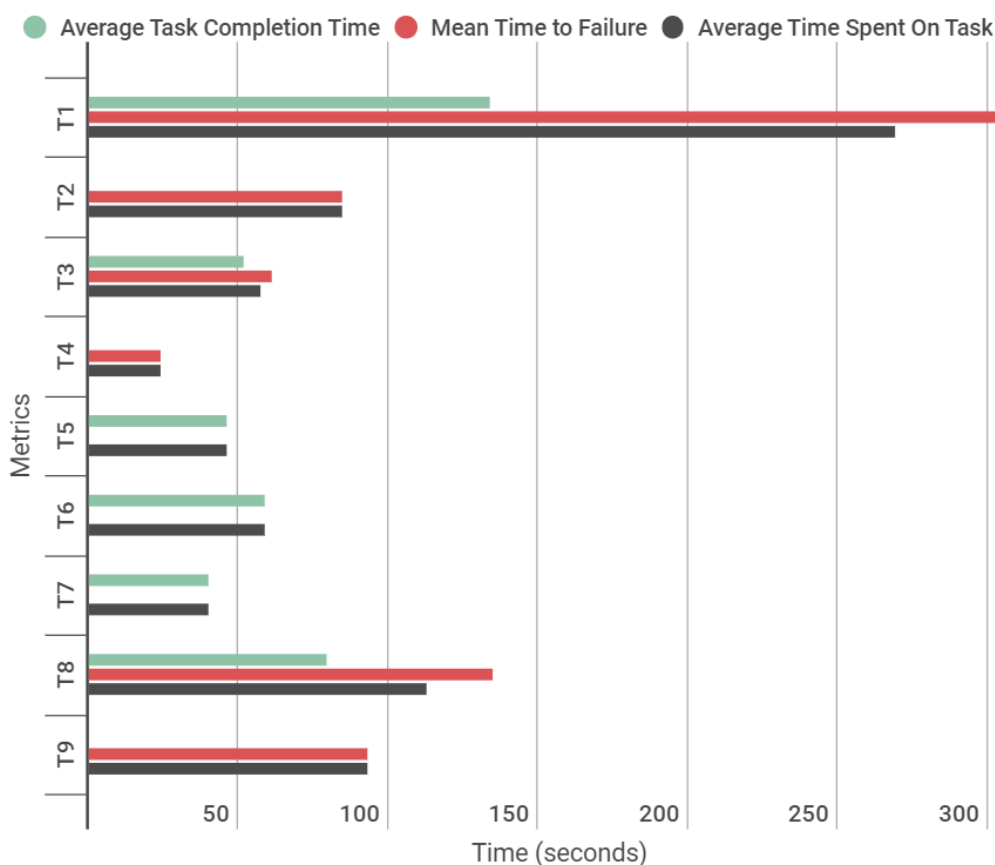
something wrong with these features or the user experience. However, all participants were able to use the elevation map to gauge the elevation gain of any incline on the trail. This tells us that something is likely wrong with the zoom function itself, rather than a navigational issue.

Time-on-task

I measured (1) Average Task Completion Time (average of times from users who successfully completed the task only); (2) Mean Time to Failure (average spent time on tasks before participant gives up or completes task incorrectly); and, (3) Average Time on Task (average of time spent on a certain task by all participants whether they are successful or not). If participants are spending long periods of time on a task, it means the feature is not working properly or it is not obvious enough to the user. Tasks that take longer to complete—and still result in failure—are strong indicators of major usability issues. For example, see the time metric

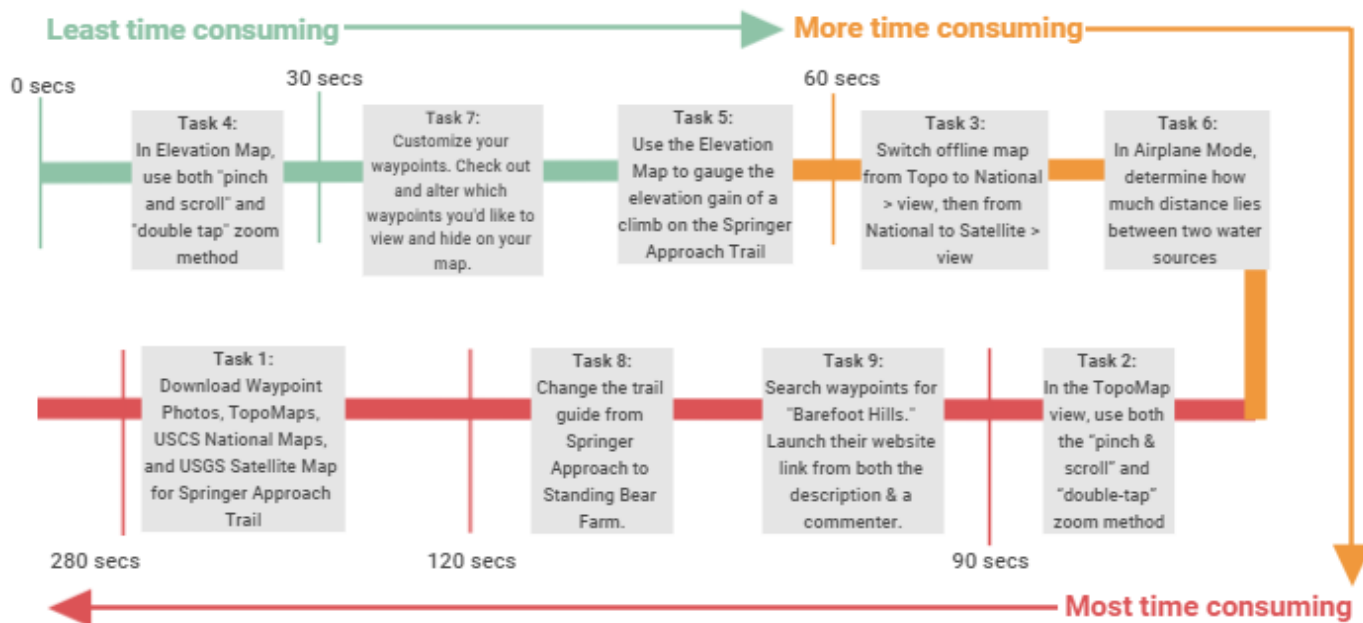


Time Metrics






graph above. Task 1’s average task completion time and mean time to failure both exceed time spent on other tasks Similarly in Task 8, some participants took longer to reach an incomplete task result than those who completed the task successfully.

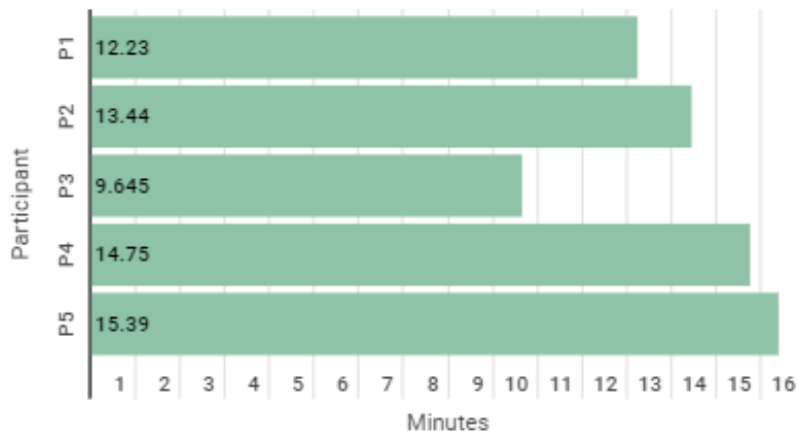
Average task times from least to most time consuming



Summary Data

-  **Least time consuming tasks:**
Tasks 4, 7, 5
-  **Most time consuming tasks:**
Tasks 1, 2, 4, 8, 9
-  **Average Time for Pre-Trail Tasks:** 13 min., 10 sec.

Average Time Spent on Pre-Trail Tasks, by participant



Test Observations

Tasks With Highest Completion Rates

Task 6: Turn your phone on Airplane mode (or turn off cellular data) and determine how much distance lies between two water sources of your choice.

Completion Rate: 5/5

This task was relatively quick and easy for participants to complete. The familiarity of knowing how to access Airplane mode may have helped; water waypoint is very clear on the app. None of the participants used the scroll-down feature that automatically tells you where the next water source is; instead, they found the nearest water waypoint on the app and mentally calculated the distance.

Tasks With Lowest Completion Rates

Task 1: Download Waypoint Photos, TopoMaps, USCS National Maps, and USGS Satellite Map for Springer Approach Trail

Completion Rate: 1/5

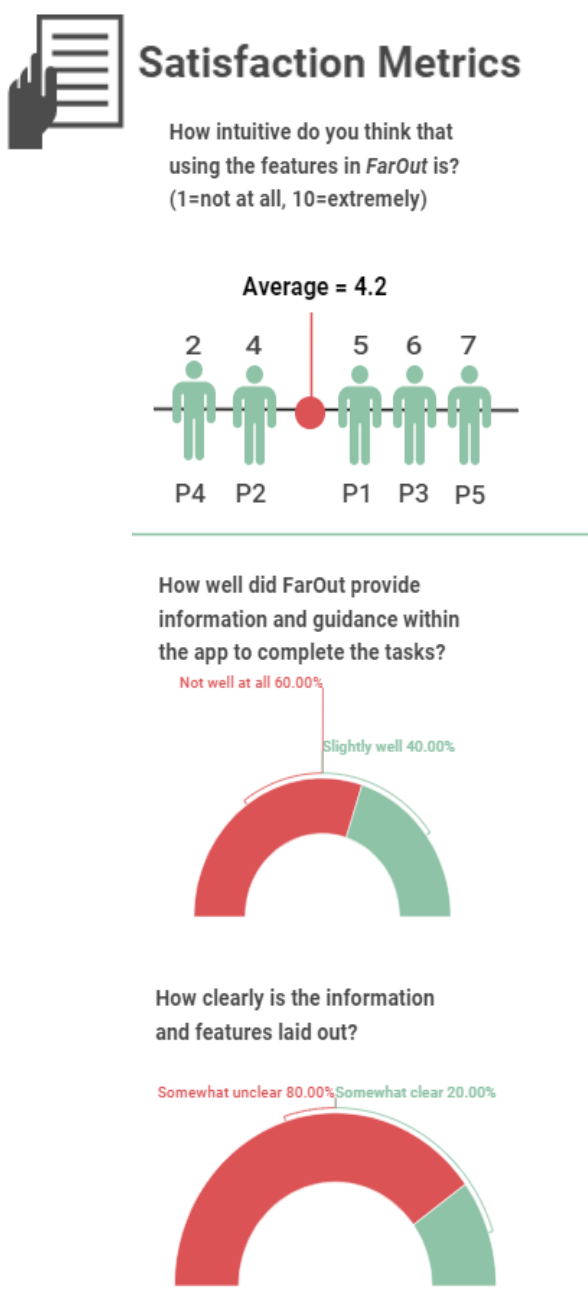
This task was the participants' first encounter with the app and took an average of four minutes and forty-eight seconds for participants to complete/give up attempting to complete. All participants repeatedly searched for the download function in the main screen taskbar. Participants often scrolled through the waypoint menu, zoomed out on the map, and clicked several different tabs to try to find this function. Participants clicked on the "More" menu that displays settings—where the function is—but only one thought to click "Settings" in order to achieve this function. The other four struggled for several minutes before giving up on this task.

Task 4: Switch to the Elevation Map. Then, use both the “pinch and scroll” and “double tap” method to zoom in on the map

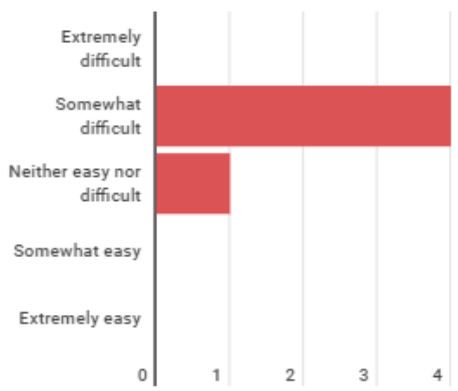
Completion Rate: 0/5

Double-tap zoom feature does not work in Elevation Maps for any user. Pinch and scroll zoom works, and double-tap and pinch and zoom work in Topographic Maps.

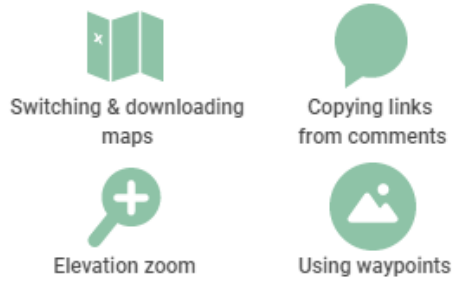
Survey Results



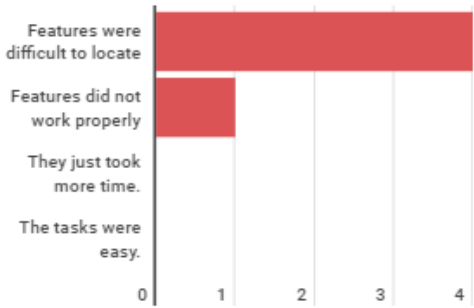
Overall, how difficult was it to complete the preliminary tasks using FarOut?



Most difficult tasks:



Why were lower ranked tasks more difficult?



Trail Test

Task Completion Rates



Success Metrics

- **Completion**
% participants that completed task
- **Failure**
% participants that did not complete task

Navigation tasks



Task 1:
Turn off and on your location using the app.



Task 2:
View Topo, Satellite, and National Maps.



Task 3:
Use the "record" feature.

Waypoint task



Task 4:
Create a custom waypoint. Then, view it on the guide.

Comment tasks



Task 5:
Sort the comments by date on a waypoint of your choice.



Task 6:
Publish a comment on a water source waypoint.



Task 7:
Copy a phone number or link from waypoint comments.



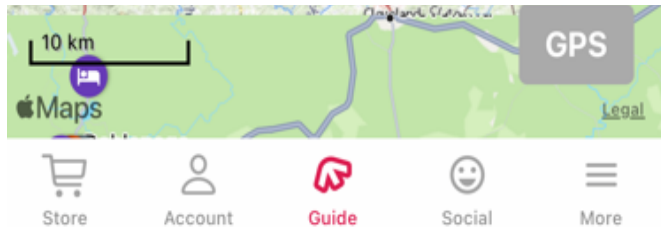
Task 8:
Refresh comments for updates.

Test Observations

Task With Highest Completion Rate

Task 11: Send A Check-In.

Completion Rate: 5/5



This task was easy for participants to access because the social button is very obvious in the bottom menu bar. There are other locations within the app where you can access this feature, like the tool icon, the

account page. At this point in the test, participants had seen this feature several times while looking for other ones, so it seemed to become familiar where this feature was when they needed it. Task 3 had the same success rate for the same reason; additionally, these tasks had been viewed by participants several times prior when completing other tasks. Familiarity with the functions likely contributed to high completion rates throughout the second series of tasks.

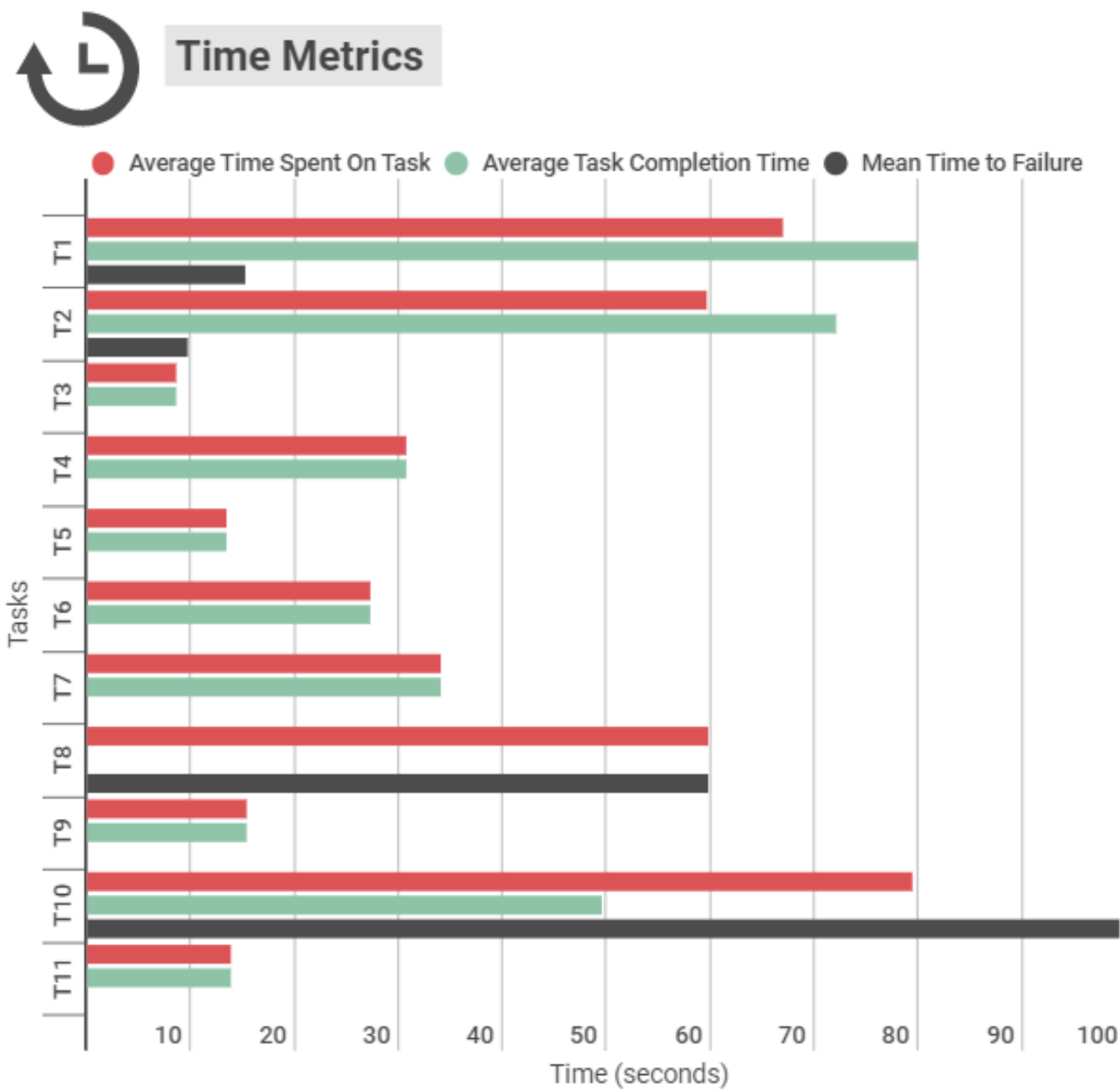
Tasks With Lowest Completion Rate

Task 8: Refresh comments for updates.

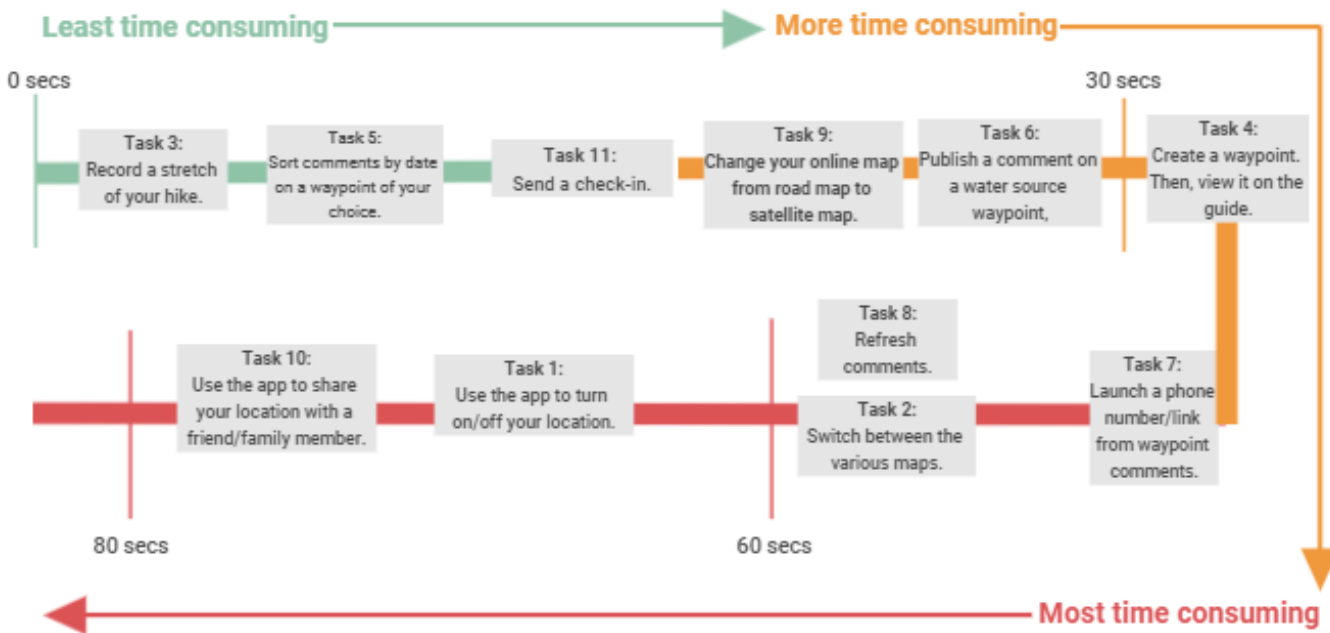
Completion Rate: 0/5

Participants struggled to find this feature; it's listed under More>Settings, but users continued to attempt this task in the comment section of waypoints. Instead of searching around in different locations of the app, they searched in different waypoints. It didn't occur to participants that this feature would be anywhere other than the comments section, except P5. It was not until this task that P5 discovered how to complete the first task of the pre-trail tasks (download waypoints, maps, etc.).

Time-on-tasks



Average task times from least to most time consuming



Summary Data



Least time consuming tasks:
Tasks 3, 5, 11

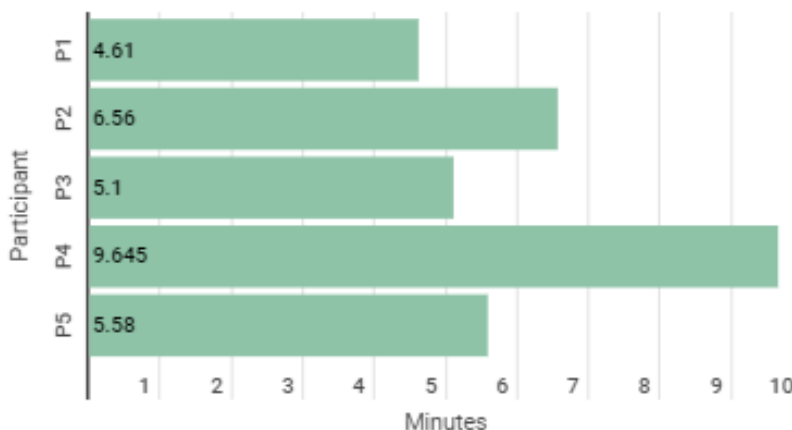


Most time consuming tasks:
Tasks 1, 2, 8, 10



Average Time Trail Tasks:
6 min., 32 sec.

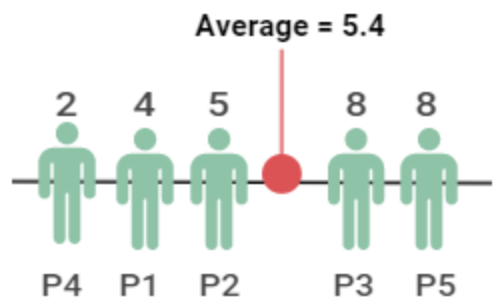
Average Time Spent on Pre-Trail Tasks, by participant



Survey Results

Satisfaction Metrics

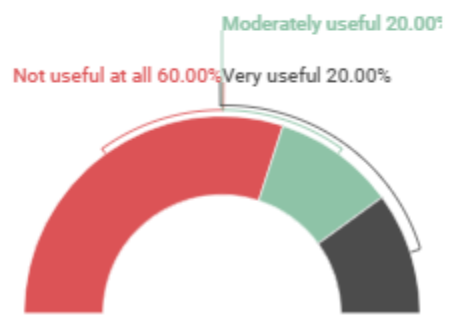
How intuitive do you think that using the features in *FarOut* is? (1=not at all, 10=extremely)



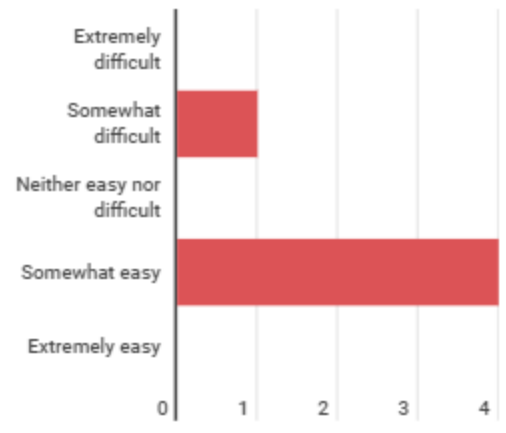
How well did *FarOut* provide information and guidance within the app to complete the tasks?



How useful would it be for *FarOut* to improve their aesthetics?



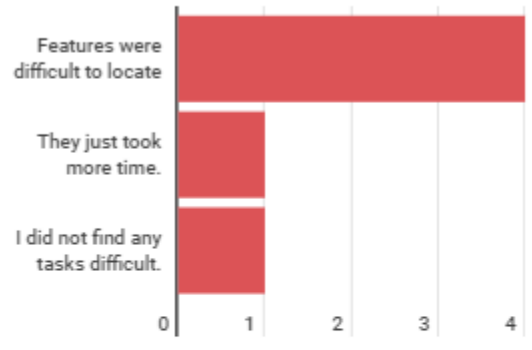
Overall, how difficult was it to complete the trail tasks using *FarOut*?



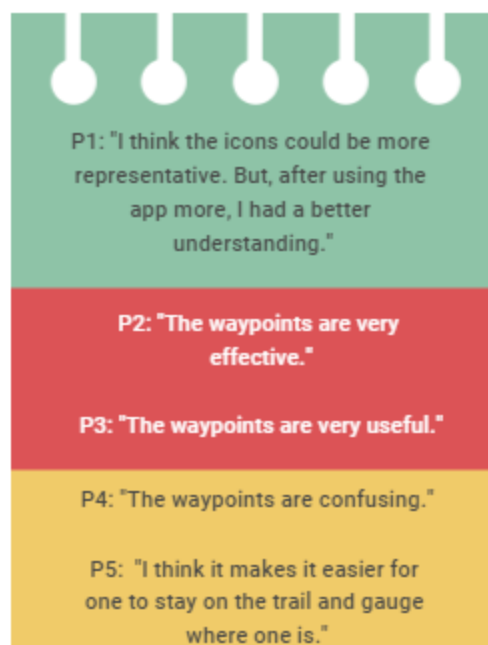
Most difficult tasks:

- Turn off/on location using the app
- Switching between maps (online and offline)
- Send location using the app.
- Copying links from comments / refreshing comments

Why were lower ranked tasks more difficult? (Check all that apply)



Waypoints



Overview of Interviews

Data collected from interviews showed that although participants struggled to complete tasks, they were satisfied with *FarOut* and its capabilities. Participants expressed their difficulties and frustrations using the app, but felt that if they had more time with it, those frustrations might eventually fade. Interviews confirmed critical usability issues with the following topics recurring in each participant's session: poor organization, lack of description of features, need for tutorials, unclear map capabilities, and "hidden" functions.

Analysis of Findings

Analyzing the results of both series of tasks, I found it useful to compare the time spent on tasks with their completion/error rates. It makes sense that using features that are less user-friendly would demand more time from participants; this is why we use time and

completion metrics. However, the analysis showed that usability issues also result from short task-times and successful completion rates. A careful look at participants' performance combined with what I learned about the target users for the app from the failure of plan A resulted in several discoveries about how the app might function in a way that better helps users reach their goals. I point out main usability issues which stem from *FarOut's* unclear navigation, and lack of in-app guidance, while bringing attention to the potential for improvement of existing functioning features and non-functioning features alike.

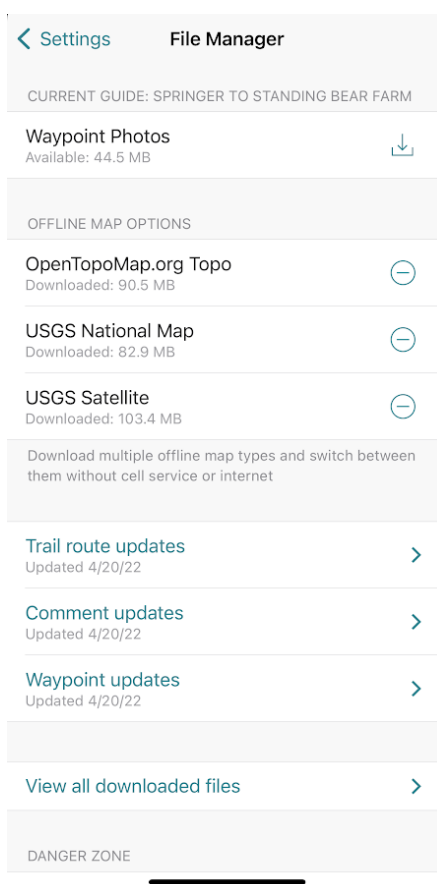
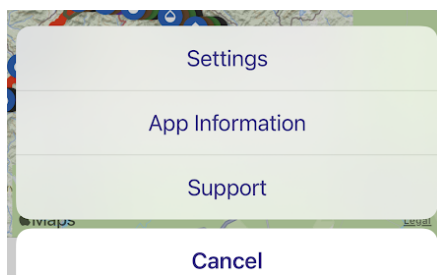
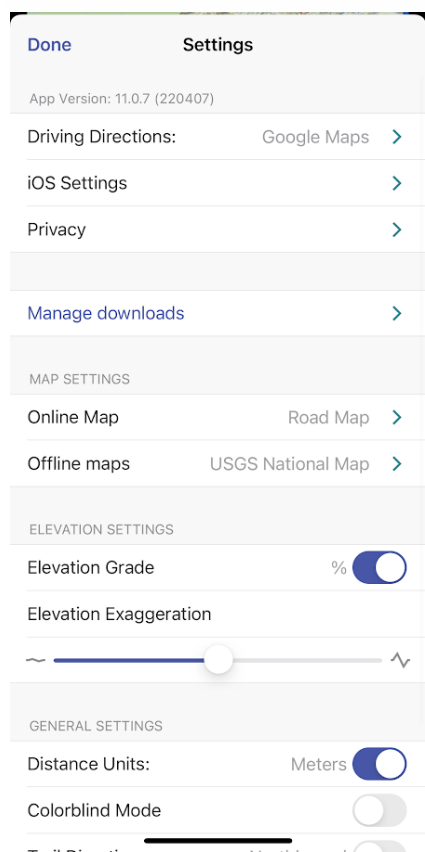
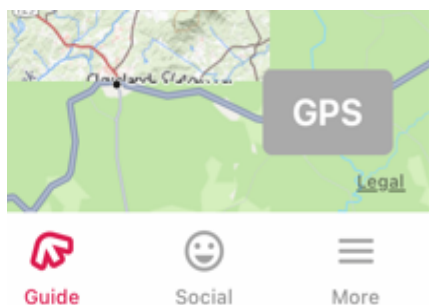
Unclear navigation

A major source of incomplete/time-consuming task performance in this study was due to participant's struggle to locate certain features that they needed to complete a task. This issue led to outstandingly long task times and low completion rates for several tasks in the pre-trail series, including:

- Task 1 (Pre-Trail): asked participants to download all maps and waypoint photos for offline use
- Task 3 (Pre-Trail): switch between said maps
- Task 8 (Pre-Trail): switch guide from Springer to Standing Bear

When prompted with Task 1, participants were completely unfamiliar with the app. Yet, if you are a thru-hiker using the app, downloading these maps and waypoint photos (T1) and switching between the maps (T2) is likely one of the most important things you can do—as well as the first thing you might do—on the app. To access all maps that you might download, you can access it one of two ways: clicking the tool icon on the main taskbar > file manager or clicking the More, or “hamburger” button > Settings > Offline maps or Manage downloads.

Participants took much more obvious routes looking for this page, such as clicking the map button on the main toolbar, searching through waypoints, clicking the label of the trail section on the main screen, and just about everything other than checking the settings tab.

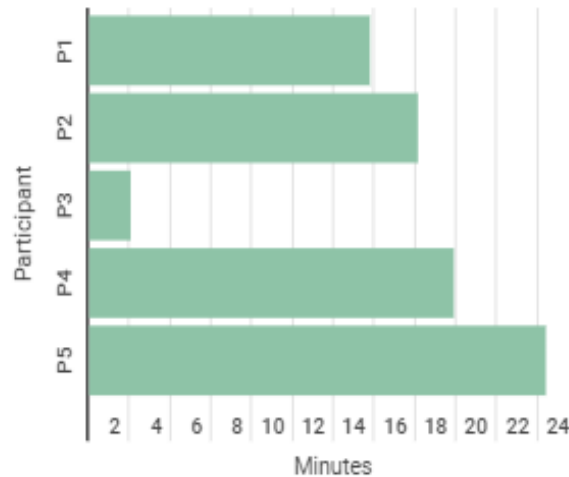


Clearly, the current map organization is not obvious to users: some even hovered over settings, then decided they would not find an option to download maps there. It is not intuitive to users that these maps would be in the “settings” folder and many participants did not discover this folder until they were prompted with another task.

In fact, the sooner participants discovered the settings page and its contents, the quicker and more successfully they would complete tasks. For instance, P3 and P5 shared similar demographics: hiking experience, which app features they valued most—but most relevant for this example, they both indicated

themselves as tech wizards in the demographic survey and rated the app relatively high on the scale of intuitiveness in each post-task survey.

Minutes elapsed before participants used "settings" page

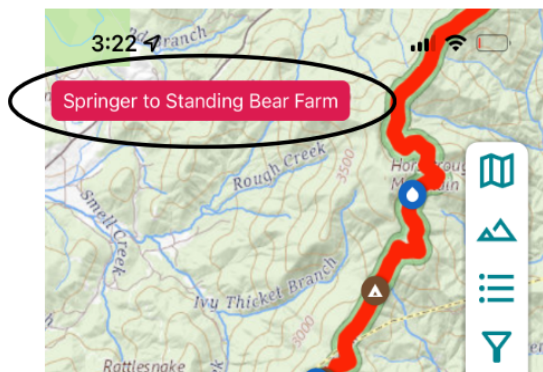


| Task Failed | Successful participant(s) | Unsuccessful participant(s) | Does the task require visiting settings/maps? | Notes |
|--|---------------------------|-----------------------------|---|--|
| Task 2 - Pre-trail (topo zoom) | | P3, P5 | ● | P3 did not select correct map for "topographic," P5 could not find where to download |
| Task 3 - Pre-trail (switch maps) | P3 | P5 | ● | |
| Task 4 - Pre-trail (elevation zoom) | | P3, P5 | ● | Function faulty |
| Task 9 - Pre-trail (waypoint comments) | | P3, P5 | ● | Neither could locate "Barefoot Hills" |
| Task 2 - Trail (switch maps) | P3 | P5 | ● | P5 had not found settings yet |
| Task 8 - Trail (refresh) | | P3, P5 | ● | Neither thought to look in settings, only comments |

| | | | | |
|-----------|--|--|--|--|
| comments) | | | | |
|-----------|--|--|--|--|

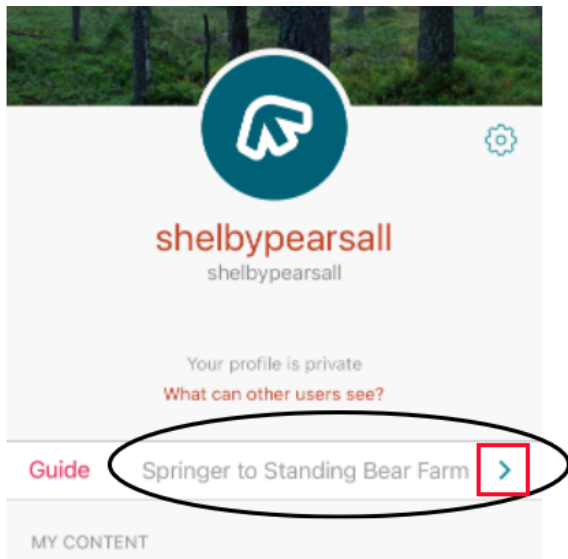
In fact, the sooner participants discovered the settings page and its contents, the quicker and more successfully they would complete tasks. For instance, P3 and P5 shared similar demographics: hiking experience, which app features they valued most—but most relevant for this example, they both indicated themselves as tech wizards in the demographic survey and rated the app relatively high on the scale of intuitiveness in each post-task survey. Had P5 discovered how to download maps during Task 1 (Pre-trail) like P3, it's arguable that the two would have had the same completion rates and more similar time-on-tasks. While P5 finished the test with 7 incomplete tasks and P3 with 4, a large number of P5's failed tasks were due to their prolonged discovery of settings and its capabilities. This theory is also strong because both P3 and P5 were the only participants to complete two difficult tasks that proved to be a major pain point of the app: switching sections of the guide (Pre-trail, 8) and sharing location - not a check-in (Trail task, 10).

Another similar—yet notable—issue exists in the event that a user would want to change trail sections. *FarOut* offers users the option to purchase the A.T. section by section instead of all at once. Despite owning the entire A.T. guide, users must physically change the section they are headed towards next, which proved to be another major pain point of the user experience. All participants did at least one of the following when attempting this task:



- Click the ever-present red label on the main screen that shows users which section they have selected
- Profile > Guide

These attempts were logical, but the completion of the task required that participants go to the Store tab > A.T. guide > choose a different section from the drop down menu. To return to the



store for a guide you've already purchased is a step backwards; this organization is unnatural and therefore not user-friendly. Not only does this create a frustrating user experience in general, it disagrees with the nature of thru-hiking. If thru-hikers are without service, phone battery, or even willingness to devote effort to fiddling with the app, they might not know how to access the guide for the next section of the trail that they just crossed into. This is

especially problematic knowing that hikers have paid a decent sum to have these guides available and may rely on the guide for safety, communication, or planning purposes.

Though the severity of this issue has already been stated, similar problems occurred in the second series of tasks with:

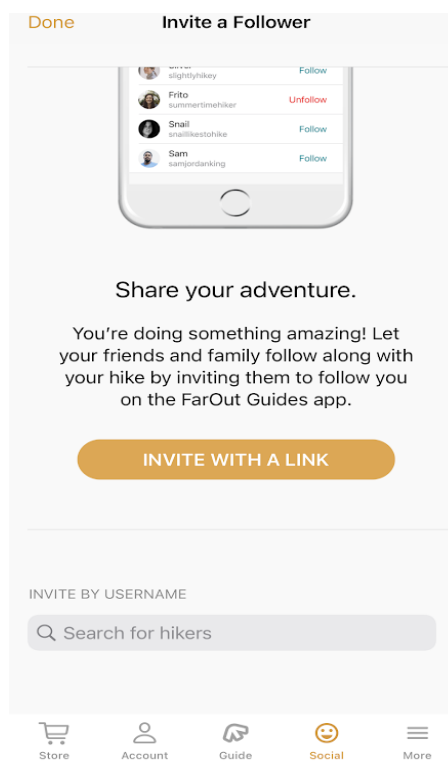
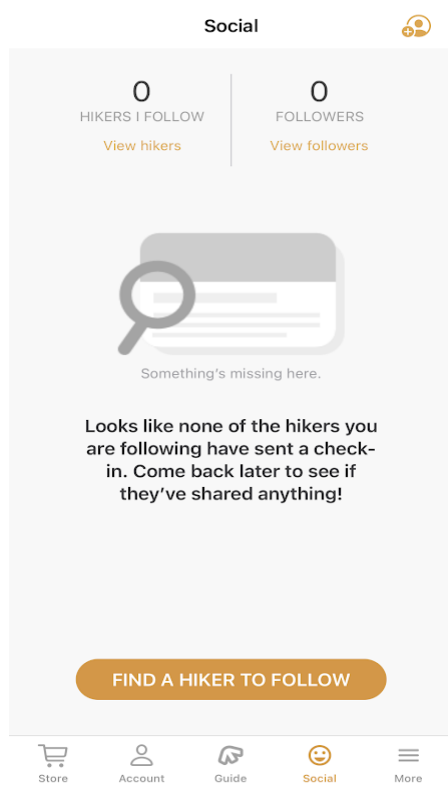
- Task 8 (Trail): refresh comments for updates
- Task 10 (Trail): share location via *FarOut*

Again, these features are hidden in inconspicuous locations. All participants expected to refresh comments while on the comments pages, yet the only way to access this option was through More>Settings>Manage downloads>Comment updates>Check comment for updates.

Participants too struggled to use the “Share Location” feature which allows you to send a G.P.S. ping to contacts who do not have the app. One reason for this could be that it is accessed by clicking on the marker that shows the phone's location. Since my phone was not on the A.T., but

many tasks revolved around using the guide, this feature was not as obvious as it might have been to someone on the trail. Still, users must click once on their location marker, again on their G.P.S. ping, and then they can have the option to send their location. The option to send your location without leaving the app (or a “check in” to your followers who must have the app downloaded) is much more visible throughout the app’s design. Despite the “Check-in” feature being more apparent, the participant from Plan A described his trouble with understanding how to operate the social features and connect with others. Stumped on what to do after “inviting a contact,”

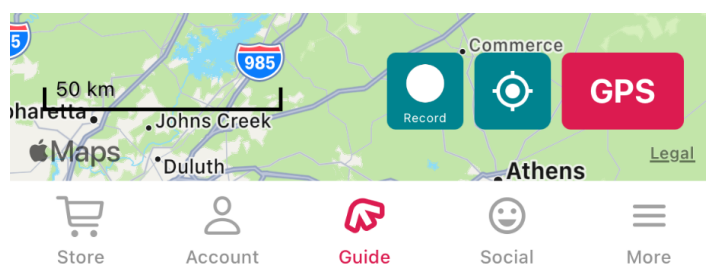
They characterized this experience as a perfect example of how *FarOut* tells you a lot about what it can do, but they don’t tell you how to do it.



Lack of instruction / in-app guidance

A unanimous agreement amongst participants (from both Plan A & B) showed that users would undoubtedly benefit from a tutorial system or set-up wizard. The information information provided by *FarOut* proved to be static when first-time users had trouble using basic functions. For example, Task 1 (Trail Tasks) asked that participants “turn off and on their location using the app.” This task was the most time consuming task of this series, taking on average 301 seconds to complete (nearly 4x as long as the second-most-time-consuming task [share location, avg. 79 seconds]). This outlier is especially compelling when it's considered that the button required for this task is next-door-neighbors with the “record” button—whose task had the shortest average time of all at 8.55 seconds (Task 3 [Trail tasks]: record a section of your hike). Both features are visibly obvious and recurrent to the user on the main screen/map, which explains record’s quick task times. Although the G.P.S. button’s presence is quite obvious, its function or purpose is not as clear as “record,” explaining the disparity of test times for features right next to each other. A new-user tutorial, a searchable help taskbar, improved labelings, or a set-up wizard make usability

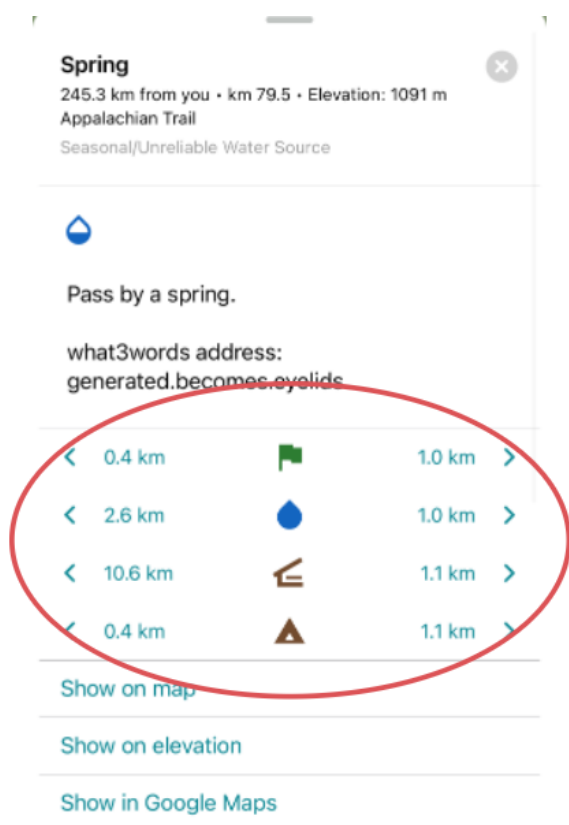
issues like these much more avoidable and keep important features from hiding in plain sight.



Waypoints

My Reddit research led me to the presumption that creating personal (custom) waypoints was a relatively “hidden” feature; many commenters desired this as a potential new feature—yet it already existed. With the exception of some participants not getting links to launch from

waypoints, my participants had overwhelmingly positive feedback about the usefulness and



satisfaction of having waypoints (and their comments) as a tool. The 0% completion rate of Task 9 (Pre-trail) showed me that although participants were satisfied and otherwise generally successful using waypoints, the system's design could be improved to better help users reach their goals. I noticed that participants surfed around the waypoint list relatively quickly and inattentively, making me wonder if they fully understood what kinds of information was found there. Next, I noticed that only two participants used a key element of waypoints—one that tells the user

exactly how much distance lies between themselves and another waypoint/destination (Task 6, Pre-trail). Participants likely did not know they could scroll up and access this information, but that means there's a good chance real users are also unaware—despite it being a resourceful, time-saving feature.

Next, the icon system can be potentially overwhelming with 43 different icons and their respective meanings. Symon (former Director of UE at *FarOut*) addressed this in one of her projects in the past, adjusting waypoints to fit in different categories with assigned colors (e.g. water waypoints=blue) so that even if users did not know what the icon meant, they'd know it had something to do with water (Symon, 2020). This organization method—along with the ability to customize which waypoints you see on your guide—is an effective solution to promoting better

understanding of waypoints without compromising all the information they can bring users. However, when a user goes to the page to customize waypoints, they must hold down the waypoint to reveal its meaning. This is problematic because holding down on a waypoint on this screen is also the way to hide them from your map. If users are not careful of this, they might end up losing out on valuable information without knowing why. This is especially problematic with the two gray-colored waypoints—bus service and shuttle service—because waypoints turn gray when you choose to “hide” them from your guide. Re-organizing the waypoints system and implementing waypoint “hacks” into user tutorials/help centers would skyrocket the usefulness and consistency of an already outstanding feature that is part of the reason why some people choose *FarOut* over guidebooks.

Non-functional features

Throughout the test, I discovered a couple additional issues of consistency where some features may have functioned properly on one page but not the other. First, this issue was detected when participants attempted to use double-tap zoom on the Elevation Map. All five participants failed to complete this task (Task 4, Pre-trail), though pinch-and-scroll zoom worked on this map and double-tap zoom worked on other maps (like Topo, Satellite). While this problem lies lower on the totem pole of factors that might hinder the user experience as much, it remains a cosmetic issue that should be addressed. Next, the copy text/hyperlink functionality in waypoint descriptions and comments is unpredictable. While several waypoint descriptions or comments on such display click-able hyperlinks to phone numbers or websites, others do not. Further, there is no current capability to copy these links (or any text for that matter) from the comments. Ensuring that hyperlinks and copy text functionality is available may be extremely

useful to thru-hikers who don't have the phone connection at the time to launch those links. From a more general standpoint, it's very irksome to move between one app and another copying down a phone number or link. Adding this feature would reduce the time and mental capacity that users needed to emit using the app, which is a main goal of usability testing.

Recommendations

The following changes are based on the aforementioned usability test results, research, and interview sessions conducted with thru-hikers using *FarOut* on their current thru-hikes. These recommendations aim to reveal a more efficient, easier-to-navigate, and reliable version of the mobile app *FarOut*. The following suggestions will be categorized by their distinguished threats to the user experience (UE): **Critical** (hinders users from reaching goals/completing tasks), **Serious** (slows down the UE), **Medium** (might not interfere with UE often, still frustrating), and **Low** (cosmetic issues that need to be fixed, but don't interfere with UE as much) (Maze, 2022). Critical and serious changes are demonstrated in a visual mockup following their sections.

Critical

Recommendation #1: Add all maps to the main toolbar.

The first major change I would suggest for *FarOut* is to include icons for all types of maps in the main toolbar on the guide screen. This change is priority based on the fact that it took up to six minutes and excessive clicking for participants to discover how to find (or give up on finding) these maps to download. Based on my observations, participants continued returning

to the main task bar to find the maps that ultimately weren't there. So, I suggest adding all maps to the map icon on the main screen. I think that a pop-up menu that displays all map choices when you hold down the map icon would greatly alleviate this confusion and time wasted figuring out this feature. Maps should also be labeled with a short description that tells users what type of information they might benefit from by using or downloading that map. Though the app has several nifty features that make it unique, it cannot function properly without a user knowing how to access its maps.

Recommendation #2: Add all purchased sections of the user's currently selected guide to the new map menu and other areas that imply its relevance.

It is crucial that thru-hikers can easily make the switch from one trail section to the next. Test results show that this is a difficult task for users to complete, given that participants could not switch sections in places that seemed obvious for this to occur, like the top right corner of the main screen that lists the users' current section, and the profile tab that lists the users' current section with an arrow that communicates you can choose a new section there. Currently, when a user selects that button, it kicks them back onto the main screen. I do not recommend taking away the ability to switch sections in the store tab. Although it does not make much sense in an intuitive sense—to return to the store for something you've already purchased—taking away this ability may confuse users who are accustomed to this organization. In addition to where the options to switch sections already exist, I recommend adding that option to the profile tab, the top right of the main screen, and in the new map menu.

Recommendation #3: A running tutorial or "help" page should be created as a new permanent page/tab within the app and be downloadable for offline use.

When users first download the app, welcome messages greet users that briefly mention that the app has Trusted Guide Data, Offline Maps & GPS, and Detailed Waypoints, but after that the users are on their own to learn how to use those functions. Given that every participant that I interviewed for this study said they would benefit from more tutorials and guidance, I insist that this feature is necessary. According to the participant from Plan A, thru-hikers do not have the time or are unwilling to give the time to locate unknown features; their frustration in finding the feature is likely to cause them to not use the app. It's true that over time, thru-hikers may get more accustomed to the app. However, they also might get more accustomed to the trail—alleviating the need they once had of using the app to guide them. This means that many users of the app might not have had time to learn all of its features yet, so readily accessible tutorials on how to access and use features are necessary for their safety and wellbeing on the trail. If users can easily find the answers to their questions instead of getting frustrated with the app, *FarOut* could experience a higher volume of user engagement while further promoting their target users' hiking experience.

Ideally, when the user opens the app for the first time, a “setup wizard” would appear. This wizard would explain to users all of the basic features of the app like the different kinds of maps, how to use waypoints, how to get your social profile started, and how to create certain preferences. It would also show users what type of information they could find in different pages of the app, so that users would not be as lost when trying to navigate the app. After the initial set-up period is complete, there will be a new “Help” tab that lets users search keywords. Those keywords will bring up step-by-step tutorials and troubleshooting videos on related content to the user's search. These videos and instructions will be available

for offline download so that users can access them while they are on their hike. Finally, I also think that the integration of an AI that nudges users when they aren't using some of the key features. Users would be able to turn this feature off if they preferred, but this could help users both learn to use the app and discover functions that they pay for but did not know were there (like how none of my participants knew about the waypoint→destination feature).

Serious

Recommendation #4: Make improvements to the current waypoint system.

Waypoints can be accessed in numerous ways within the app. First, they are displayed along the “red line” that helps users navigate the trail. Then, there are three waypoint icons on the main toolbar on the guide page; one depicted by a funnel (or filter) icon which lets users customize waypoints, another depicted by a list icon that shows waypoints in list form with an option to search all waypoints, and another depicted by a building which shows users “Town Guide” or waypoints directly related to surrounding towns. Then, users can create waypoints through the Account tab, the tools icon, or by clicking on their location marker. While all three are great resources, usability via number of clicks, reduction of mental energy, and required memory to operate the app would be improved if waypoints had their own page on the bottom toolbar instead of the guide toolbar. Participants often expressed that they forgot what buttons meant when completing tasks; the consolidation of these three taskbar buttons into one would alleviate this issue. While the building icon is more straightforward, users may forget that the other two generic icons (filter and list) also lead to waypoints.

The new waypoint tab would have all of its existing elements, with improved labeling, structure, and clarity. The new tab would appear similar to the Account page, in that it would list all the waypoint options up front before the user chose the one they were looking for. For example: Town guides, Create a custom waypoint, Customize waypoints, Search waypoints, Waypoint list view, Waypoint guide view, and so on.

One final change I would make to waypoints would be in the filter/customize waypoints page. Currently, the app instructs users to “tap and hold” waypoints to determine which ones they would like to view and hide on the guide. This feature is a great way to make the 40+ icons less overwhelming to users, but there are two issues: the only way to see what the icons mean is to hold down on them, and when you hold down on them they turn gray. There are two icons that are already gray, Shuttle Bus & Shuttle Service, so when users hold down on them it is difficult to see whether they are selected or not. This is especially problematic for users that are colorblind or hard of sight. To fix this issue, the new waypoint customization page would automatically list the names of waypoint icons underneath them, not use gray icons, and use a drag and drop method instead of a tap and hold method to choose which waypoints appear on your guide to better avoid the possibility of unintentionally selecting/deselecting a waypoint.

Recommendation 5: Add a warning message when user clicks G.P.S. button.

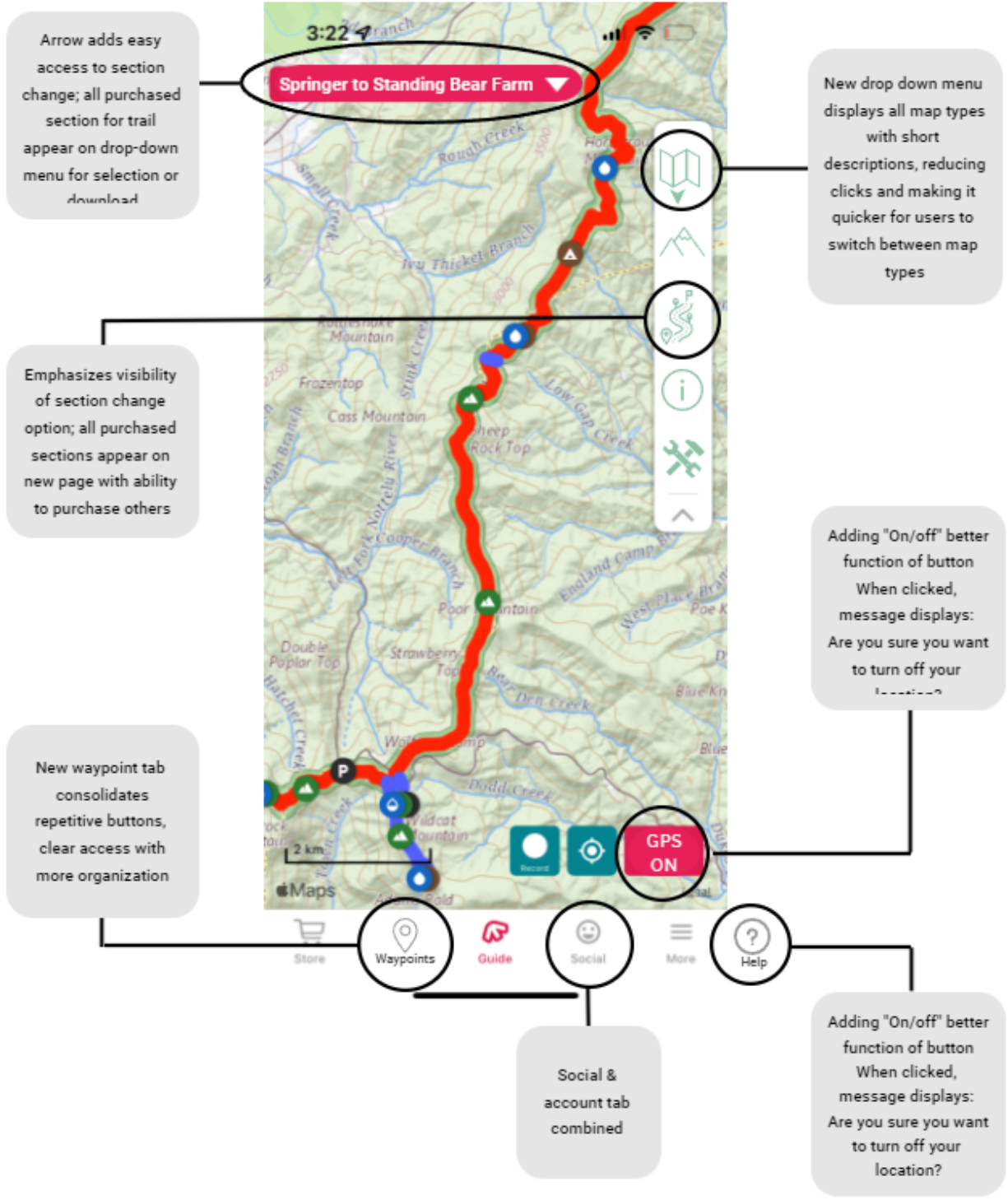
Given the disparity between the “record” and “turn off location” task times, I recommend that when the G.P.S. button is activated, it prompts the user with a message that reads, “*Are you sure you want to turn off your location?*” This button presented the finding that while it was extremely visible, poor labeling, app guidance, and further information resulted in users having little to no clue what the button really meant, or did. When users finally completed the task, they almost all asked, “Wait, was that it?” still not sure if they had successfully turned off/on their

location with the app. I would also recommend adding the words, “Turn on” and “Turn off” to G.P.S. because it would better relay information and detail about the function and use of that feature.

Current Main Page



Recommended Changes



Medium

Recommendation 6: Automatically hyperlink valid phone numbers and websites, permit copy text functionality in waypoint comments.

In the test, I observed that only some links or phone numbers had underlined hyperlinks that would allow the user to click and launch them directly. It did not seem to matter whether it was an official waypoint description published by *FarOut*, a business offering services, or a personal comment—in all scenarios I found cases of both linked and non-linked phone numbers and websites. To that note, copy text functionality is only available for waypoint descriptions, but not comments. While these are not major usability concerns, it can still be frustrating to someone with a low phone battery, someone who has poor eyesight, or someone who doesn't have the patience to go back and forth between apps copying down a link, a helpful hint, or a phone number to a shuttle. It makes the app feel outdated and a bit out of touch to not have a consistent functionality like hyperlinks and copy-paste. There are definitely more pressing issues, but even making subtle usability improvements will impact the user's experience with the app and relationship with the brand.

Low

Recommendation 7: Address double-tap zoom method in Elevation Map.

If double-tap zoom works on every other map, it should work on the Elevation Map. This is listed as a low concern because pinch-and-scroll zoom does work for this map, but nonetheless it is an issue that exists and will need fixing. Consistency across similar features and throughout the app as a whole is an important factor to keeping our products predictable and reliable.

Limitations

Though this research provided significant findings about the mobile app *FarOut* and the connection between usability and thru-hiking as a whole, this research is subject to limitations.

First, time and money; as a college student, I don't have much of either. Running traditional usability tests can take several months and sums if it is not designed mindfully. If I were to re-attempt this test in the future, I would need access to a grant that would allow me to compensate participants for their time. I could've offered any sort of compensation, I might have avoided the circumstance where thru-hikers turned out to be unreliable data sources. To this note, I designed the study for a hard-to-reach audience and required distinct prerequisites. Next, there were relatively few sources to consult on the subject of usability and thru-hiking, so designing a test, recruiting participants, maintaining participants, and knowing what to expect from thru-hikers in a research study was not common (or researchable) knowledge. Did I mention this project was my first ever attempt at a usability test?

My results became limited without the intended feedback from real thru-hikers who would actively use the app onsite during the test. Switching gears to working with people who *weren't* thru-hikers, but *did* enjoy hiking, I re-created the best test possible given an extreme time constraint. My participants were brand-new users that provided an unbiased, fresh perspective on the app's usability although we only could test the app offsite. My new design did however allow a much closer look at the specific functions of the app that might not have otherwise been recollected by participants if I continued with the original method.

The new method was further limited by the new participants because they were all relatively the same age and lived in the same location (Boone). Further, they were all people I was familiar with before the test. This could have raised concern for the potential of participants' bias in task-determination, survey and interview questions; as well as my own bias in the ability to remain a neutral, professional moderator and in analyzing results, having known the personalities of these participants. Next, the test was only run on the iOS version of the app.

Additionally, I was not able to test how using the app affected battery life or how accurate the maps are. But, if I wanted to run the test at all, to get any real data or usability metrics– I had to do it this way. Otherwise, my data would have had one phone call transcript between myself and a thru-hiker talking about the app– which was not how my first attempt at UX design was going to end.

Suddenly taking on the role of a moderator in a previously remote, unmoderated test was a challenge: it was difficult to time tasks, record phone screens and completion rates, and observe hand motions all at once, alone. Though the original test did not go according to plan, I discovered critical, definable issues concerning the functionality of the app-whether or not the data was pulled from thru-hikers. I worked with the resources I had and uncovered strong findings about thru-hiking culture, working with thru-hikers, the importance of usability and the outdoors, and UX as a whole. I would like to re-open this study down the road, more prepared for the challenges that come with this specific genre that combines two topics that are so enthralling to me: hiking and (user) design. Moving forward, I will expand on what I've learned in this research to pose new questions on how I can further advocate for the fusion of usability and the outdoors.

Conclusion

This thesis fused two ubiquitous concepts: mobile apps and thru-hiking. New mobile apps are constantly being developed to make various aspects of users' lives more convenient and accessible. Thru-hiking is a lifestyle choice that people around the world make for various personal reasons, but everyone shares the goal of hiking thousands of miles in one long trip. I have argued throughout this work that technologies made for thru-hikers deserve to have a larger spotlight in terms of how usable, efficient, and effective they are in helping the hikers walk

thousands of miles. *FarOut* itself was created due to the gap between guidebooks and the growing market of mobile apps; being first to the market, they reign and enjoy no fierce competition. My usability test demonstrates the importance of challenging the neutrality of the app; just because the app was created by thru-hikers, does not mean their values, attitudes, beliefs, and preferences represent the end users' needs. My work demonstrates that the app works, but it needs to work better to suit their audience. Cleaning up the organization and reducing the steps users need to take to fulfill their needs abides to thru-hikers appreciation of time and promotes their experience using the app.

I designed Plan A with hopes that the right safeguards were in place to make the test accessible and easy for thru-hikers; though I did not reach the results I wanted, I present valuable research about the connection between usability and thru-hiking. When working with thru-hikers as a user-group, it must be deeply considered and appreciated that priorities, motivations, and identities shift when you're on the trail. Thru-hikers do not thru-hike to live the same way they did in society; the shift in value of time, solidarity, and being out-of-touch must be applied to the technologies that we develop for them. Using this finding in combination with Plan B results presented a strong discovery of usability issues within the app. Below I explain how these test results can be taken together to understand the usability of *FarOut*.

FarOut should drastically reduce the amount of time users spend navigating and becoming oriented to the design. Evidence of user flows from Plan B demonstrate the app's organization is not natural or intuitive for users. Making maps and purchased sections more visible, assigning a specific tab for all waypoint features, creating descriptive labels for buttons and features, and implementing a permanent (and downloadable) help/tutorial page will drastically impact the app's usability. Users' experience with the app correlates with their

experience on the trail; thru-hikers' goals may differ subjectively, but objectively—they share the goal of getting to mile 2,193.1. *FarOut*'s impressive database of trail information paired with its ability to connect with others, receive real-time updates, and option to leave custom pins and notes along the trail surpasses the caliber of competitor apps and guidebooks alike. However, there lies ample room for usability improvement so that thru-hikers may better achieve their ultimate goal of getting away from the world and into the wild.

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Appendix A

This appendix contains documents from the online research portion of this study. The contents include the Reddit post that helped determine areas of focus for tasks, the Facebook post that recruited participants, and Facebook messages between participants that helped them learn more about the study.

Figure A1. Reddit forum posted in r/Appalachian Trail



11



r/AppalachianTrail · Posted by u/

3 months ago



FarOut (Guthook) Thesis Research -- I'd love your help!!

Gear Questions/Advice

Hi friends, I am an undergrad student conducting a usability study on FarOut (aka Guthook) for my thesis paper. I've section hiked the AT and am thinking about thru-hiking one day but I've found joy and interest in researching the AT/thru-hiking throughout my college education.

Having not used the app much myself, I want to hear your opinions--tell me what you love, tell me what you don't. Anything missing in the app? Any information is good information.

32 Comments Share ...



3 mo. ago · edited 3 mo. ago

AT/2013/SOBO, PCT/2021/NOBO, AZT LASH

I think it's done a lot to democratize NSTs, especially ones out West. Navigation is a hurdle for a lot of people and the app makes backcountry nav very easy. You really don't need this kind of functionality on the AT but it helps a lot for more remote trails.

The real innovation of FarOut is linking backcountry maps with a trail information database. The critical mass of users is what separates FarOut from competitors IMO.

Things that I don't think are great? It's created hikers who are completely reliant on following the "red line". I think FarOut should use it's app and reach as a platform to help teach people how to read topo maps, which oddly enough, their product helped make less fundamental for distance hiking.

Feel free to DM me if you want to talk more, happy to help!

13 Reply Give Award Share Report Save Follow



OP · 3 mo. ago

Beautifully put. This is especially interesting because I really want to consider the evolution of trail-related technology in my study. Thank you kindly!

2 Reply Share Save Edit Follow ...



· 3 mo. ago

Im really glad they added upvote/downvoting on comments. The comments themselves are incredibly useful especially in towns when you're not sure where to stay or what shuttle to call.

One thing I would love to see is a separate map with friends locations. Wouldn't have to be super accurate but would be nice to be able to see approximately how far ahead or behind your friends are.

 13   Reply Give Award Share Report Save Follow



3 mo. ago

2005 NOBO, other LASHes

Definitely need to be careful about tracking others. Could be abused in the wrong hands.

 4   Reply Give Award Share Report Save Follow



· 3 mo. ago

Probably no more dangerous than writing your trail name in a log book. For Guthooks I would like to see the option to share location and even then it would only share with people you request/accept and only work with data. Most likely it would just show what town your friends were last in.

 5   Reply Give Award Share Report Save Follow



· 3 mo. ago

2005 NOBO, other LASHes

Yeah I mean it could definitely work, just need to give clear controls and details about who exactly is following your location and make it easy to revoke it and whatnot. I do agree it would be a pretty sweet feature.

 4   Reply Give Award Share Report Save Follow



OP · 3 mo. ago

yes, another commentor talks about how they could really ramp up the app with greater ability for social connection. This is super interesting to me! Thank you for answering.

 1   Reply Share Save Edit Follow ...



· 3 mo. ago

While Guthook is an amazing app for navigation, and the crowd sourced information for things like water sources is truly awesome, and comments available on every waypoint can really help someone who comes at a later date to avoid someone's previous mistakes.

What's not good: guthook tend to be the best source for water info, by far. If someone goes out hiking without the app which just be paid for, they don't have the best water information and that's not ideal that there's a pay barrier

Also, hikers are so reliant on Guthook. It's SUCH a different experience to backpack on trails where you don't know the location of every possible campsite or to make choices when you come to a split in the trail, and having to debate where the next water will be and how reliable it will be.

Maybe it takes away adventure slightly as there's so much info.

Overall though, great resource. Even those that criticize it heavily are almost all drawn to pulling out their phone and looking at the app...

I do wish there was competition, I think that essentially the same app could be presented in a more user friendly and more aesthetic manner than the current far out, but they dominate the market so far...

Have hiked over 20k miles, sometimes with Guthook, sometimes without. In a lot of ways I wish Guthook didn't exist to force all of us to develop other skills, but that's a moot point now, so I embrace it fully...

9 Reply [Give Award](#) [Share](#) [Report](#) [Save](#) [Follow](#)



OP · 3 mo. ago

Well said. This is awesome feedback, it really piques my interest about the evolution of technology and the trail over time. I did an ethnography on thru-hiking culture last semester and talking to people of different ages, I kept coming back to this idea. Huge goal would be to get my study back to FarOut-- we'll see. Thank you for commenting!!

1 Reply [Share](#) [Save](#) [Edit](#) [Follow](#) ...



· 3 mo. ago

Just finished my Thruhike in July, and guthooks was incredible. well worth the money. With that being said, I can think of a few features i would like added.

1. A way to mark favorite locations along the trail. there have been several times post trail I've been slowly scrolling up the map in guthooks to try and find a specific place i remember, and would be nice if I could just mark that location as a fav.
2. Some kind of option for users to make their own point on the map, kind of like how when using google maps, drivers can mark out speed traps or crashes, hikers could mark "ground hornets" or other potential hazards. to prevent a spam of these, maybe they would disappear after 24 hours, unless another hiker passes that location and confirms the hazard is still there.
3. A way to mark where I stayed each night on trail. I have it in a memo on my phone, but it would be nice to add it to the app.

Good luck on your thesis!

 6   Reply Give Award Share Report Save Follow



[deleted] · 3 mo. ago

1 & 3 are features already with custom private waypoints. (at least on iOS)

 4   Reply Share Report Save Follow



OP · 3 mo. ago

This is helpful-- app features that are more difficult to find are not very usable. Thank y'all!

 5   Reply Share Save Edit Follow ...



[deleted] · 3 mo. ago · edited 3 mo. ago

I never got around to sending them this list but I'll post it here after using it on PCT & AZT this last year.

- iOS & Android having completely different UIs is weird.
- iOS double tap zoom is broken on elevation.
- Hybrid icons for shelter / water, like a blue inlaid circle within a majority brown icon. Combine close water waypoints.
- App constantly resets with GPS background tracking off on trail. (Use FarOut, put it away, re-open 30 mins later to have to reload the entire app)
- Copy text functionality absent (cant copy links/phone numbers!)
- I think X'ing out while in town navigation mode gets weird, wish it was clearer UI on if I want out entirely or back to the main list.
- Scrolling down a waypoint with lots of comments, the close functionality does not travel with it.
- I have thought that a wiki approach (w/ report functionality) might be great for allowing editing of outdated waypoint content, or additions of new shops/businesses.
- This might not be possible, but I wish it didn't revert to 'as the crow flies' miles when off trail. I've made a lot of mis-estimates due to that. My initial hunch for how to improve that is to fly to the closest spot on the red line, then estimate. At the least, it should be clearer that the estimate is direct and not based on guide distances. -Leave comments with your selected username instead of your account name!

4 Reply [Share](#) [Report](#) [Save](#) [Follow](#)



OP · 3 mo. ago

This is amazing grounding to get started on developing my tests. You're amazing. I hope to get my study to FarOut once its complete, I'm hoping they will see it as valuable as I do.

1 Reply [Share](#) [Save](#) [Edit](#) [Follow](#) ...



[deleted] · 3 mo. ago

You're welcome. I forwarded this thread and my bullet points over to their support as well.

2 Reply [Share](#) [Report](#) [Save](#) [Follow](#)



· 3 mo. ago · edited 3 mo. ago

It was extremely useful. I actually underestimated how useful it would be... so I only had it for the northern half of the hike.

All of the basic functionality was very useful (location, sat-map, topo-map, elevation profile, etc). Aside from that, the comments were also extremely useful, and were probably the biggest advantage over using a traditional guidebook. (Well, the real-time location may have been even more useful... but the comments *were* great.)

One thing that might be useful would be if hikers could leave pins with relevant info. We can only comment on existing waypoints, but there are often a lot of water sources and whatnot that aren't marked.

Being able to bookmark locations would also be good.

One criticism is that the waypoints in towns were often very out of date or had incorrect information. Comments helped, but not always.

Also might be useful if the button to turn your location off was a bit more obvious in what it did. Like if it just had a pop-up that said, "Turn off location?" I spent a week thinking the app was broken because I had accidentally hit that button and hadn't noticed.

5 Reply Give Award Share Report Save Follow



OP · 3 mo. ago

That's super interesting-- I'm shocked you can't leave pins, more shocked that info was out of date with the amount of hikers who use the app. I suppose there is no incentive in the app to comment? The turn-off location comment will help me greatly in developing tasks for my participants. Thank you for your help!

1 Reply Share Save Edit Follow



· 3 mo. ago

Cool idea, lots missing, and it's sometimes inaccurate. Here's the only thing I want to really say: It's an excellent study in the importance of being first to market.

Adding social media and comment threads was brilliant. In hindsight, incredibly obvious, but they're the ones who did it. And that's awesome...except they're not coders. It's some hot garbage that's been taped together. The map function is generally pretty okay (but when it does screw up and you're 40 miles from town, it's a bad time). The comments are nice. But if they were to ever actually incorporate the social aspect that they're kind of reaching for, it would be phenomenal. But I don't think they'll ever invest in getting somebody to do that for them, and I don't think anybody else is going to invest in competing with them.

4 Reply Give Award Share Report Save Follow



OP · 3 mo. ago

Such valuable info for this study! Thank you. I really want to make the social reach one of my objectives of study and this gives me amazing insight.

1 Reply Share Save Edit Follow



· 3 mo. ago

Main thing I like is water sources. Water source is dry can be a lifesaver. In Maryland there were places where 4 water sources in a row were f Dry, so we prepared and brought extra water

5 Reply Give Award Share Report Save Follow



OP · 3 mo. ago

Did you ever find a situation where the info about the water source was incorrect?

1 Reply Share Save Edit Follow ...



· 3 mo. ago

Yes, however, it never recent, it was only when it was months old. Unfortunately, there was not always engagement to keep it up to date. I know I didn't update it, except one time when a supposedly wet source was dry. Otherwise, if everything was fine I just went on. So, if there aren't updates, you have to consider it with skepticism.

1 Reply Give Award Share Report Save Follow



OP · 3 mo. ago

Gotcha. I guess there's no real incentive, within the app anyways, to add comments?

2 Reply Share Save Edit Follow ...



· 3 mo. ago

Like so many other aspects of the trail, altruism is the best motivation, but, in the app the only motivation

3 Reply Give Award Share Report Save Follow



· 3 mo. ago

No business comments — a separate tab at waypoints for shuttle drivers/hostel owners to post their spam. AT Guthooks is completely overrun by petty infighting of shuttle drivers in Georgia.

6 Reply Give Award Share Report Save Follow



doubtingthomas77 OP · 3 mo. ago

Really!?! I wouldn't have expected that. Thank you for sharing. . this could lead me to some good stuff.

2 Reply Share Save Edit Follow ...



· 3 mo. ago

NOBO 21

Absolutely worth the money. Having the information from fellow hikers on demand like that makes it super easy to plan distances and town stays and takes a lot of the guesswork out of planning.

I do think it does take some of the exploration aspect out of the hike though, and it's definitely hurting the shelter culture on the AT a bit, at least in regard to shelter logs and how many people use them.

4 Reply Give Award Share Report Save Follow



OP · 3 mo. ago

Are you referring to the journals left in the shelters? If so, ouch. I was always so fascinated passing by them on my weekend trips, it seemed so special and like something I wished to be a part of. That's pretty sad.

1 Reply Share Save Edit Follow ...



· 3 mo. ago

NOBO 21

There's still a good journal culture, it's just more for fun and doesn't convey info very much because that's in the guthook comments now.

2 Reply Give Award Share Report Save Follow



· 3 mo. ago

I'm not speaking out against Guthook and I'm not trying to say anything bad about anyone who uses it. I'm simply going to say what I felt about using it and my preferences. I'm sorry in advance if anyone gets offended or upset about it.

I used maps to section hike the Cali part of PCT. I relied a lot more on talking to other hikers to get info about water points, etc. I had compasses, learned about shooting azimuths and back azimuths, I learned a few hard lessons about how to gauge distances, gauging time, orienting maps, and picked up a lot of confidence in my abilities while out there. I used Guthook in my first AT section hike a couple of years ago and at first I really liked it, but quickly realized it took away big parts of what I liked about hiking. It was a completely different experience where I found myself relying more on my equipment than relying on my own skill. Don't get me wrong, I'm glad it's there to let a lot more people hike that would not be able to otherwise, but I uninstalled it and have gone back to using maps for my 4-7 day hikes now. It's just a very different experience for me.

If I installed it again, I would probably just try to use it for updates from hikers on the trail about shelters and water, but I find unfolding my paper maps and plotting out my days, time, and distances a lot more satisfying. Rarely I get to hike in the spring, but every Fall there's no shortage of water at least, so not having those updates isn't a real deal breaker so far. Having those updates seems like it would be nice though if I needed them. Again, I don't mean any disrespect to anyone who uses it. I just prefer not to, hike your own hike and all.

 4
 
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  Follow



OP · 3 mo. ago

Right. I'm really fascinated with the effect technology has had on long distance hiking and the different perspectives that surround that. It seems more complex than what it seems at the surface level and I am excited to dig into that. Thank you for sharing.

 2
 
 Reply
  Share
  Save
  Edit
  Follow
  ***

Figure A2. Facebook post in “” for recruiting purposes.



Shelby Pearsall

February 1 · 🌐



2022 thru-hikers, I need your help! I'm writing my thesis paper about the AT. I'm looking for some kind folks willing to participate in my usability test on FarOut aka Guthook.

More specifically, I'm looking for participants who:

- are already planning on using the AT guide on FarOut on their 2022 thru-hike
- will be on the trail in Feb-Early April so I have time to process data

I know this isn't typical trail talk, but I'd be honored to work with anyone who's willing to participate. I will be flexible-- at the least, I'm looking for notes and feedback on the app after a week of usage, the completion of a short survey, and a short phone interview.

If you have any form of interest, question, opinion--lets talk! I'd be thrilled to hear from you. Y'all are my heroes--I've found so much joy & interest in studying the AT & thru-hiking throughout my undergraduate education. I really want to bring more research literature on thru-hiking to the field. I will make this post shareable--my DMs are open!

👍 15

17 Comments



Like



Comment



Share

All comments ▾

Is this to try to find ways to improve the app???????

Like Reply Share 11w



Shelby Pearsall Author

yes, but not in any connection with the company. This is a independent, non-funded project that combines my personal passions & skills. I have completed ethnographic studies on thru-hiking culture and it has led me to an interest in the evolution of technology and in relation to thru hiking— what it gives, what it takes. This study a moving part of my research

Like Reply Share 11w



Shelby Pearsall if you need more things you can ask me later what you want once i get out there. I think i just understood what you wrote.

Like Reply Share 11w



best way to get info on something like that is get out there and hike it yourself that way you are speaking not only from others experiences but your own imo

Like Reply Share 11w



Shelby Pearsall [Author](#)

I agree! I've been in college the past four years but would love to get on the trail afterwards. I have to write this paper for credit to graduate, I always try to write & research topics I'm genuinely interested in and believe may positively impact others, but still pertain to my program of study.

Like Reply Share 11w

Shelby Pearsall i get it and didnt mean to sound condescending or anything good luck to you on that paper and hope you get some hiking time in it really will change your life

Like Reply Share 11w



Shelby Pearsall [Author](#)

I believe it. I can't wait for that day to come!

Like Reply Share 11w



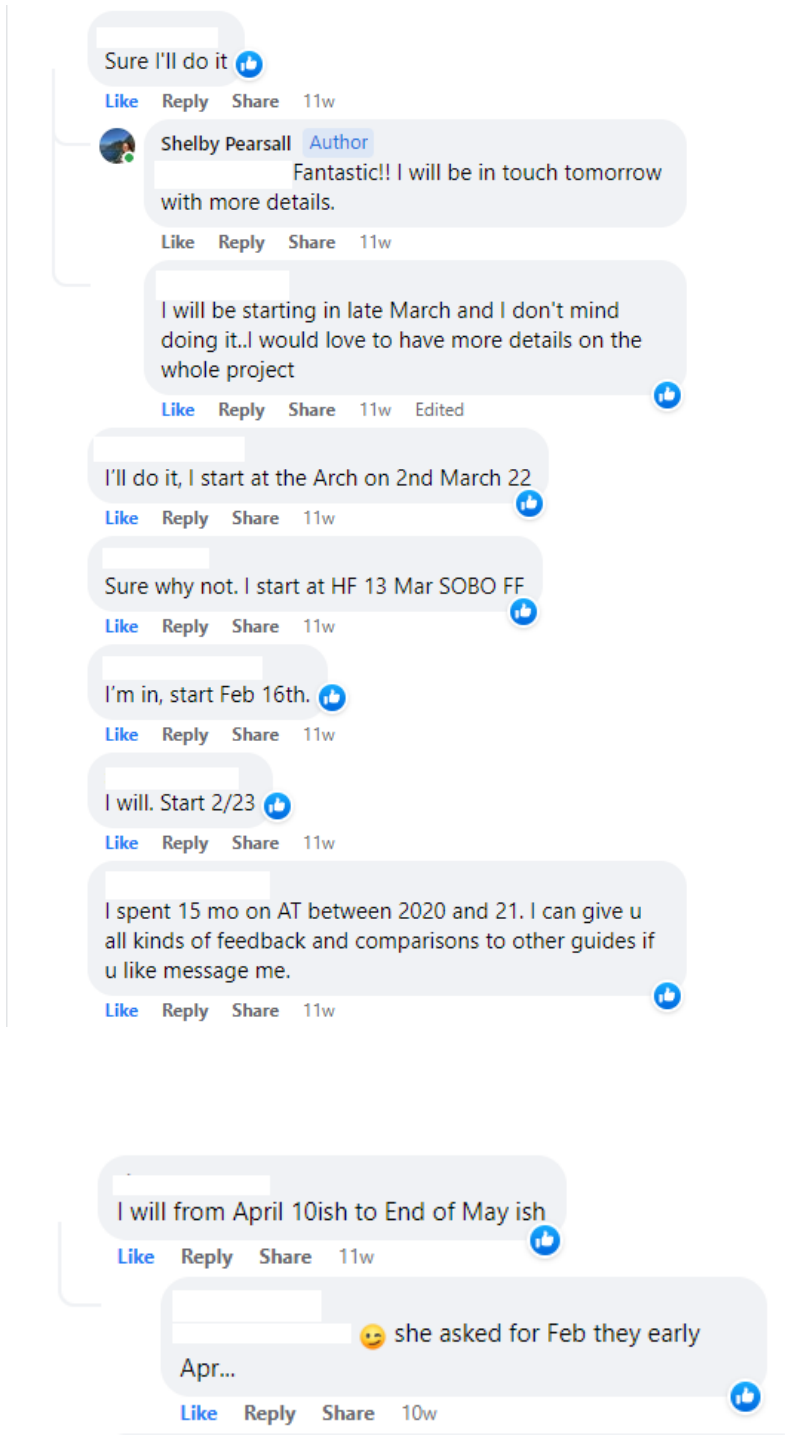


Figure A3. Facebook message sent to interested participants.

Hi (insert participant name)! I hope your day is going well. I am so grateful to hear that you are interested in my research study. To give you some more background, I am conducting a

usability test on *FarOut*. A usability test, essentially, is an evaluation of a product or service by testing it with its representative users. Usability tests aim to identify any usability problems, collect data, and determine participant's satisfaction with the product.

This test is a working part of my thesis, an extensive research study that I must complete in order to graduate. I'm a technical writing student at Appalachian State University, and I like to write and research topics that I'm passionate about, like the AT. So, I've decided to do some research on *FarOut* so that I can incorporate my interests and my field of study. I am not in any association with *FarOut*, just a curious student. I may provide my results to *FarOut*, as my goal is to look for solutions to their product and pitch a more reliable, safe, and functional product.

Since there is no guarantee my results will be accepted or applied by *FarOut*, my ultimate goal is to learn more about the connection between long-distance hiking and technology. In my ethnographic research done on thru-hiking in the past, I've found that there are distinct and unique perspectives on the increasing role that technology plays in hiking. I find this fascinating, and my genuine goal is to learn more about it, with this study as a part of my research.

As a participant, you would be provided with a series of tasks to complete over the course of a week using the *FarOut* app (likely tasks that you would use anyways if you are already planning to use the app). I would ask that you jot down any notes, comments, critiques you have as you have the opportunity to. Once you have the chance, after the tasks are complete, I will be flexible in finding a time to send you a short survey and speak with you briefly on the phone about your experience using the app. I know these things can't exactly be scheduled with you on the trail, and I don't want to intrude on your experience. Whatever works best for you, scheduling wise, will work for me.

If you are interested, I had the idea to additionally test your knowledge of the app before you start the hike as well, so that I can create a comparative analysis. This would not be required: I know this must be a busy, exciting time for you in your preparation for the hike. I know this is a ton of information, but I wanted to make sure you are well informed. This study is ambitious, but

so exciting for me. If you wish to proceed with the process, I would be happy to email you a participant consent form. Please let me know if you have any further questions or comments.

Warm regards,

Shelby

Appendix B

This appendix includes several documents from “Plan A,” such as signed participant consent forms³ and survey questions/results from the preliminary demographic survey (5 responses). The pre-trail/ trail surveys from Plan A are not listed because they are not useful to the main study; those single responses were not used as proof for the determined usability issues with the app.

³ My records indicated that 3/5 consent forms were signed and returned, but one form was lost. The other two participants who did not sign continued to express initial interest in participating in the study, but did not return the form.

Figure B1. Participant 1A consent form.



Information to Consider about this Research

[Smartphone Navigation on the Appalachian Trail: A Usability Test on FarOut]

Principal Investigator: Shelby Pearsall
 Department: English
 Contact Information: (256) 679-6395, pearsallsa@appstate.edu
 Faculty Advisor: Dr. Hopton, hoptonsb@appstate.edu

You are invited to participate in a research study. This study will test the usability of the smartphone application FarOut (formerly Guthook), an app that helps hikers navigate long-distance trails. We are asking you to take part in this study because we want to learn more about the relationship between technology and long-distance hiking. By testing the usability of FarOut, we hope to determine the app's effectiveness as an aide to long distance hiking and to promote the safety and wellbeing of long-distance hikers.

FarOut offers users trail routes (including side trails and alternate routes), comprehensive town guides, and detailed waypoints to help facilitate their hikes. Although FarOut provides resources for several long-distance trails around the world, this study will focus on its usability on the Appalachian Trail. This study will examine the app's navigational accuracy, validity of data and information, and overall necessity in order to measure the app's functionality and usability.

If you agree to be part of the research study, you will be asked to:

- Download FarOut on your mobile device & purchase the Appalachian Trail guide (FarOut can be found [here](#), AT Guide \$59.99)
 - o To protect the integrity of the study, and because the project is not funded through FarOut, we cannot offer compensation for the guide at this time.
- Use the FarOut app for seven days while hiking the Appalachian Trail in February or March 2022 - Complete certain tasks using the app such as locating water sources, navigating trails, finding information about towns and accommodations, etc. Once tasks are complete, further use of the app for this study is encouraged, but not required.
- Complete a short online survey (5-10 minutes) about your experience using FarOut
- Participate in a short phone interview (20-30 minutes) about your experience using FarOut

Benefits of this study may include:

- Although there is no guarantee you will personally benefit from this study or using FarOut, the results of this study will contribute to the research literature on technology's role in thru-hiking and the usability of navigational mobile apps on trails. These results could lead to safer conditions and more reliable information for long-distance hikers in the future.

Risks and discomforts may include:

- You will use the app for navigational purposes and tasks, but we cannot guarantee that the information you find on FarOut will be accurate. Please remember that if you feel unsafe or are misguided from the trail at any time, you are not obligated to fulfill the task.



- Looking at a mobile device while hiking the trail may interfere with your ability to recognize obstacles like tree roots, rocks, stumps, animals, holes, etc. Remember that your safety is our priority; we do not recommend using the app while walking to avoid potential injuries.
- Information regarding water sources, shuttles, and accommodations on FarOut may be outdated or inaccurate. Please be prepared for this risk and use the app as an aide, not as life support.
- While the app works offline, it may use up your phone's battery. It is important to be able to make a phone call in the case of an emergency, so please plan accordingly and do not compromise your safety for the study.
- You may find that some of the questions we ask in the survey or interview are uncomfortable or stressful. Please remember that you are not obligated to answer any question that you do not feel comfortable answering.
- A potential risk of participating in this study is a breach of confidentiality. This happens when the private information you share with us is seen by or made accessible to people who do not have permission to see your data.

Confidentiality:

- To ensure that your information is kept confidential, identification numbers instead of names will be used in the final copies of study documents.
- No identifying information will be included in the transcripts of interviews or surveys without your permission.
- Your de-identified data may be shared with other researchers for use in unknown future research without the need for additional informed consent. This means that any information potentially shared in the future will not include your name or any other information disclosing who you are.
- Your data will never be used for purposes other than those described in this consent form.

Participating in this study is completely voluntary, which means it is your choice whether you participate in this research. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any survey questions or continue with the interview for any reason.

If you have questions about this research study, you may contact Shelby Pearsall (Principal Investigator) by phone at (256) 679-6395, or by email at pearsallsa@appstate.edu. You also may contact the faculty advisor for this study, Dr. Hopton at hoptonsb@appstate.edu.


The Appalachian State University Institutional Review Board (IRB) has determined that this study is exempt from IRB oversight.

I agree to participate in the study.

A handwritten signature in blue ink that reads "N. McArthur".

Mr. Neil McArthur 3rd February 2022

Figure B2. Participant 2A consent form.



Participating in this study is completely voluntary, which means it is your choice whether you participate in this research. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any survey questions or continue with the interview for any reason.

If you have questions about this research study, you may contact Shelby Pearsall (Principal Investigator) by phone at (256) 679-6395, or by email at pearsallsa@appstate.edu. You also may contact the faculty advisor for this study, Dr. Hopton at hoptonsb@appstate.edu.

The Appalachian State University Institutional Review Board (IRB) has determined that this study is exempt from IRB oversight.

I agree to participate in the study.

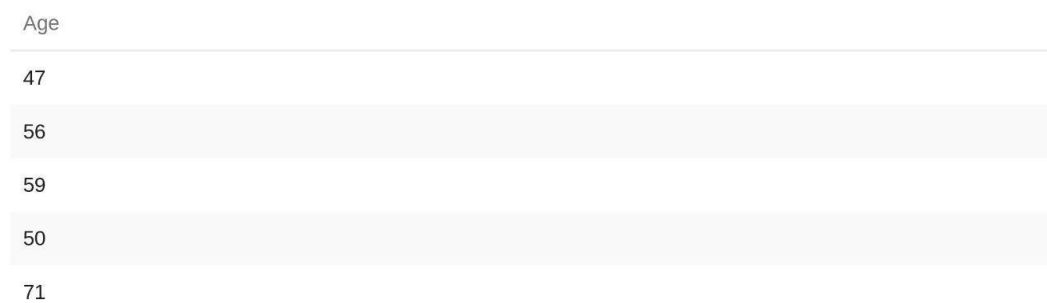
Michael Jensen
Signature

2/3/2022
Date

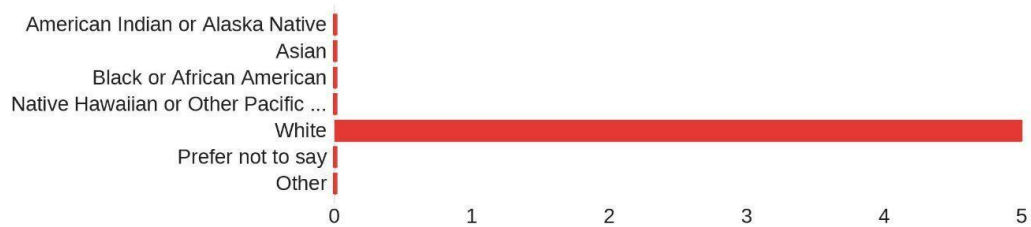
Figure B3. Preliminary Demographic Survey Questions and Responses. Personal information like names, phone numbers, and email addresses were removed from the survey report for confidentiality purposes.

1

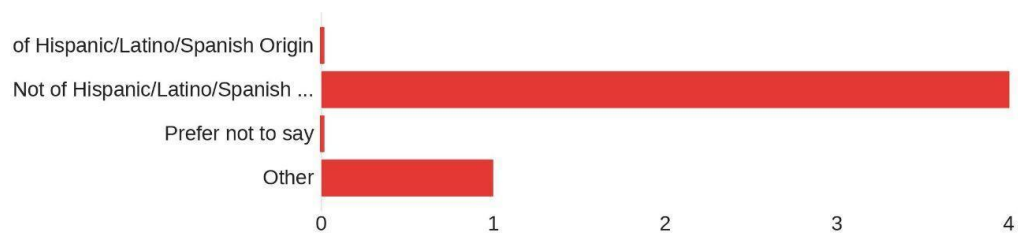
Q4 - Age



Q5 - I am



Q6 - I am



Other - Text

White British

Q7 - Location

| Field | Choice Count |
|----------------------------|--------------|
| (where you live currently) | 5 |
| Prefer not to say | 0 |
| Total | 5 |

(where you live currently) - Text

Apopka, Florida

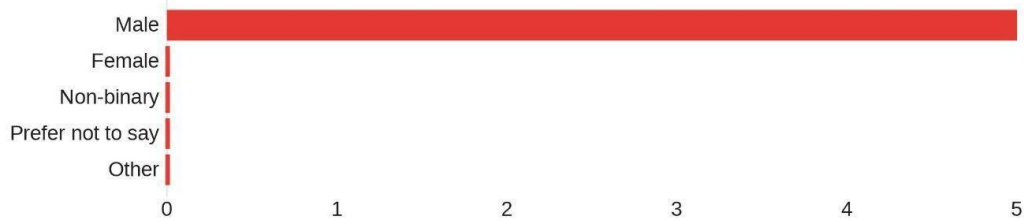
Indiana

Cambridge UK

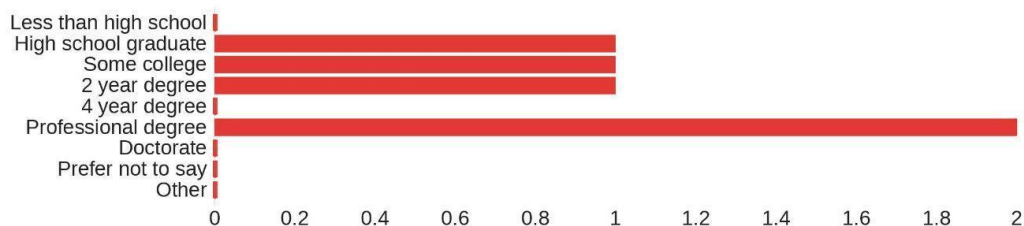
Boone NC 28607

San Pedro, CA (LA)

Q8 - I identify as



Q9 - Education Status



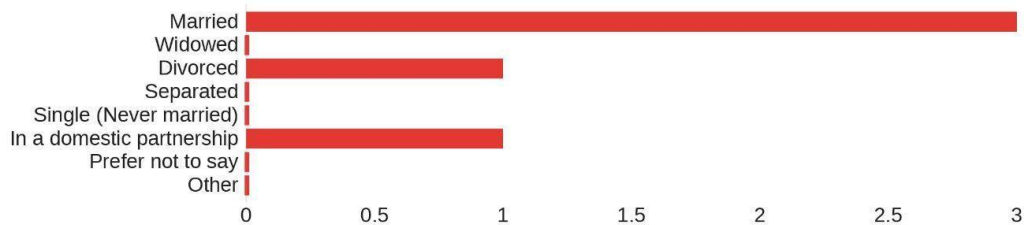
Q10 - Employment Status

| Field | Choice Count |
|--|--------------|
| Employed full time | 1 |
| Employed part time | 0 |
| Unemployed; I left my job for the hike. | 1 |
| Unemployed; I am looking for work after the hike. | 0 |
| Unemployed; I am not looking for work after the hike. | 0 |
| Unemployed temporarily during my hike; otherwise, employed full-time | 0 |
| Unemployed temporarily during my hike; otherwise, employed part-time | 0 |
| Retired | 2 |
| Student | 0 |
| Disabled | 0 |
| Prefer not to say | 0 |
| Other | 1 |
| Total | 5 |

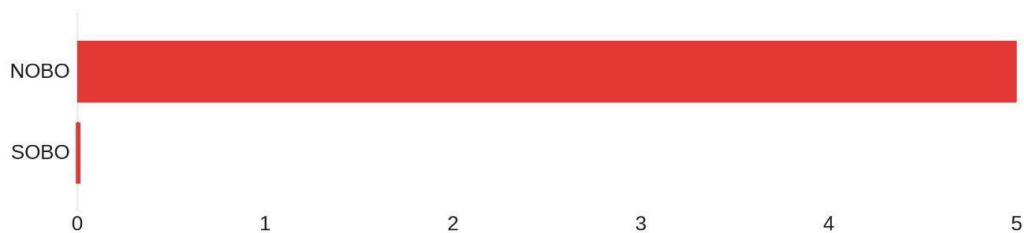
Other - Text

Leave of Absence

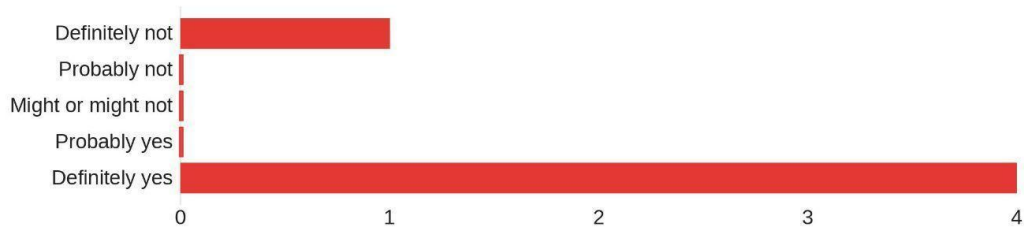
Q11 - Marital Status



Q12 - I am hiking



Q13 - Are you starting the trail solo?



Q14 - What date do you plan to start the trail?

What date do you plan to start the trail?

April 1

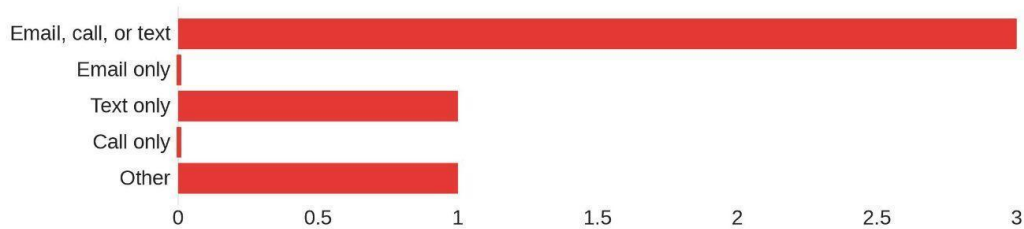
Feb. 16th

2nd March 2022

March 26 2022

3/14/2022

Q15 - In the case that I need to contact you while you're hiking, how would you like to be reached?



Other - Text

both text email r good

Q16 - As a participant in this study, you will complete a series of tasks using the app FarOut. Do you plan to complete your tasks at the beginning of your hike, or will you wait until you have started to find your groove?

| Field | Choice Count |
|--|--------------|
| I plan to start my tasks on or around Day 1. | 0 |
| I plan to get acclimated to the trail before I start my tasks. | 4 |
| I don't know yet. | 1 |
| Other | 0 |
| Total | 5 |

Q17 - Once you have completed your tasks, you will be asked to take a short survey (which you will receive via email) and participate in a phone interview. How would you like to signal that you are ready for the survey and interview?

| Field | Choice Count |
|---|--------------|
| I will text or email you when I have completed my tasks. | 1 |
| I would like you to email me to check if I have completed my tasks. | 2 |
| I would like you to text me to check if I have completed my tasks. | 2 |
| Total | 5 |

7

Q18 - Scheduling an interview for this study will look much different than usual, given our circumstances. When it is time for your interview, how would you like to schedule it?

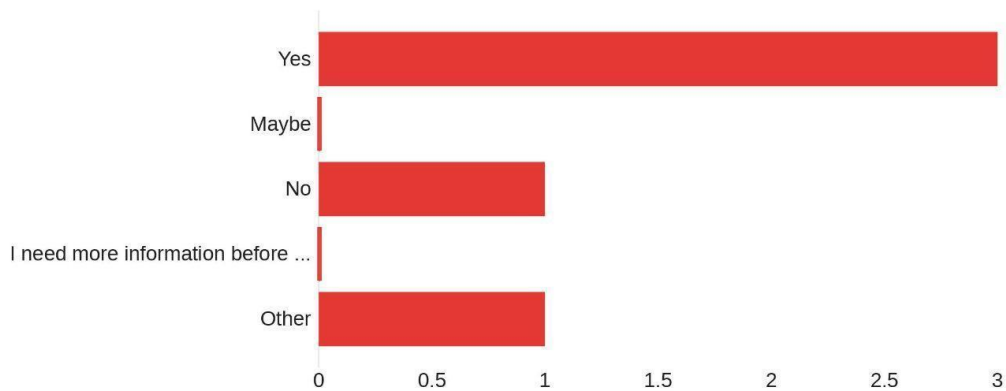
| Field | Choice Count |
|--|--------------|
| I will text you when I am available. | 2 |
| I will call you when I am available. | 0 |
| I will email you when I am available. | 0 |
| I don't know yet. | 0 |
| I would like you to remind me about the interview via (text, call, etc.)_____. | 3 |
| Other | 0 |
| Total | 5 |

I would like you to remind me about the interview via (text, call, etc.)_____ . - Text

Text

Q19 - Would you be willing to participate in a preliminary usability test of FarOut, before you start the trial?

8



Other - Text

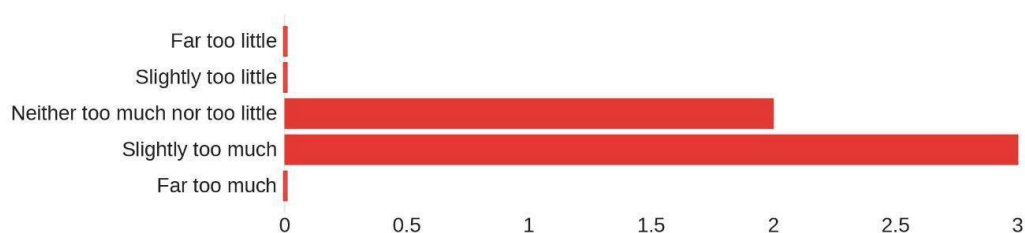
Already started

Q20 - How did you discover the app FarOut?

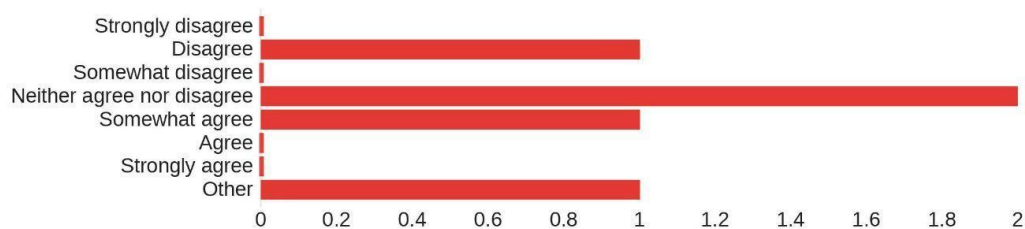
| Field | Choice Count |
|--------------------------------------|--------------|
| Recommended by a friend or colleague | 1 |
| Social media | 3 |
| Search engine (Google, Yahoo, etc.) | 0 |
| Blog or publication | 1 |
| Third-party review | 0 |
| Internet/App Advertisement | 0 |
| Other | 0 |
| Total | 5 |

Q21 - When you saw the AT Guide on FarOut, what did you think of the

price?



Q22 - Some people think that FarOut takes changes the thru-hiking experience. Do you agree?

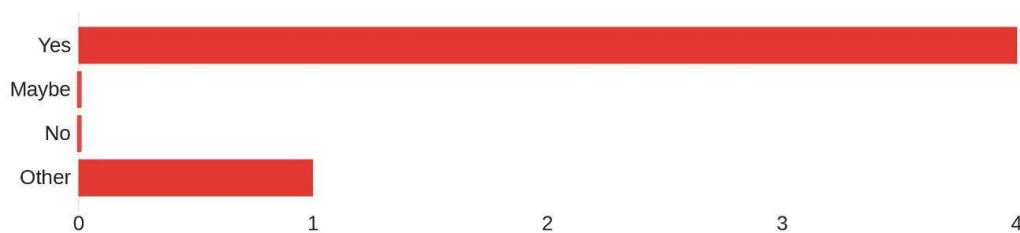


Other - Text

Makes it Safer

Q23 - Do you think the AT Guide on FarOut is valuable to day hikers/section hikers?

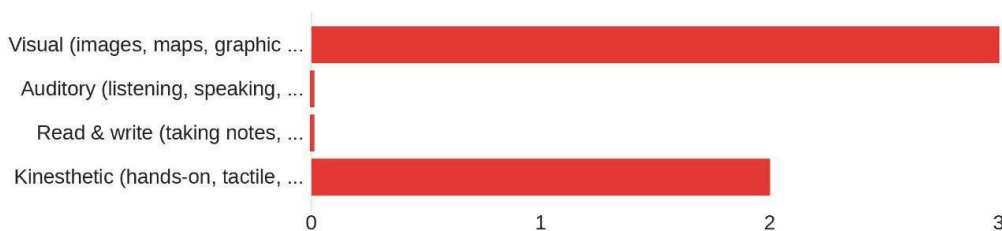
10



Other - Text

I'm an AT Thru Hiker

Q24 - How would you categorize your learning style?



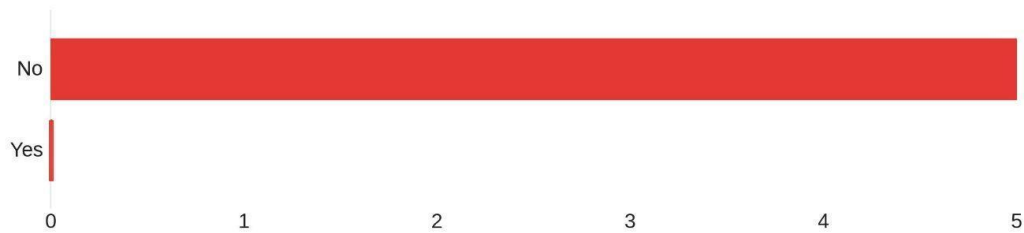
Q25 - What is the main reason you want to use FarOut on your thru-hike?

| Field | Choice Count |
|---|--------------|
| Navigation | 3 |
| Information about water sources, shuttles, etc. | 1 |
| Planning town trips | 0 |
| Other | 1 |

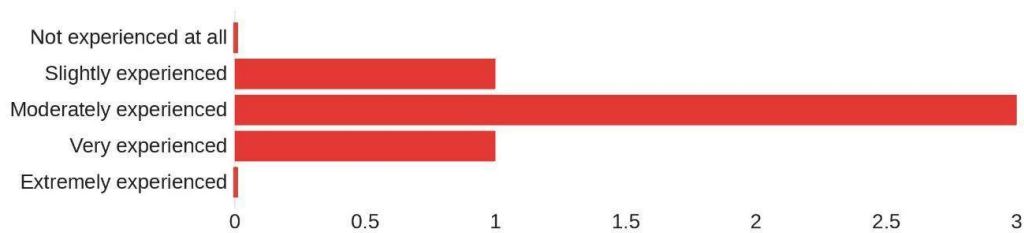
Other - Text

All the above,

Q26 - Have you used FarOut on your hikes in the past?



Q27 - How would you describe your experience as a hiker?

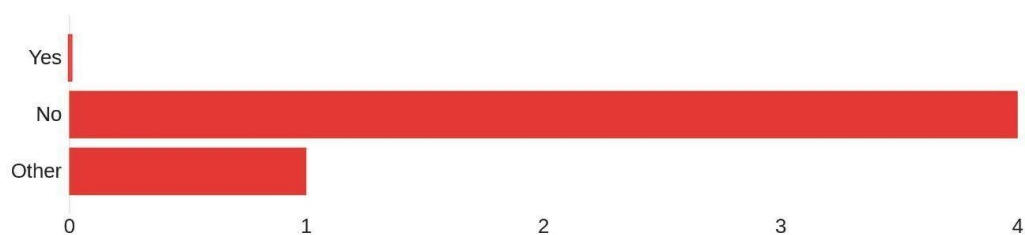


Q28 - How would you describe your relationship with technology?

13

| Field | Choice Count |
|--|--------------|
| I often have trouble using new technology. | 0 |
| I can figure out the basics of new technology, but don't pay much attention to the bells and whistles. | 3 |
| I generally have no trouble using and understanding new technology. | 2 |
| Using new technology feels like second-nature to me. | 0 |
| I am a tech wizard. | 0 |
| Other | 0 |
| Total | 5 |

Q29- Have you thru-hiked the AT before?



Other - Text

This will be my second attempt

Q30 - If you answered yes, did you use FarOut?

Please use this space to add any additional comments.

I am an experienced long distance hiker from the UK using a variety of navigation Apps on my iPhone, including GAIA GPS. This is my first long distance hike in the USA and my first experience of using Far Out (Guthooks) as recommended by many previous AT Thru Hikers on FaceBook. I will also be using ATC AWOL Guide and WhiteBlaze Pages as pdf files on my iPhone for planning ahead shuttles, hostels, etc.. I will also carry a hard-copy of the ATC AWOL Guide for backup safety.

As yet, I have not used FarOut in anger, but I have a few initial concerns ;

a) Having loaded the AT Routes & down-loaded Topo Maps, I find it frustrating that I have to wait a few seconds for the App to re-start each time I want to refer to it - maybe this will be quicker when I am actually on the AT ?

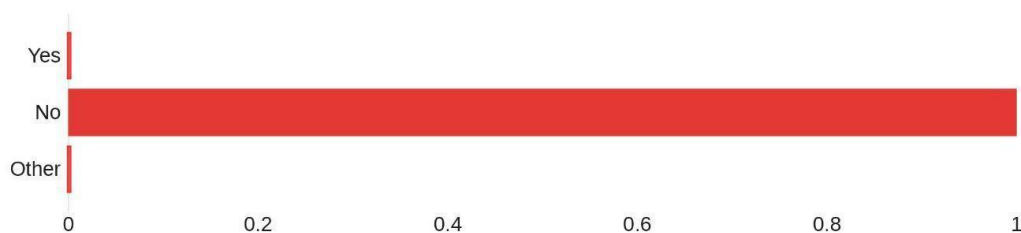
b) I do not see any mile-markers along the trail on the Map view, unlike GAIA GPS which helps me count how far I've hiked, and how much further to my next stop

c) I cannot find a "Search" facility in the Map & Elevation view i.e. I have reached High Shoals Road at mile 2.9, and wish to search for the Nimblewill Gap to meet a friend?

I'm sure it'll all be fine when I'm on the Trail and ask others how best to use FarOut (as I don't read manuals or user-guides)

Neil Mc.

I look forward to working with you on this Shelby. And to learning how best to use FarOut!




Q31 - Please use this space to add any additional comments.

Appendix C

This appendix includes several documents from “Plan B,” such as signed participant consent forms, survey questions/results from the preliminary demographic survey (5 responses), pre-trail survey (5 responses), and trail survey (5 responses).

Figure C1. Participants 1B Consent Form.



- Information regarding water sources, shuttles, and accommodations on FarOut may be outdated or inaccurate. Please be prepared for this risk and use the app as an aide, not as life support.
- You may find that some of the questions we ask in the survey or interview are uncomfortable or stressful. Please remember that you are not obligated to answer any question that you do not feel comfortable answering.
- A potential risk of participating in this study is a breach of confidentiality. This happens when the private information you share with us is seen by or made accessible to people who do not have permission to see your data.

Confidentiality:

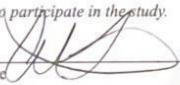
- To ensure that your information is kept confidential, identification numbers instead of names will be used in the final copies of study documents.
- No identifying information will be included in the transcripts of interviews or surveys without your permission.
- Your de-identified data may be shared with other researchers for use in unknown future research without the need for additional informed consent. This means that any information potentially shared in the future will not include your name or any other information disclosing who you are.
- Your data will never be used for purposes other than those described in this consent form.

Participating in this study is completely voluntary, which means it is your choice whether you participate in this research. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any survey questions or continue with the interview for any reason.

If you have questions about this research study, you may contact Shelby Pearsall (Principal Investigator) by phone at (256) 679-6395, or by email at pearsallsa@appstate.edu. You also may contact the faculty advisor for this study, Dr. Hopton at hoptonsb@appstate.edu.

The Appalachian State University Institutional Review Board (IRB) has determined that this study is exempt from IRB oversight.

I agree to participate in the study.

Signature  _____

Date 04-~~18~~⁹ 22

Figure C2. Participants 2B Consent Form.

Appalachian
STATE UNIVERSITY

- Information regarding water sources, shuttles, and accommodations on FarOut may be outdated or inaccurate. Please be prepared for this risk and use the app as an aide, not as life support.
- You may find that some of the questions we ask in the survey or interview are uncomfortable or stressful. Please remember that you are not obligated to answer any question that you do not feel comfortable answering.
- A potential risk of participating in this study is a breach of confidentiality. This happens when the private information you share with us is seen by or made accessible to people who do not have permission to see your data.

Confidentiality:

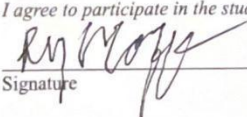
- To ensure that your information is kept confidential, identification numbers instead of names will be used in the final copies of study documents.
- No identifying information will be included in the transcripts of interviews or surveys without your permission.
- Your de-identified data may be shared with other researchers for use in unknown future research without the need for additional informed consent. This means that any information potentially shared in the future will not include your name or any other information disclosing who you are.
- Your data will never be used for purposes other than those described in this consent form.
-

Participating in this study is completely voluntary, which means it is your choice whether you participate in this research. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any survey questions or continue with the interview for any reason.

If you have questions about this research study, you may contact Shelby Pearsall (Principal Investigator) by phone at (256) 679-6395, or by email at pearsallsa@appstate.edu. You also may contact the faculty advisor for this study, Dr. Hopton at hoptonsb@appstate.edu.

The Appalachian State University Institutional Review Board (IRB) has determined that this study is exempt from IRB oversight.

I agree to participate in the study.

Signature 

Date 4/19/2022

Figure C3. Participants 3B Consent Form.



- Information regarding water sources, shuttles, and accommodations on FarOut may be outdated or inaccurate. Please be prepared for this risk and use the app as an aide, not as life support.
- You may find that some of the questions we ask in the survey or interview are uncomfortable or stressful. Please remember that you are not obligated to answer any question that you do not feel comfortable answering.
- A potential risk of participating in this study is a breach of confidentiality. This happens when the private information you share with us is seen by or made accessible to people who do not have permission to see your data.

Confidentiality:


- To ensure that your information is kept confidential, identification numbers instead of names will be used in the final copies of study documents.
- No identifying information will be included in the transcripts of interviews or surveys without your permission.
- Your de-identified data may be shared with other researchers for use in unknown future research without the need for additional informed consent. This means that any information potentially shared in the future will not include your name or any other information disclosing who you are.
- Your data will never be used for purposes other than those described in this consent form.
-

Participating in this study is completely voluntary, which means it is your choice whether you participate in this research. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any survey questions or continue with the interview for any reason.

If you have questions about this research study, you may contact Shelby Pearsall (Principal Investigator) by phone at (256) 679-6395, or by email at pearsallsa@appstate.edu. You also may contact the faculty advisor for this study, Dr. Hopton at hoptonsb@appstate.edu.

The Appalachian State University Institutional Review Board (IRB) has determined that this study is exempt from IRB oversight.

I agree to participate in the study.


Signature


Date

Figure C5. Participants 5B Consent Form.

Appalachian

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- Information regarding water sources, shuttles, and accommodations on FarOut may be outdated or inaccurate. Please be prepared for this risk and use the app as an aide, not as life support.
- You may find that some of the questions we ask in the survey or interview are uncomfortable or stressful. Please remember that you are not obligated to answer any question that you do not feel comfortable answering.
- A potential risk of participating in this study is a breach of confidentiality. This happens when the private information you share with us is seen by or made accessible to people who do not have permission to see your data.

Confidentiality:

- To ensure that your information is kept confidential, identification numbers instead of names will be used in the final copies of study documents.
- No identifying information will be included in the transcripts of interviews or surveys without your permission.
- Your de-identified data may be shared with other researchers for use in unknown future research without the need for additional informed consent. This means that any information potentially shared in the future will not include your name or any other information disclosing who you are.
- Your data will never be used for purposes other than those described in this consent form.

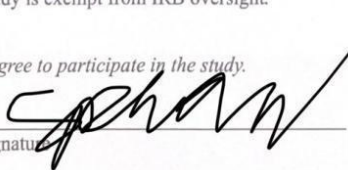
Participating in this study is completely voluntary, which means it is your choice whether you participate in this research. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any survey questions or continue with the interview for any reason.

If you have questions about this research study, you may contact Shelby Pearsall (Principal Investigator) by phone at (256) 679-6395, or by email at pearsallsa@appstate.edu. You also may contact the faculty advisor for this study, Dr. Hopton at hoptonsb@appstate.edu.

The Appalachian State University Institutional Review Board (IRB) has determined that this study is exempt from IRB oversight.

I agree to participate in the study.

Signature



Date

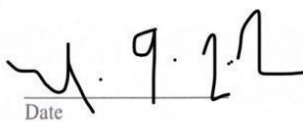


Figure C6. Preliminary Demographic Survey Questions and Results. Identifying information such as name, phone numbers, and contact information were deleted for confidentiality.

1

Q4 - Age

Age

21

23

21

22

21

Q5 - Location

(where you live currently) - Text

Boone, NC

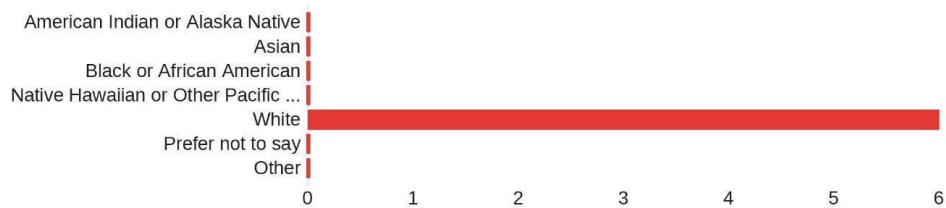
Boone

Boone, NC

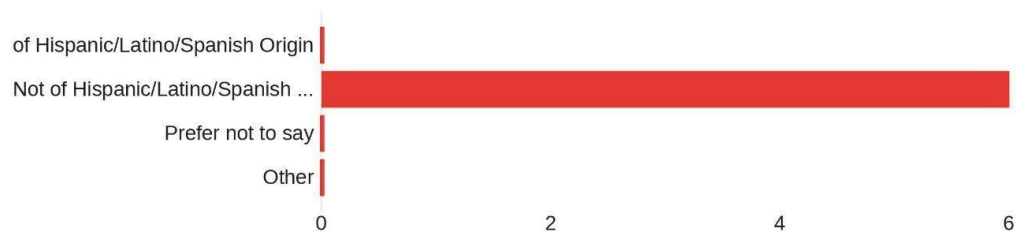
Boone

Boone,NC

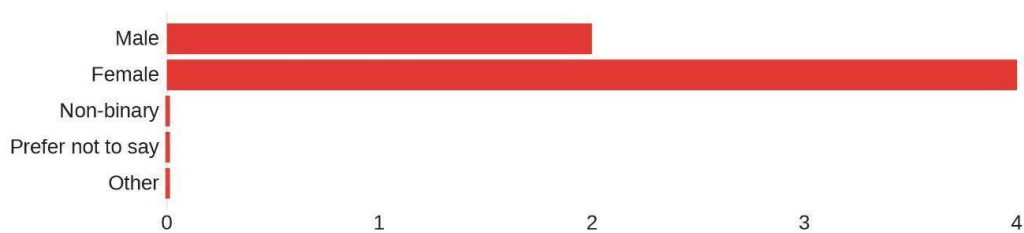
Q6 - I am



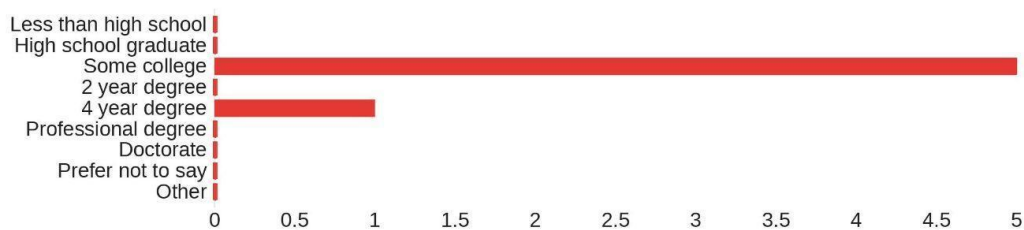
Q7 - I am



Q8 - I identify as



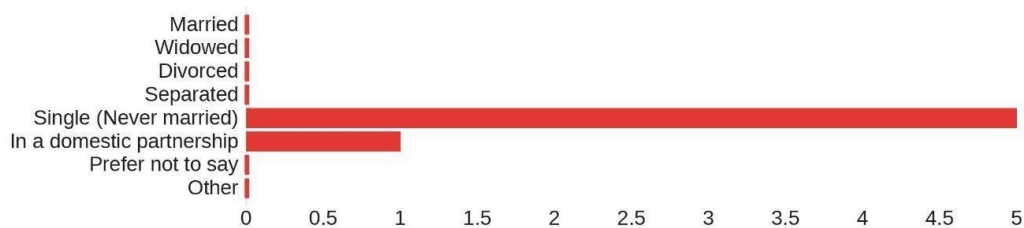
Q9 - Education Status



Q10 - Employment Status

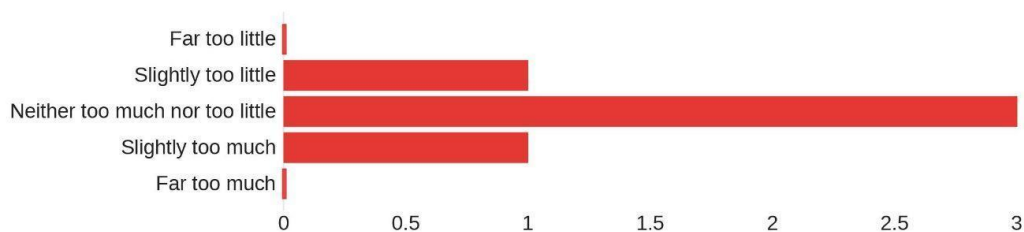
| Field | Choice Count |
|--|--------------|
| Employed full time | 0 |
| Employed part time | 5 |
| Unemployed; I left my job for the hike. | 0 |
| Unemployed; I am looking for work after the hike. | 0 |
| Unemployed; I am not looking for work after the hike. | 0 |
| Unemployed temporarily during my hike; otherwise, employed full-time | 0 |
| Unemployed temporarily during my hike; otherwise, employed part-time | 0 |
| Retired | 0 |
| Student | 1 |
| Disabled | 0 |
| Prefer not to say | 0 |
| Other | 0 |
| Total | 6 |

Q11 - Marital Status

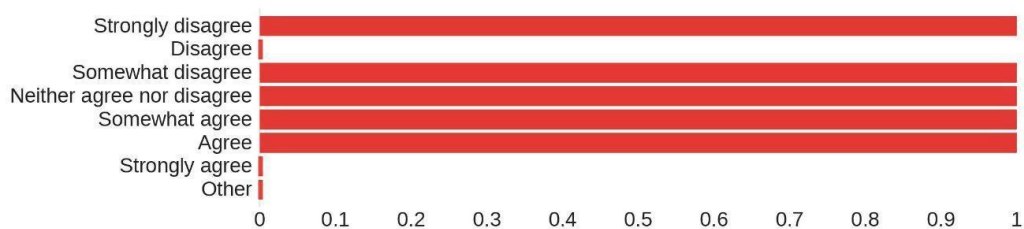


4

Q12 - When you saw the AT Guide on FarOut, what did you think of the price?

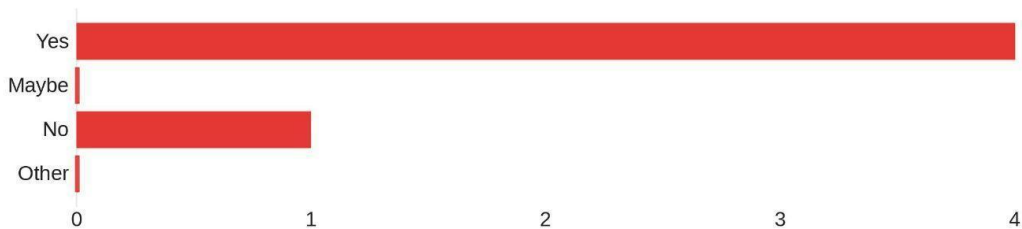


Q13 - Some people think that FarOut takes changes the thru-hiking experience. Do you agree?

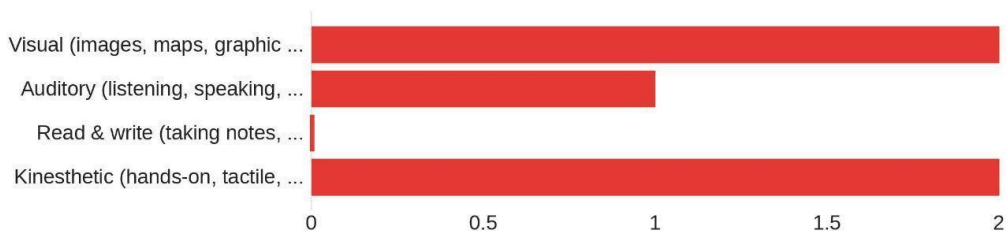


Q14 - Do you think the AT Guide on FarOut is valuable to day hikers/section hikers?

5



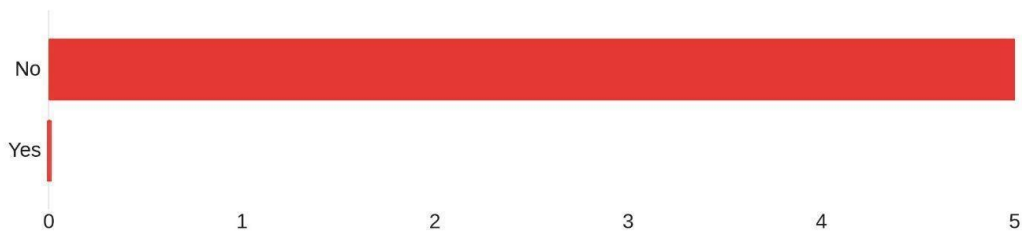
Q15 - How would you categorize your learning style?



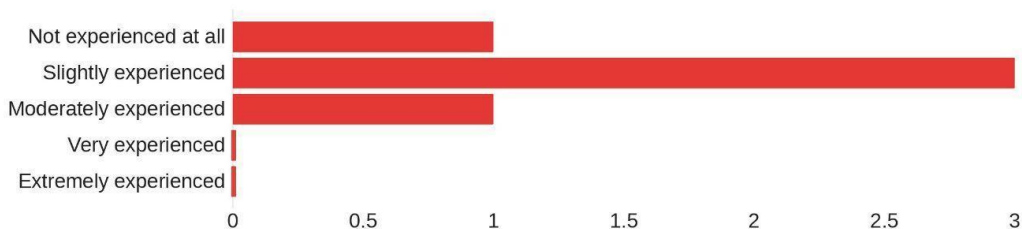
Q16 - What is the main reason you want to use FarOut on your thru-hike?

| Field | Choice Count |
|---|--------------|
| Navigation | 2 |
| Information about water sources, shuttles, etc. | 3 |
| Planning town trips | 0 |
| Other | 0 |
| Total | 5 |

Q17 - Have you used FarOut on your hikes in the past?



Q18 - How would you describe your experience as a hiker?



Q19 - How would you describe your relationship with technology?

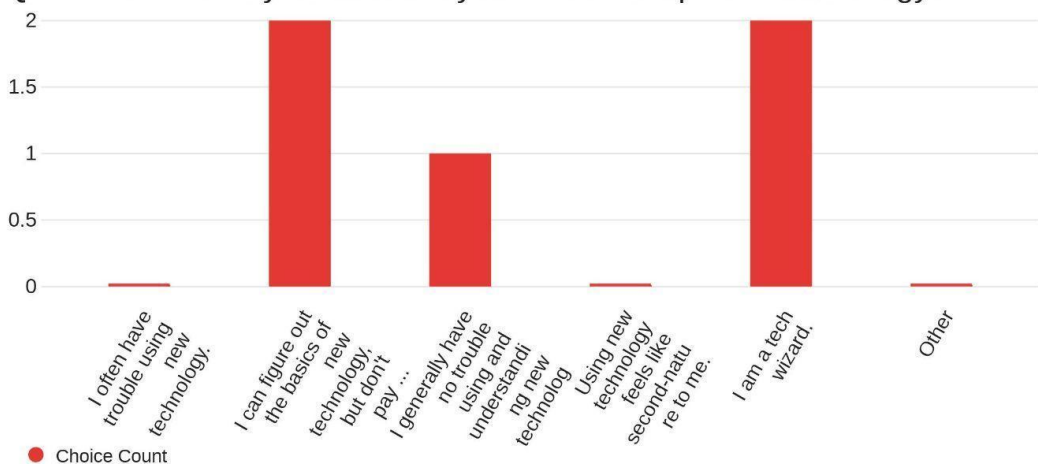


Figure C7. Pre-trail task sheet.

Preliminary Tasks - FarOut Usability Test

This brief preliminary test is intended to assess your knowledge of the *FarOut* app *before* using it on the Appalachian Trail. The results of this test will be used in comparison with your results from the trail test to gauge FarOut’s accessibility and usability. I would like to stress to you that my goal in this study is to get honest user feedback. That being said, there are no right or wrong answers and any feedback is valuable feedback. I want to thank you again for your participation in this study.

Instructions

Open the *FarOut* app and complete each task to the best of your ability. If you are unable to complete a task for any given reason, it is okay to leave it incomplete.

I encourage you to use the space below to take any notes you may have about the tasks. In the post-task survey, you will be asked questions about how much time or effort each task took.

While you are completing these tasks, some examples of things you might keep in mind include:

- How long did it take to complete this task?
- How easy or difficult was this task to complete?
- How useful will this task be to me when I am on the trail?

Once you have completed the tasks, please use the link below to take a survey about your experience.

Tasks

| | Task | Notes |
|---|--|-------|
| ● | Download Waypoint Photos, TopoMaps, USCS National Maps, and USGS Satellite Map for Springer Approach Trail | |
| ● | In the TopoMap view, use both the “pinch & scroll” and “double-tap” method to zoom in on the map | |
| ● | Switch your offline map from TopoMap to National Map. View the | |

| | | |
|---|--|--|
| | National Map on the guide. Then, switch your offline map from the National Map to the USGS Satellite Map. View the Satellite Map on the guide. | |
| ● | Switch to the Elevation Map. Then, use both the “pinch and scroll” and “double tap” method to zoom in on the map | |
| ● | Use the Elevation Map to gauge the elevation gain of a climb on the Springer Approach Trail | |
| ● | Turn your phone on Airplane mode (or turn off cellular data) and determine how much distance lies between two water sources of your choice | |
| ● | Customize your waypoints. Check out and alter (if applicable) which waypoints you would like to view or hide on your map | |
| ● | Change the trail guide from Springer Approach Trail to Springer to Standing Bear Farm. | |
| ● | <p>Search waypoints for “Barefoot Hills.”</p> <ul style="list-style-type: none"> ● Launch their website link from the waypoint description. ● Launch their website link from commenter “katiewind” (not the description link). | |

Preliminary Tasks Post-Survey Link

https://appstate.az1.qualtrics.com/jfe/form/SV_3a90mQQxbIW6u6G.

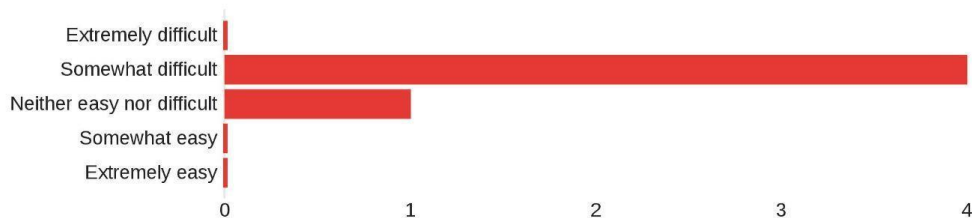
Figure C9. Pre-trial Survey Questions and Results. Unanswered questions were left out of this report.

1

Q1 - Did you find that the instructions for the preliminary tasks were easy to follow?



Q2 - Overall, how difficult was it to complete the preliminary tasks using FarOut?



Q3 - At this moment, how would you describe your relationship with FarOut?

| Field | Choice Count |
|---|--------------|
| I'm still pretty confused about how to navigate the app. | 4 |
| I've figured out the basic features that I'll need to use. | 1 |
| I've figured out the basic features that I'll need to use, but I want to learn more about the others. | 1 |

2

| | |
|---|---|
| I am confident using the app and all of its features. | 0 |
| Other | 0 |
| Total | 6 |

Q4 - Has completing these preliminary tasks changed your relationship with FarOut?

| Field | Choice Count |
|---|--------------|
| No, I feel the same as I did before completing the tasks. | 1 |
| Yes, I feel more confused now. | 2 |
| Yes, I discovered new features and I feel more comfortable with FarOut | 2 |
| Yes, I didn't learn anything new but I feel more comfortable with FarOut. | 0 |
| Other | 0 |
| Total | 5 |

Q5 - On a scale of 1-10, rate how intuitive (neutral / self-explanatory) you think using the features in FarOut is

| Field | Min | Max | Mean | Standard Deviation | Variance | Responses |
|--|------|------|------|--------------------|----------|-----------|
| 1=not intuitive at all, 10=extremely intuitive | 2.00 | 7.00 | 4.80 | 1.72 | 2.96 | 5 |

Q6 - Did you complete Task 1?

3



Q7- If you did not complete Task 1, what prevented you?

| Field | Choice Count |
|---|--------------|
| I could not find where I could download these maps. | 3 |
| I didn't want to use storage on my phone to complete this task. | 0 |
| Other | 1 |
| Total | 4 |

Q8- Did you complete Task 2?



Q9 - If you did not complete Task 2, what prevented you?

5

| Field | Choice Count |
|--|--------------|
| I do not know what "double tap" or "pinch and scroll" means. | 0 |
| Double tap zoom did not work. | 0 |
| Pinch and scroll zoom did not work. | 0 |
| I could not switch to Topo Map. | 2 |
| Other | 0 |
| Total | 2 |

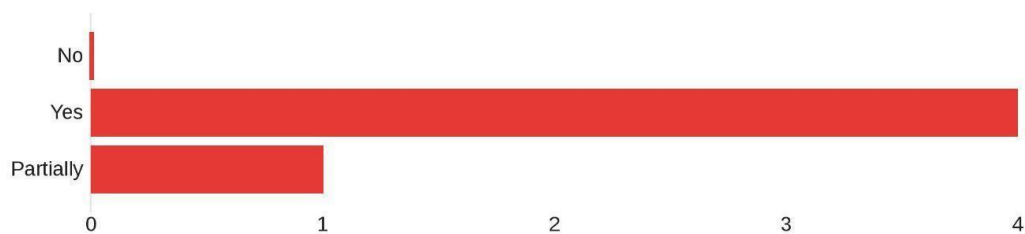
Q10 - Did you complete Task 3?



Q11 - If you did not complete Task 3, what prevented you?

| Field | Choice Count |
|---|--------------|
| I could not find where I could switch the various maps. | 3 |
| I didn't want to use storage on my phone to complete this task. | 0 |
| I did not download these maps. | 0 |
| Other | 0 |
| Total | 3 |

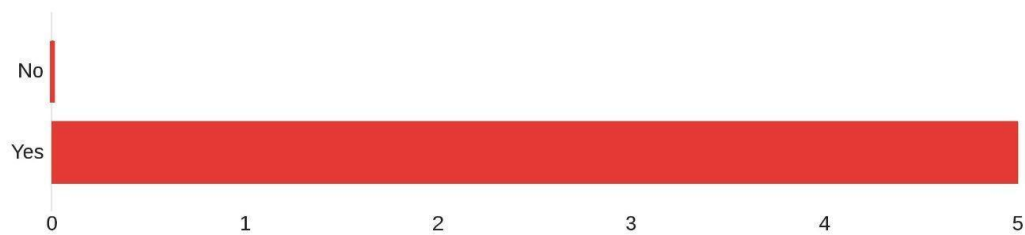
Q12 - Did you complete Task 4?



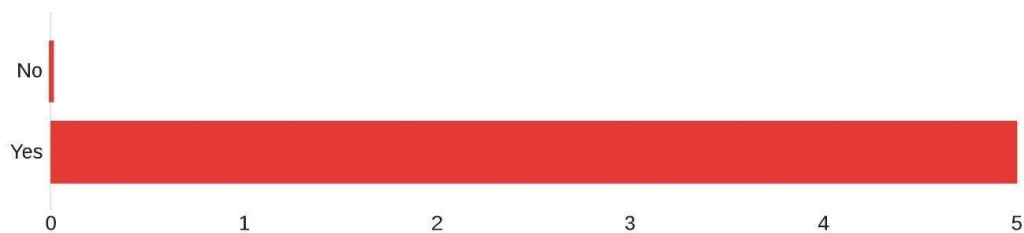
Q13 - If you did not complete Task 4, what prevented you?

| Field | Choice Count |
|--|--------------|
| I do not know what "double tap" or "pinch and scroll" means. | 0 |
| Double tap zoom did not work. | 1 |
| Pinch and scroll zoom did not work. | 0 |
| I could not switch to Topo Map. | 0 |
| Other | 0 |
| Total | 1 |

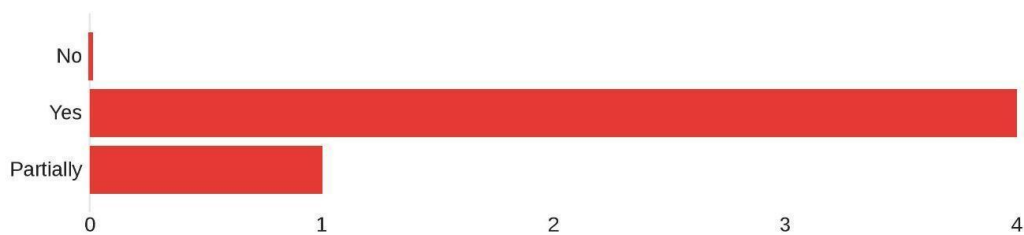
Q14 - Did you complete Task 5?



Q16 - Did you complete Task 6?



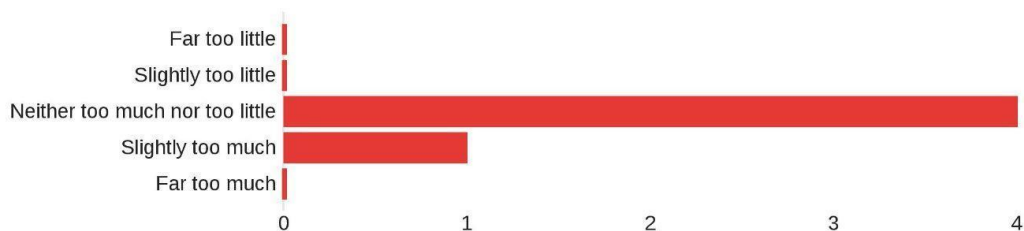
Q18 - Did you complete Task 7?



Q19 - If you did not complete Task 7, what prevented you?

| Field | Choice Count |
|---|--------------|
| I could not find where to view all waypoints. | 0 |
| I could not find where to customize / alter my waypoints. | 1 |
| I could find the waypoints, but not how to view or hide them. | 0 |
| I did not want to alter my waypoints. | 0 |
| Other | 0 |
| Total | 1 |

Q20 - How did you feel about the amount of waypoint icons?



Q21 - Did you complete Task 8?



Q22 - If you did not complete Task 8, what prevented you?

| Field | Choice Count |
|--|--------------|
| I could not find where to change the guide from Springer Approach to Springer - Standing Bear. | 3 |
| I could find where to switch the guide, but it would not work. | 0 |
| I did not want to change the guide from the Springer Approach Trail. | 0 |
| I did not have Springer - Standing Bear downloaded. | 0 |
| Other | 0 |
| Total | 3 |

10

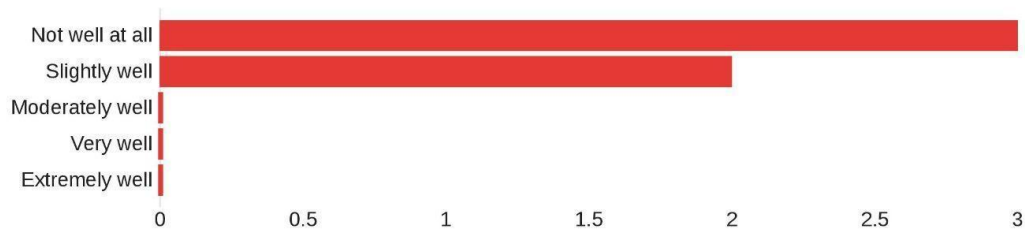
Q23 - Did you complete Task 9?



Q24 - If you did not complete Task 9, what prevented you?

| Field | Choice Count |
|--|--------------|
| I could not find how to search waypoints. | 0 |
| I could not find Barefoot Hills in the waypoint search. | 1 |
| I could find Barefoot Hills in the waypoint search, but could not launch the link from the description. | 1 |
| I could not find the commentor "katiewind." | 0 |
| I could find Barefoot Hills in the waypoint search, but could not launch the link from the commentor. | 0 |
| I could find Barefoot Hills in the waypoint search, but could not launch the link from the commentor or description. | 0 |
| Other | 0 |
| Total | 2 |

Q25 - How well did FarOut provide information and guidance within the app to complete its functions and these tasks?



Q26 - Please drag and drop to rank the following tasks from easiest (1) to complete to most difficult (9).

| Field | Min | Max | Mean | Standard Deviation | Variance | Responses |
|--|------|------|------|--------------------|----------|-----------|
| Task 1: Download Waypoint Photos, TopoMaps, USCS National Maps, and USGS Satellite Map for Springer Approach Trail | 1.00 | 9.00 | 6.80 | 2.99 | 8.96 | 5 |
| Task 2: In the TopoMap view, use both the "pinch & scroll" and "double-tap" method to zoom in on the map | 1.00 | 7.00 | 3.00 | 2.28 | 5.20 | 5 |
| Task 3: Switch offline map from TopoMap to National Map > view. Then, switch offline map from National to Satellite > view. | 4.00 | 9.00 | 7.00 | 1.79 | 3.20 | 5 |
| Task 4: In the Elevation Map view, use both the "pinch and scroll" and "double tap" method to zoom in on the map | 2.00 | 5.00 | 3.20 | 1.17 | 1.36 | 5 |
| Task 5: Use the Elevation Map to gauge the elevation of a climb on the Springer Approach Trail | 4.00 | 7.00 | 5.40 | 1.02 | 1.04 | 5 |
| Task 6: Turn your phone on Airplane mode (or turn off cellular data) and determine how much distance lies between two water sources of your choice | 1.00 | 6.00 | 3.80 | 1.72 | 2.96 | 5 |
| Task 7: Customize your waypoints. Check out and alter (if applicable) which waypoints you would like to view or hide on your map | 1.00 | 8.00 | 4.60 | 2.65 | 7.04 | 5 |

14

| Field | Choice Count |
|---|--------------|
| These features were difficult to locate within the app. | 4 |
| These features did not work properly. | 1 |
| They just took more time. | 0 |
| I did not find any tasks difficult. | 0 |
| Other | 0 |
| Total | 5 |

Q28 - Please use this space to explain any other notes or comments you may have on tasks (if applicable).

Please use this space to explain any other notes or comments you may have on tasks (if applicable).

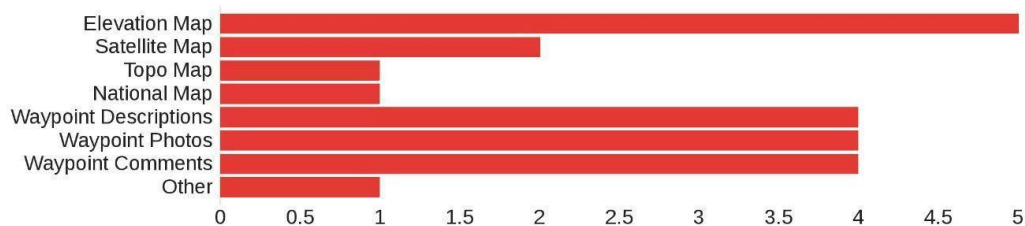
There was no guide to accessibility within the app. A "set-up" wizard of sorts would be useful.

Overall it's a cool App and I think it helps with safety on the trial by know what is ahead. However when it came to downloading different maps or switch maps it was difficult.

Q29 - How much would you benefit from in-app tutorials of how to use its features?

| Field | Choice Count |
|---|--------------|
| Not much; I could figure it out on my own. | 0 |
| Some; it would be helpful for the more obscure features. | 0 |
| Neutral; I think that its fine how it is. | 0 |
| A good amount; I would like to see quick tutorials of how to use the features within the app. | 4 |
| A lot; I would like to see in-depth tutorials of how to use each feature within the app. | 1 |
| Total | 5 |

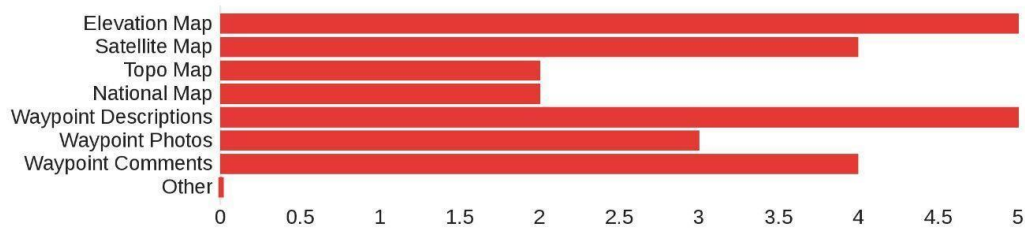
Q30 - Which features do you think will be the most useful to you on your thru-hike? Check all that apply.



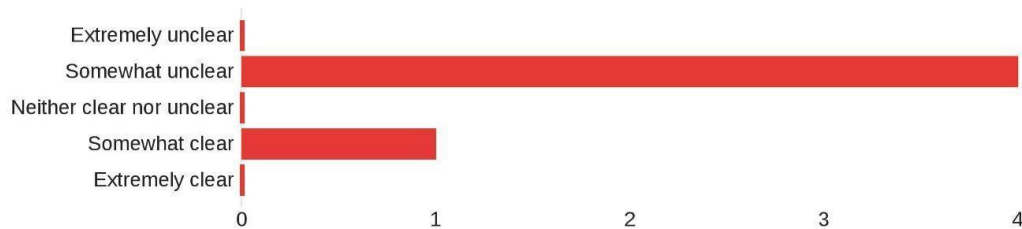
Other - Text

I noticed that you could report an incident while on the trail and I think that is super important when it comes to being a through hiker and would make me feel more safe.

Q31 - Which features do you think are worth downloading for offline use while thru-hiking?



Q32 - How clearly is the information and features laid out?



If you answered "unclear," please elaborate.

I couldn't figure out how to switch between maps. A feature that showed you how to do things like that would make the app more clear overall.

It was hard to remember what buttons brought you to which page.

I could not figure out switching between maps

Some of the icons were unclear of what they meant.

Q33 - If you could change one thing about FarOut, what would it be and why?

If you could change one thing about FarOut, what would it be and why?

Set-up wizard on how to use all of the apps features

Titles for specific buttons and layouts of where each task is.

Easier to navigate the app, more helpful hints to new hikers using the app

list map options in one place

Making the icons more representative of what they bring you to on the app. As well as making it easier to find how to download the maps.

Q34 - How can I improve this survey for the Trail Task Usability Test?

How can I improve this survey for the Trail Task Usability Test?

N/A

n/a

Include questions related to the incident report process on the app. Otherwise I think it was a useful survey for the makers of the app.

Figure C10. Trail task sheet.

Trail Tasks - FarOut Usability Test

These tasks are intended to test the usability of the *FarOut* app in real-time as you hike on the Appalachian Trail. I would like to emphasize that my goal in this study is to get honest user feedback. That being said, there are no right or wrong answers. Any feedback is valuable feedback. I want to thank you again for your participation in this study.

Instructions

Use the *FarOut* app to complete each task to the best of your ability. You may complete the tasks in any order and frequency as you please. If you are unable to complete a task for any given reason, it is okay to leave it incomplete. I suggest that you do an initial read-through of the tasks because they might be features you are already using on your hike.

I have provided check boxes in the table if you wish to check the tasks off as you complete them. I encourage you to use the space below to take optional notes of anything that comes to mind about the tasks as you complete them. In the post-task survey and interview, you will be asked questions about how much time, effort, etc. each task required. While you are completing tasks, some examples of things you might keep in mind include:

- How long did it take me to complete this task?
- How easy or difficult was this task to complete?
- Have I used this feature outside of this test?

Once you have completed your tasks, please use the link at the end of this document to complete a brief survey about your experience.

Tasks

These tasks may be completed with or without cellular service or wifi.

Navigation Tasks

| | Task | Comments |
|---|---|----------|
| ● | Turn off and on your location. | |
| ● | Spend some time hiking and navigating using OpenTopoMap, USGS Satellite Map, and USGS | |

| | | |
|---|--------------------------------|--|
| | National Map. | |
| • | Record a stretch of your hike. | |

Waypoint Tasks

| | Task | Comments |
|---|---|----------|
| • | Create a custom waypoint. Then, view the waypoint on the guide. | |

Comment Tasks

| | Task | Comments |
|---|--|----------|
| • | Sort comments by date on a waypoint of your choice by date. | |
| • | Publish a comment on a Water Source waypoint to validate or invalidate its status. | |
| • | Copy a phone number or link from the comments to help form town plans. | |
| • | Refresh comments for updates. | |

Online Tasks

These tasks can only be completed with cellular service or wifi.

| | Task | Comments |
|---|--|----------|
| • | Change your online map from road map to satellite map. | |
| • | Use the app to share your location by text with a friend or family member. | |
| • | Send a check-in. | |

Trail Tasks Post-Survey Link

https://appstate.az1.qualtrics.com/jfe/form/SV_4PBaA9o60gMKOs6.

Figure C11. Time on task data sheet.

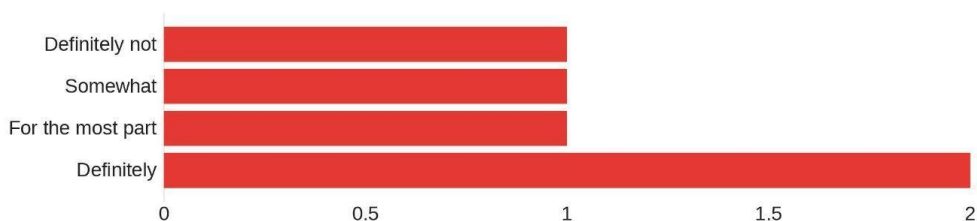
| Preliminary Tasks | | | | | | |
|--------------------------|---------|---------|---------|---------|------------------|-------------------|
| | P1 | P2 | P3 | P4 | P5 | Average Task Time |
| Task 1 (download maps) | 4.40.41 | 5.27.68 | 2.23.73 | 4.20.86 | 6.33.42 | 269.16 sec |
| Task 2 (topo zoom) | 1.07.97 | 0.59.51 | 0.38.67 | 0.11.67 | 4.15.30 | 84.61 |
| Task 3 (switch maps) | 1.59.05 | 1.47.0 | 0.24.92 | 1.30.58 | 0.00.00, refused | 57.3 |
| Task 4 (elevation zoom) | 0.59.32 | 0.25.15 | 0.07.85 | 0.08.90 | 0.19.20 | 24.08 |
| Task 5 (elevation gain) | 0.32:23 | 1.30.40 | 0.39.52 | 0.41.71 | 0.38.40 | 45.97 |
| Task 6 (airplane water) | 0.47.83 | 0.42.79 | 0.32.39 | 0.49.49 | 2.01.06 | 58.62 |
| Task 7 (customize wps) | 0.44.48 | 0.43.39 | 0.48.95 | 0.37.61 | 0.24.90 | 39.87 |
| Task 8 (standing bear) | 1.05.90 | 1.34.86 | 2.04.60 | 4.35.11 | 0.36.43 | 112.65 |
| Task 9 (wp comments) | 1.06.15 | 1.21.52 | 2.17.31 | 2.41.80 | 0.54.88 | 93.18 |
| Total Time | 734.06 | 806.24 | 578.7 | 884.98 | 923.21 | 785.44 |
| Trail Tasks | P1 | P2 | P3 | P4 | P5 | |
| Task 1 (on/off location) | 1.03.18 | 0.15.25 | 0.28.77 | 2.02.98 | 1.24.82 | 301.42 |
| Task 2 (switch maps) | 0:39.26 | 2.42.27 | 0.21.76 | 1.05.12 | 0.09.68, refused | 55.78 |
| Task 3 (record hike) | 0.08.22 | 0.09.87 | 0.19.00 | 0.03.58 | 0.02.10 | 8.55 |
| Task 4 (create wp) | 0:26.09 | 0.32.98 | 0.30.75 | 0.31.85 | 0.31.70 | 30.674 |
| Task 5 (sort comments) | 0:12.08 | 0.19.66 | 0.10.42 | 0.13.19 | 0.11.85 | 13.44 |
| Task 6 (comment water) | 0.12.00 | 0.18.42 | 0.20.20 | 0.59.60 | 0.26.18 | 27.28 |

| | | | | | | |
|--------------------------------|---------|---------|---------|---------|---------|---------|
| Task 7 (launch # from coms) | 0:16.85 | 0:17.66 | 0:53.35 | 0:37.20 | 0:45.40 | 34.1 |
| Task 8 (refresh coms) | 0:27.33 | 0:20.88 | 0:38.43 | 2:50.25 | 1:04.59 | 59.81 |
| Task 9 (online map) | 0:08.76 | 0:14.96 | 0:06.49 | 0:11.65 | 0:35.11 | 15.39 |
| Task 10 (share location) | 0:58.17 | 0:56.23 | 1:11.60 | 3:06.94 | 0:32.53 | 79.43 |
| Task 11 (check-in) | 0:09.20 | 0:42.77 | 0:09.54 | 0:04.20 | 0:03.20 | 13.78 |
| | | | | | | |
| Total Time | 279.76 | 393.88 | 305.31 | 679.07 | 334.55 | 701.234 |

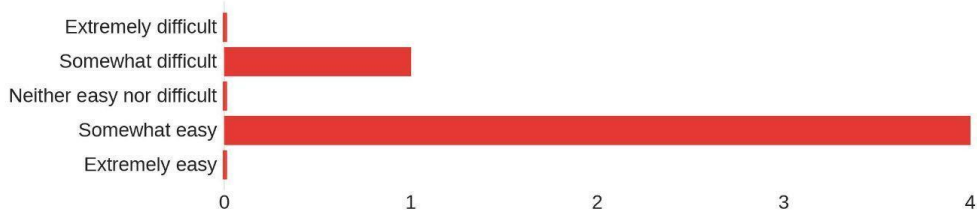
Figure C12. Trail Survey Questions and Results. Participants were instructed to answer questions that were catered towards on-trail experiences as if they were hypothetically on a thru hike (For example: *Did the waypoint comments influence your planning?*).

1

Q1 - Did you find that the instructions for the tasks were easy to follow?



Q2 - Overall, how difficult was it to complete the tasks using FarOut?



Q3 - At this moment, how would you describe your relationship with FarOut?

| Field | Choice Count |
|---|--------------|
| I'm still pretty confused about how to navigate the app. | 1 |
| I've figured out the basic features that I'll need to use. | 2 |
| I've figured out the basic features that I'll need to use, but I want to learn more about the others. | 2 |
| I am confident using the app and all of its features. | 0 |
| Total | 5 |

2

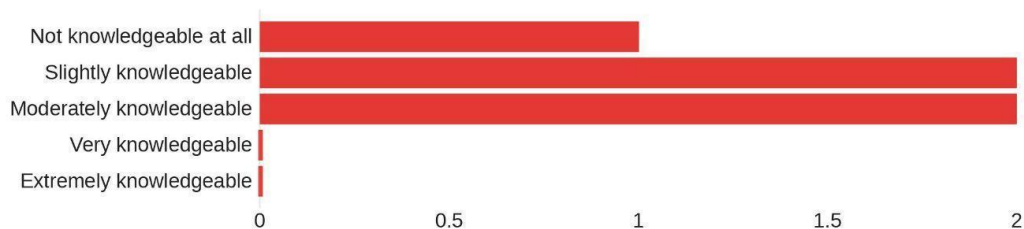
Q4 - Do you feel that you used any features of FarOut that you wouldn't have if it weren't for this study?

| Field | Choice Count |
|---|--------------|
| No, I would've used all of these features anyways. | 1 |
| Somewhat, I used some features that I probably wouldn't have. | 3 |
| Yes, I wouldn't use most of these features. | 1 |
| Other | 0 |
| Total | 5 |

Q5 - On a scale of 1-10, rate how intuitive (neutral / self-explanatory) you think using the features in FarOut is

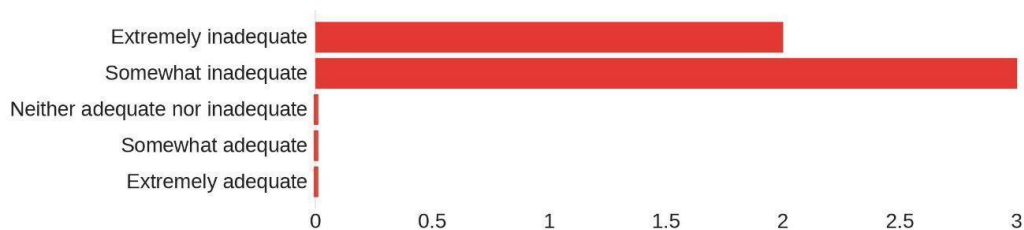
| Field | Min | Max | Mean | Standard Deviation | Variance | Responses |
|--|-----|-----|------|--------------------|----------|-----------|
| 1=not intuitive at all, 10=extremely intuitive | 2 | 8 | 5 | 2 | 5 | 5 |

Q6 - How would you assess your knowledge of FarOut's features and the terms used within the app?

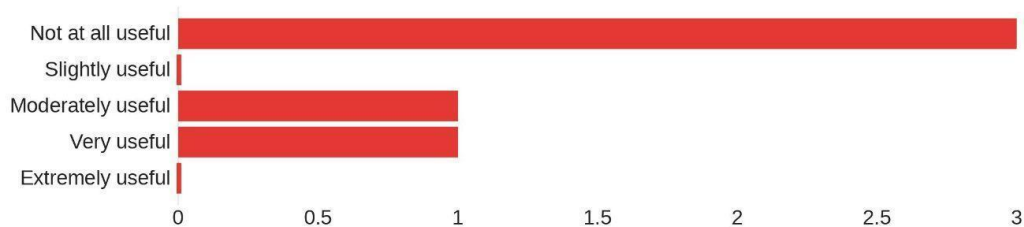


3

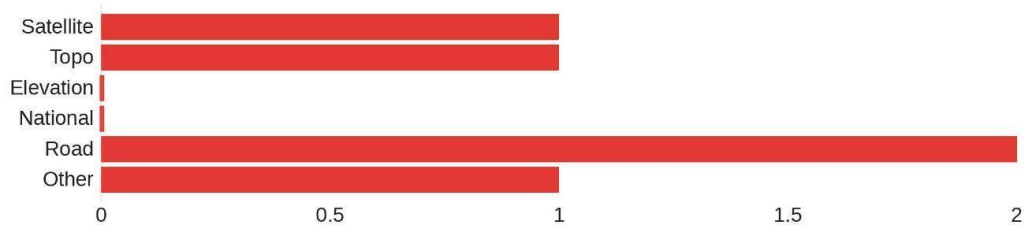
Q7 - Is there adequate information displayed within the app to use the features effectively?



Q8 - How useful would it be for FarOut to improve their aesthetics?



Q9 - Which map do you use the most while using FarOut?

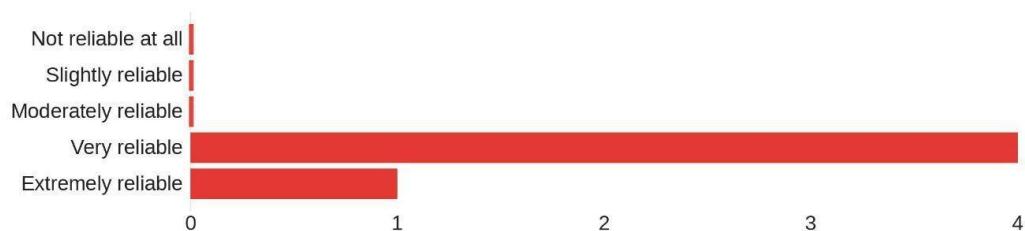


4

Other - Text

Sharing my location and providing check ins

Q10 - How reliable was FarOut for navigation purposes?

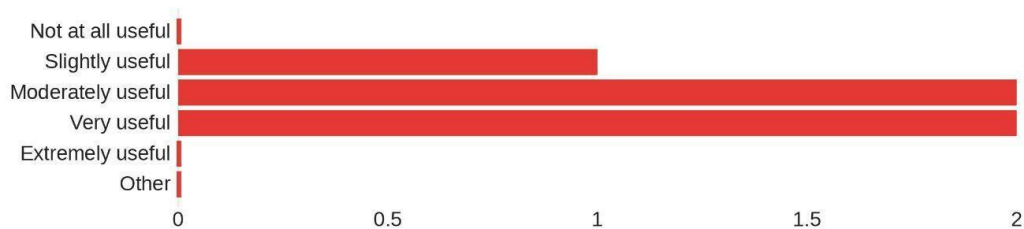


Q11 - How easy was it to turn off and on your location?

| Field | Choice Count |
|---|--------------|
| Extremely difficult | 0 |
| Slightly difficult | 0 |
| Neither easy nor difficult | 0 |
| Slightly easy | 3 |
| Extremely easy | 2 |
| I could not turn off and on my location | 0 |
| Total | 5 |

Q12 - Was the "record" feature useful to you?

5



Q13 - What do you think of the waypoint icon system?

What do you think of the waypoint icon system?

I think it makes it easier for one to stay on the trail and gauge where one is.

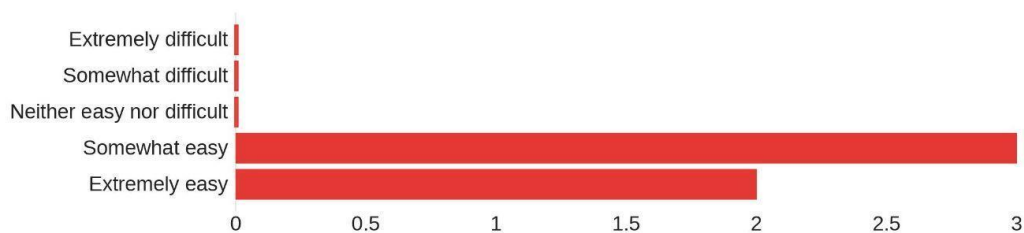
Confusing

It's very useful

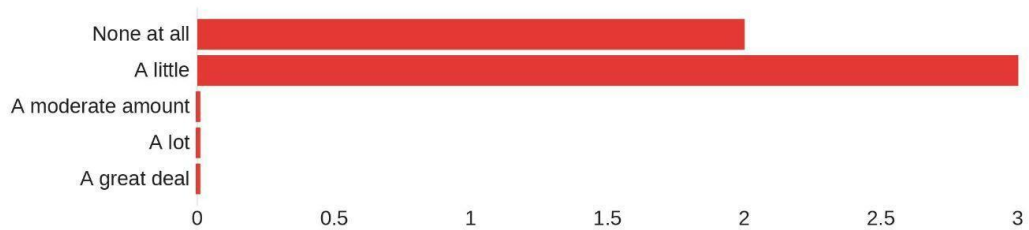
very effective

I think the icons on could be a little more representative but after using the app more I had a better understanding

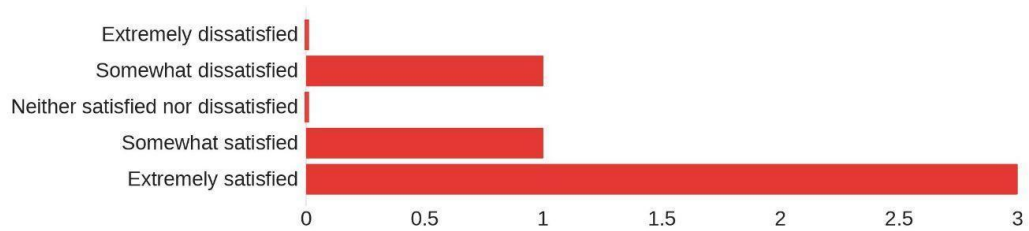
Q14 - How easy was it to create a custom waypoint?



Q15 - How much time did it take you to create a custom waypoint?



Q16 - How satisfied are you with the waypoint features?

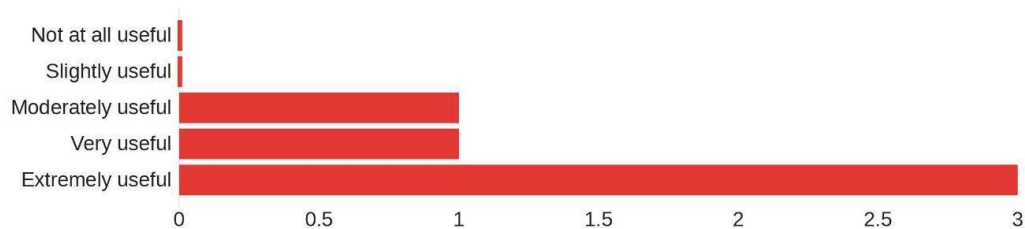


Q17 - Any additional comments about waypoints?

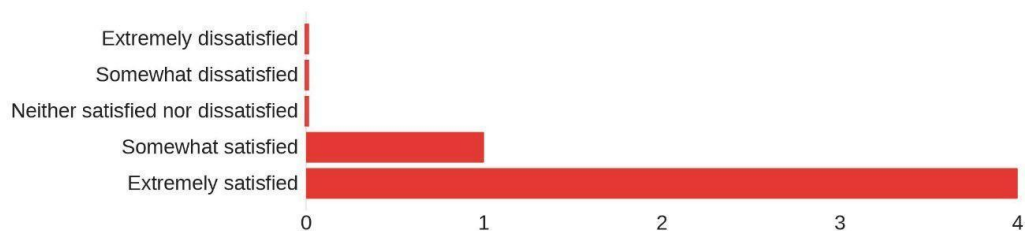
Do you have any additional comments about the waypoint system?

Good system

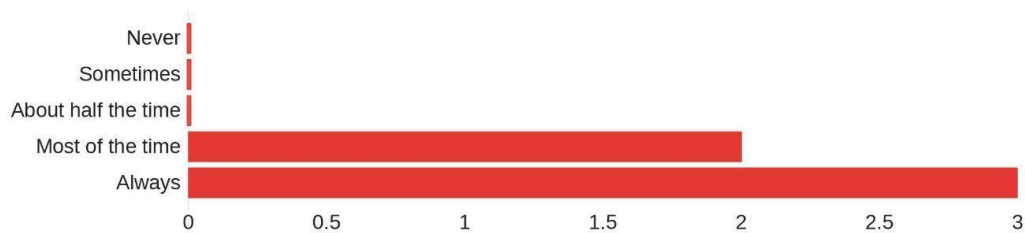
Q18 - How useful are the waypoint comments?



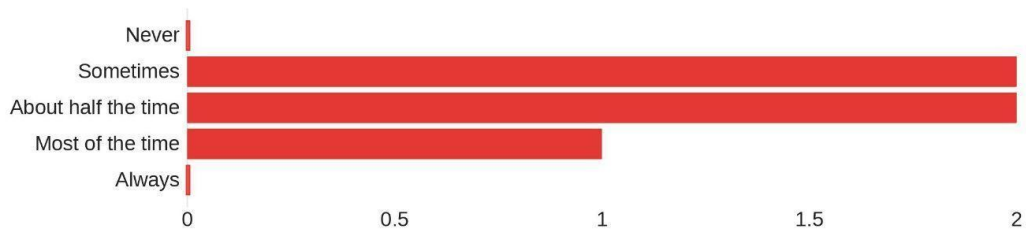
Q19 - How satisfied are you with the commenting system?



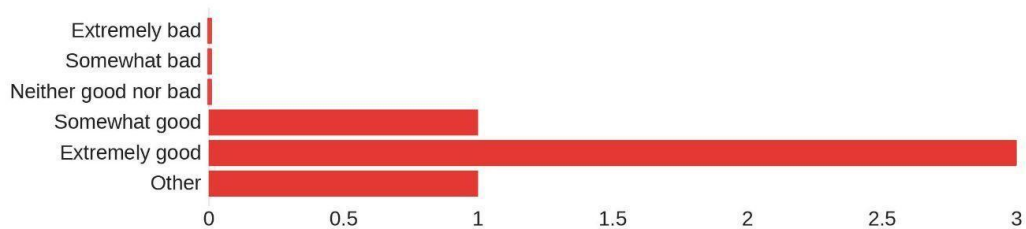
Q20 - Were the comments generally up-to-date?



Q21 - Other than for the task, did you feel inclined to leave comments of your own?



Q22 - How was your experience launching phone numbers and links from the comments?



Other - Text

There wasn't hyperlink functionality in the comment section which was annoying.

Q23 - If you answered yes to the previous question, please elaborate. Would comments influence your town plans, your trail plans, etc.?

If you answered yes to the previous question, please elaborate. Would comments influence your town plans, your trail plans, etc.?

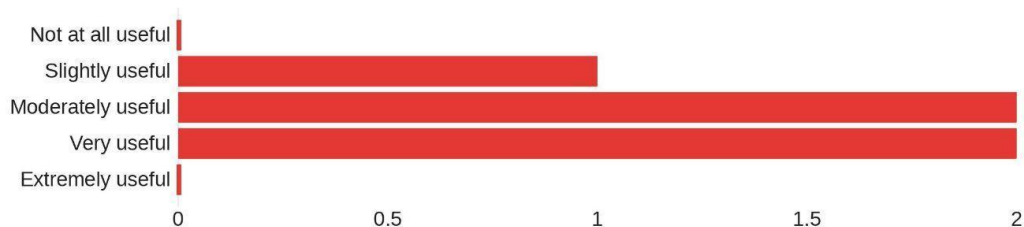
I would not choose to go to a waypoint if the comments were negative.

They would most definitely influence where I would sleep and obtain water from

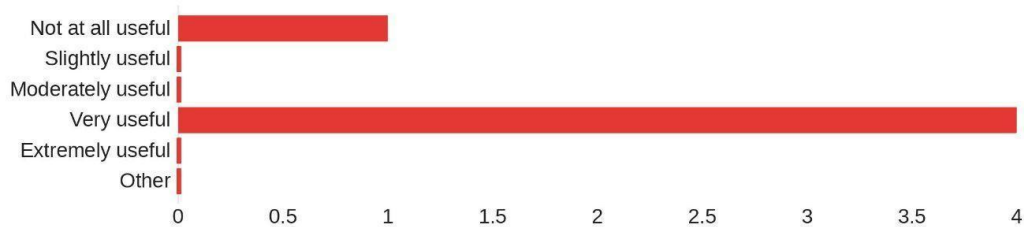
helpful to read other experiences

Knowing if a water source is running is super important to be knowledgeable about before heading out that day. Also safely is hostels is important to be aware of.

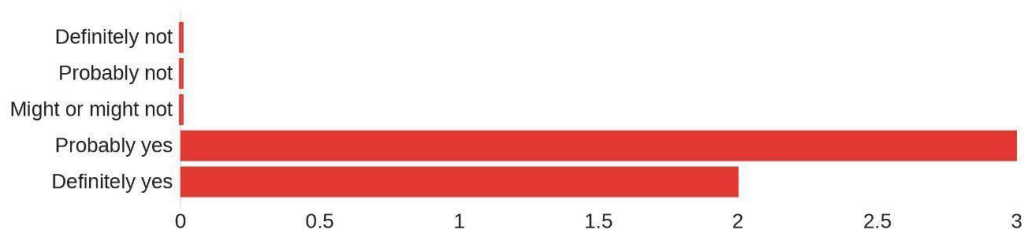
Q24 - How useful are FarOut's social features?



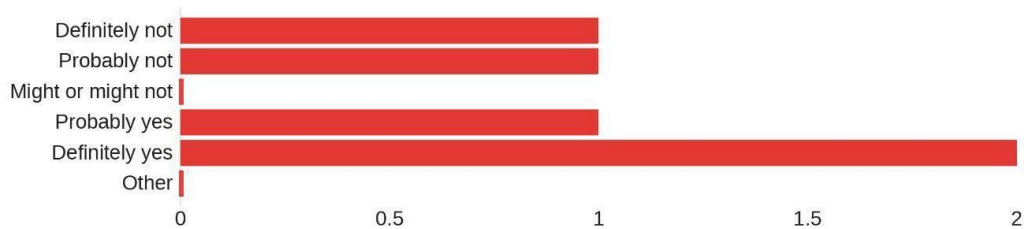
Q25 - Was location-sharing via FarOut useful?



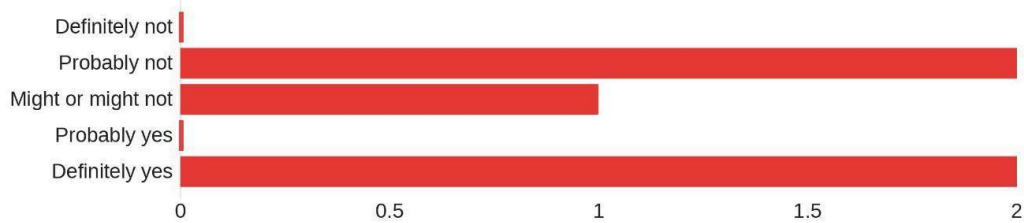
Q26 - Did the comments on waypoints influence your planning?



Q27 - Was location-sharing via FarOut easy to use?

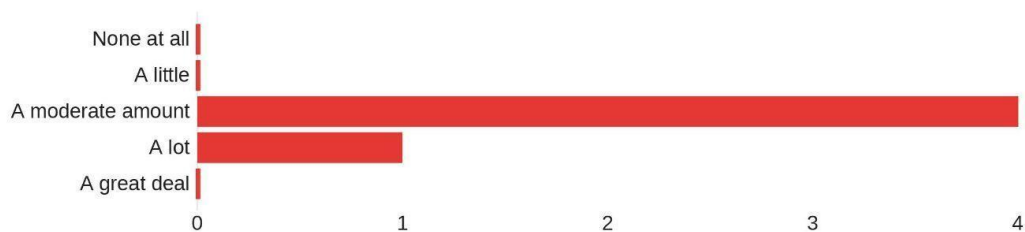


Q28 - Are you likely to use FarOut for location sharing rather than another platform or service?

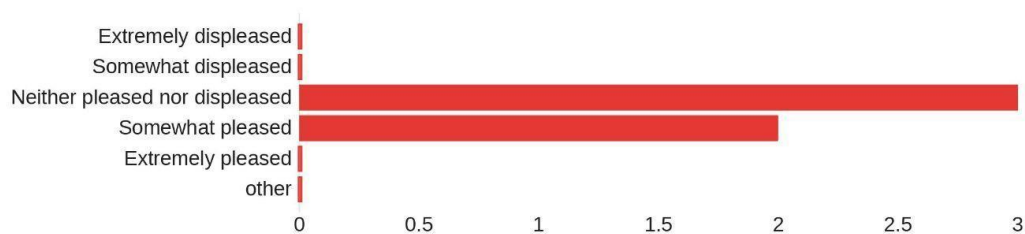


12

Q29 - How much do you value the social functions, like following other users, posting updates, etc.?

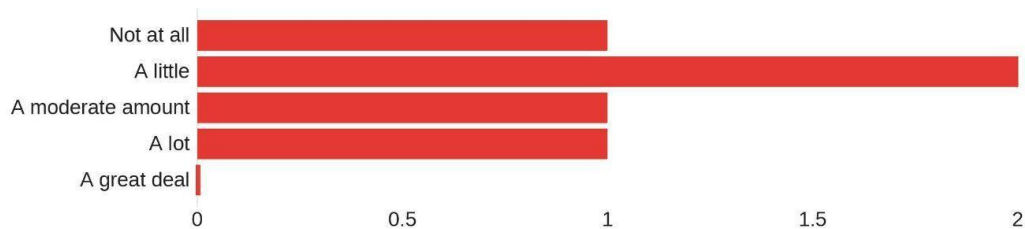


Q30 - How did you feel about businesses or people promoting their services via comments?



Q31 - Were these tasks time consuming?

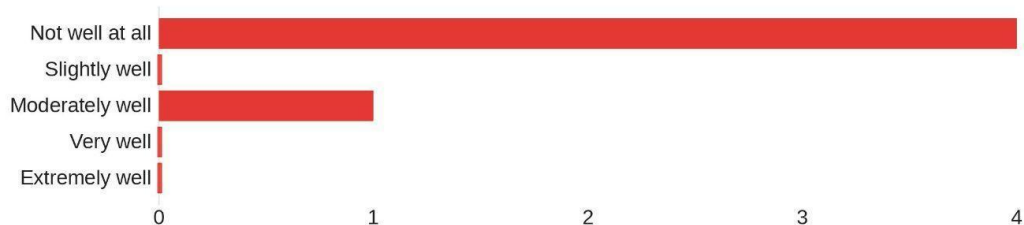
13



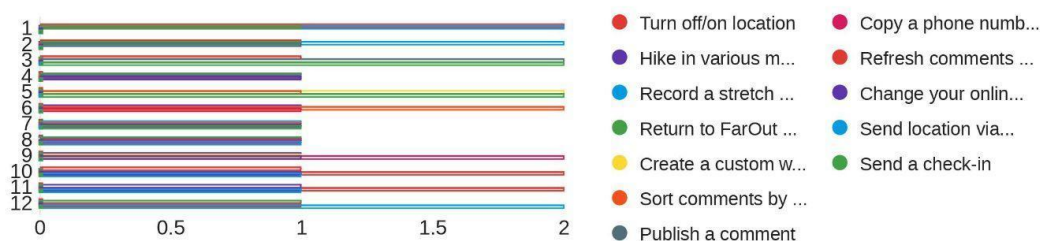
Q32 - Which tasks were the most time consuming? Check all that apply.

| Field | Choice Count |
|--|--------------|
| Turn off/on location | 0 |
| Hike in various maps (Topo, Satellite, National) | 3 |
| Record a stretch of your hike | 0 |
| Return to FarOut after app ran in background | 0 |
| Create a custom waypoint | 0 |
| Sort comments by date | 0 |
| Publish a comment | 0 |
| Copy a phone number or link from comments | 0 |
| Refresh comments for updates | 3 |
| Change your online map | 2 |
| Send location via FarOut | 3 |
| Send a check-in | 0 |
| Total | 11 |

Q33 - How well did FarOut provide information and guidance within the app to complete its functions and these tasks?



Q34 - Please drag and drop to rank the following tasks from easiest (1) to complete to most difficult (9).



| Field | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Total |
|--|---|---|---|---|---|---|---|---|---|----|----|----|-------|
| Turn off/on location | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 |
| Hike in various maps (Topo, Satellite, National) | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 5 |
| Record a stretch of your hike | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 |
| Return to FarOut after app ran in background | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 5 |
| Create a custom waypoint | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 5 |
| Sort comments by date | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 5 |
| Publish a comment | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 5 |
| Copy a phone number or link from comments | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 5 |

15

| | | | | | | | | | | | | | |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Refresh comments for updates | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 5 |
| Change your online map | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 5 |
| Send location via FarOut | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 5 |
| Send a check-in | 0 | 0 | 2 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 |

16

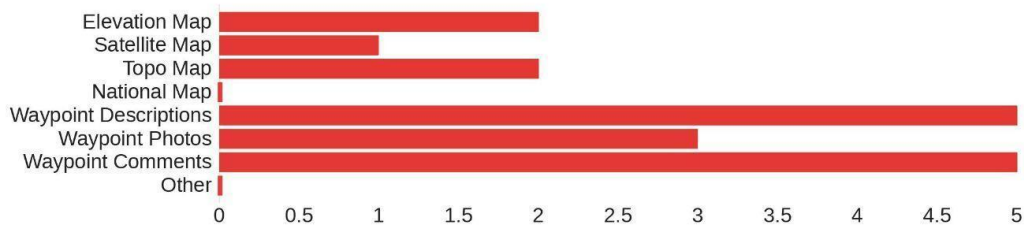
Q35 - Why were the lower ranked tasks more difficult than others?
Check all that apply.

| Field | Choice Count |
|---|--------------|
| These features were difficult to locate within the app. | 4 |
| These features did not work properly. | 0 |
| They just took more time. | 1 |
| I did not find any tasks difficult. | 1 |
| Other | 0 |
| Total | 6 |

Q36 - How much would you benefit from in-app tutorials of how to use its features?

| Field | Choice Count |
|---|--------------|
| Not much; I could figure it out on my own. | 0 |
| Some; it would be helpful for the more obscure features. | 1 |
| Neutral; I think that its fine how it is. | 0 |
| A good amount; I would like to see quick tutorials of how to use the features within the app. | 2 |
| A lot; I would like to see in-depth tutorials of how to use each feature within the app. | 2 |
| Total | 5 |

Q37 - Which features, so far, have been the most useful to you on your thru-hike? Check all that apply.



Q38 - Please use this space to explain any other notes or comments you may have on tasks (if applicable).

Please use this space to explain any other notes or comments you may have on tasks (if applicable).

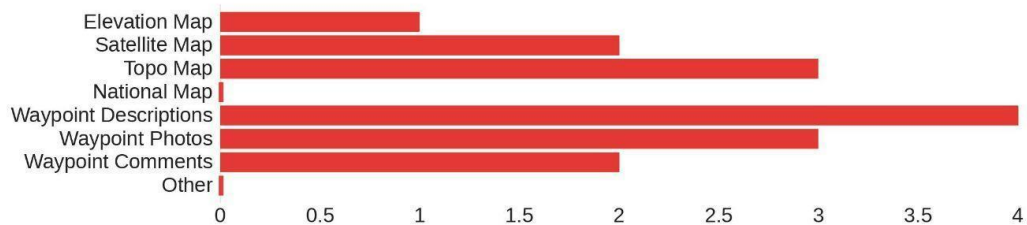
Needs set-up wizard

I love that I can send checking and people not on the trail can be my friend on the app.

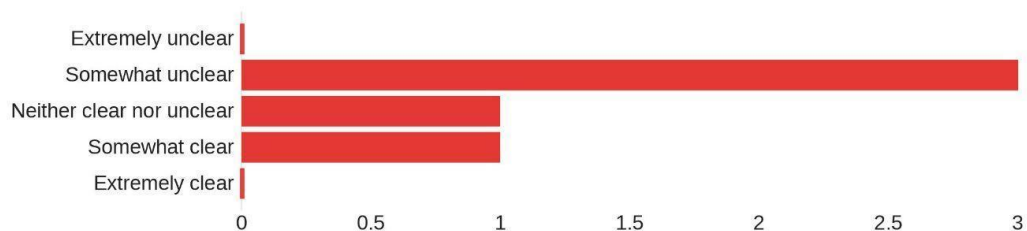
| Field | Choice Count |
|-----------------------|--------------|
| Elevation Map | 2 |
| Satellite Map | 1 |
| Topo Map | 2 |
| National Map | 0 |
| Waypoint Descriptions | 5 |
| Waypoint Photos | 3 |
| Waypoint Comments | 5 |
| Other | 0 |
| Total | 18 |

Q57 - Which features do you like to keep downloaded for offline use?

18



Q63 - How clearly is the information and features laid out?



Q64 - If you answered "unclear," please elaborate.

If you answered "unclear," please elaborate if you wish.

Couldn't find some of the critical features (like changing maps) right away.

Hard to find certain features when doing tasks

Q65 - If you could change one thing about FarOut, what would it be and why?

If you could change one thing about FarOut, what would it be and why?

Add set-up wizard on how to use all the features within the app.

More directions and guides on how to mark your location, share it, etc.

Making switching from different maps easier for the user