

Backpacker

A Mobile Application

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Backpacking as an adventure sport provides the people that participate in this activity with a set of needs and circumstances as unusual as they are unaddressed in today's mobile application market. While backpacking has traditionally been an activity devoid of much electronic usage, the recent surge in popularity of mobile devices as well as the advent of cheap and light personal alternative energy phone chargers has brought about a state where a mobile application to fill their needs can become a reality. Specifically the needs for GPS progress logging, supply availability and consumption rate tracking, and automated emergency capabilities can be met by a mobile application, provided the application is carefully designed and implemented to account for the unusual circumstances in which these services will be used.

§1 Introduction

People who embark on multi-day backpacking trips experience the wilderness in a different way than any other type of adventurer. Frequently many days from the nearest signs of civilization, the isolation is second to none in this activity. Additionally, often every supply and resource needed for the duration of the trip is brought in from the start. This makes the activity one that is strenuous, dangerous, and requires careful planning. For the developer, this creates a very unique market, one that presents an opportunity—many of these needs can be intuitively fulfilled by a mobile application.

Our team will design and create a professional backpacking assistance application that meets the specific needs of backpackers through the implementation of a couple of novel features. The application will provide a GPS based log of the backpacking trip, while accounting for the battery life requirements of multiple day use with limited ability to recharge. Additionally, the program will provide a planning tool in the form of a gear inventory checklist including consumption rate tracking for both water and food. Another novel feature that will be implemented is an emergency notification scheme, which will send an emergency text message with specific details (like GPS location) the next time the phone has cellular service.

There is an opportunity to bring some of the convenience and safety features taken for granted by practitioners of less remote activities to the world of backpacking. Inattention to gear availability and consumption rates presents a real danger to people

participating in this sport, and intuitive and convenient automation of this feature will have a positive impact both on the community and on specific practitioners. Additionally, the GPS tracking will allow both for a way to quantify the experiences during the trip as well as a way to share specific details with other members of the backpacking community in a way that is hither-to unseen. The addition of even a small amount of automated emergency notification technology has the potential to save lives in an activity where the remoteness and undocumented progress of people has presented very real challenges for rescue operations.

This proposed mobile application will fulfill a unique set of needs, a set which is currently going unfulfilled, as well as provide a positive impact on a large community of people.

§2 Motivation

The specific needs of a person planning and executing a backpacking trip can be naturally filled by a mobile application.

2.1 Supply Planning/Consumption Tracking

Backpacking necessitates meticulous pre-planning when it comes to supplies. Careful consideration has to be applied to the amount of food and water being brought along, as well as consumption rates for both tracked. This is important because a danger associated with backpacking is the early or inadequate consumption of food and water. It is dangerous to consume too much food/water and run out before you can return to

a place that allows you access to more. The opposite can also be the case, a danger exists of not consuming enough food or water and becoming dehydrating or existing in a state of caloric deficiency.

For the careful backpacker, the planning portion of this task has traditionally been done by pencil and paper prior to departure, with consumption rates tracked in an informal fashion during the trip. For the less meticulous, this task is frequently ignored. With the real time computation power, as well as increased user familiarity of a mobile device this task is ripe for a transition to a mobile application.

2.2 GPS Tracking

The capability to share our experiences with each other is beginning to become a way of life for our culture. This has been a luxury that the backpacking community has been unable to participate in. With GPS tracking capabilities there will be objective information to go with the anecdotal and vaguely located features and sites shared between backpackers. Having a specific location would add a concrete and reproducible element to these experiences, and allow for the concerted documentation and sharing of the details of a backpacking trip. The built in hardware of smart phones provide a convenient platform for the introduction of these capabilities into the backpacking sub-culture.

2.3 Automated Emergency Transmission

Due to the remote nature of the activity, backpacking is inherently dangerous. One particular aspect that contributes to the danger is that frequently in the event of an emergency there is no record of where the backpacker has been prior to the emergency, frequently they are just late to check in with friends or family. While cell phone service is much worse in rural areas where backpacking is taking place, there can sometimes be sporadic service. The automated emergency transmission feature would be able to consistently check for service and send a text message if it ever has cellular service even if the backpacker is incapacitated. This feature would add a small, but not negligible, increase in safety for the backpacking community.

§3 Background

Individually, there are existing mobile applications that could meet some of the needs discussed so far. There are many applications that will track your progress in any activity using GPS. Similarly, there are products that would allow you to create a gear checklist or track caloric consumption rates. None of these have been developed with the backpacking community in mind, and as such don't address the very specific needs of the community. Specifically, GPS tracking applications frequently result in abnormally fast battery consumption. This would be unacceptable in the backpacking setting where charging can be infrequent and depend on outside factors like the sun. This application

will be designed to consume minimal battery life during it's operation to account for this constraint. In a similar fashion, none of the current gear checklist or food/water consumption applications are tailored to the needs of a backpacker who needs to keep track of these things in a very specific way and on a very unique timescale. It is the backpacking specific heuristic feature tuning, the convenient multiple feature packaging, and the novel emergency transmission feature that will set this application apart from the competitor's products.

§4 Previous Work

I am well suited to the successful and timely completion of this project. I personally have limited exposure to the activity of backpacking, but am well connected with many people who are very serious about backpacking and take multiple trips per year, sometimes weeks long in duration. This will allow me access to a sample set of the intended consumer for feature feedback.

Additionally, I have personal experience developing small applications for the iPhone. I also have experience using the iPhone's hardware features programmatically, specifically the accelerometers. This will allow for a smooth transition to interfacing with the GPS feature of a mobile device.

I also have experience working as a member of a team in large scale software development efforts having been a part of the team that developed "Mothpocalypse", an interactive

3-D moth murdering game. I also continue to be a member of a research group that is continuously maintaining and updating an incredibly large code base used for robotic motion planning and simulation, as well as molecular interaction simulation.

§5 System Description

The mobile application will be fronted by an intuitive and easy to operate user interface (UI). This will allow the user to transition between the three main features described below.

5.1 Supply Planning/Consumption Tracking

The first feature specified is the supply planning/consumption tracking feature. On a high level this feature will serve two purposes. The first is the documentation of specific supplies and the weights of those supplies. The backpacking community is very conscious of how much their supplies weigh, and will like the application to keep track of individual item's weights as well as weight totals. This feature will be primarily used prior to departure on the backpacking trip. The user will be able to type in the name, quantities, weight, and—in the case of food products—calories of every piece of their gear. This will allow the user to be able to view the entire set of supplies in one list format, with important data associated with each item.

The second part of this feature will be the water and food consumption rate tracking. This information will be located in the same area of the UI as the supply list. The

user will utilize this feature during the trip itself, in the form of imputing what food has been consumed and how much water has been consumed in a given length of time. The application will then utilize this information to provide calculated estimates on caloric consumption per day and per hour, and water consumption per day and per hour. Additionally, the application will be able to estimate how long the food and water supplies will last given current consumption rate trends.

5.2 GPS Tracking

The second main feature of the application is the GPS tracking feature. Existing in a second main UI branch, this feature will be activated at the start of the backpacking trip. The application will keep a log of GPS locations gathered at regular and customizable time periods, every half an hour for instance. This feature will be deactivated by the user at the conclusion of every day when progress has stopped and camp is being set up, and reactivated again in the morning to once again track progress.

In addition to the automated GPS tracking, the user will have the option to at any point in time collect and log current GPS data with the ability to add personal notes to each location log. This will allow a backpacker to mark the location of interesting terrain features to share with other adventurers in the future or for their own reference.

The GPS data will also allow the application to analyze other characteristics of the backpacker's progress, such as daily milage and elevation changes. This data will also be displayed in this UI section once enough data points have been collected to analyze.

5.3 Automated Emergency Transmission

The final feature is simultaneously the most passive and most novel feature of the application. This feature is the automated emergency transmission feature. Existing in a third distinct UI branch, the emergency transmission system will need to be configured prior to departure on the trip. The user will specify a set of telephone numbers that will receive any emergency transmission. The user will also have the ability to specify the time interval of the check-in process. The user will activate this feature at the start of the backpacking trip and it will then start behaving as follows. Based on the pre-specified check-in interval, the user will need to press a button in the UI to assert that the user is not in a state of emergency. This time interval can be updated during the trip to the user's preference, for instance to allow for a shorter time period in the case of a dangerous ridge traversal, or longer time periods on easier portions of the trip.

If at any time the predefined check-in interval has passed **without** the user pressing the check-in button, the emergency transmission process will be activated. The application will immediately record the current GPS data, and begin attempting to send a text message to the predefined telephone numbers which specifies the current and previous two GPS locations recorded informing the recipients of the text message both that an emergency has potentially occurred, as well as the location of the device. The application will repeat this process every hour. The user will be able to deactivate this in the event of an unintended initiation of the emergency transmission. Additionally, there will be an option to manually initiate the emergency transmission process.

§6 Challenges

The reason an application like the proposed hasn't been developed already is due to the specific constraints of the backpacker. A mobile application was previously infeasible for backpacking applications because there had in the past keeping a mobile device charged and functional was impractical. This has changed only very recently with the advent and emergence of affordable mobile alternative charging sources. A variety of small, cheap, and light solar chargers have come onto the market, as well as other charging devices some of which even utilize the burning of trash and waste to charge your device. This allows the backpacker to have a semi-reliable source of electricity for a mobile device for the first time ever—right now. Challenges still abound though. The application will still need to be very well designed to allow for minimal power consumption. Additionally, the use of the application must be simple, intuitive, and **easy**. Backpackers have been doing much of the work the application is designed to do with pencil and paper for a very long time, and the application must be easy enough to use that it is able to overcome that momentum and convince a potentially skeptical user base that this application will serve their needs. This is why these three things will be the most important factors in the UI design. Ease of use will be evaluated during testing at each iteration with a process involving new test users who are completely unfamiliar with the product.

§7 Timeline

The timeline of this project will involve very hard deadlines. Extra time has been allocated for the development/feature combination process to account for latency in any other portion of the project.

Week 1:

Client meetings

Discuss and decide on UI design specifics

Discuss and decide on platform (Android vs. iOS)

Install and get familiarized with development tools (Xcode/Eclipse)

Week 2:

Client meetings

Create "Hello World" app with shell UI features

Discuss feature set with sample of target user group

Week 3:

Client meetings

Divide the three major features up among group members

Begin feature development/documentation

Week 4:

Client meetings

Development/Documentation

Week 5:

Client meetings

Finish iteration 1 development

Combine features into working prototype

Week 6:

Client meetings

Group tests app, develops bug list and notes on app refinement

Week 7:

Client meetings

Discuss findings of first prototype testing

Decide on changes

Begin changes

Week 8:

Client meetings

Finalize and aggregate changes into iteration 2 prototype

Week 9:

Client meetings

Group tests iteration 2 prototype, develops bug list and notes on app refinement

Week 10:

Client meetings

Discuss findings of iteration 2 prototype testing

Decide on changes

Begin changes

Begin marketing process (forum posts, blog posts, Reddit posts)

Week 11:

Client meetings

Finalize and aggregate changes into final app version

Short final test

Marketing

Week 12:

Client meetings

Package and release final app version

Final marketing push

§8 Budget

Software Engineer Salary: \$500 per week x 5 engineers x 12 weeks.

Subtotal: \$30000

Office Rental: \$1500 per month x 3 months

Subtotal: \$4500

Hardware: \$500 per mobile device x 2

Subtotal: \$1000

Engineer Pizza and Caffeine Per Diem: \$50 dollars per day x 5 engineers x 60 days

Subtotal: \$15000

Miscellaneous: \$ 500

Total: \$ 51000

§9 Conclusion/Summary

I am proposing the development of a novel mobile application for the activity of backpacking. The application will have three main features: Supply Planning/Consumption Tracking, GPS Tracking, and Automated Emergency Transmission. The large design constraints involved are the minimization of power consumption, and easy and intuitive interfacing. The proposed project will be 12 weeks in duration from start to finish

including three iterations of prototyping. The budget for this project is estimated at \$51000.