In an abstract for Walk2Build, the creators speak about our current climate within public health, and it is this climate that pushes motivation for the project. The following excerpt outlines the climate and motivation:

In recent years public health has become of great concern, in particular the personal and national economic burden resulting from increasingly sedentary lifestyles. Sedentary lifestyles are particularly serious for young people who are badly affected by obesity problems that impact on their current and future lives. In an effort to tackle this problem games designers are designing games aimed at motivating people to take part in physical activities and have coined the term *exergaming*. (2)

My goal is to get users outside and interacting within our real world.

My personal goal is to make something that gets users to interact with each other and with the world we already shared. When considering different ideas for a project creating a 3-D world and sharing it was always a fascination of mine. It was on my way back from Georgia while visiting my sister that I realized there were many treasures in our world that should be shared. Many people like travelling and there are places highlighted for tourism. This is when my focus started to shift to the local. What is out there that is local and how can I highlight things that are in my own back yard? How can I get people to share their “backyards” so to speak and engage with them in a meaningful fun way. How can people benefit from exploring those backyards?

Some programs that have inspired this project follows and it is between these applications and the applications in related works that determine the design of GPS Adventure. MyTracks is a program/app that records a path that you travel in. This application provides a simple function and provides information including distance and average speed. In a way, GPS Adventure is working this problem in reverse. A user provides a set of points and objectives and another user undertakes the exploration and determines a path in order to fulfill the objectives. Google Maps and Navigation is an example of a map application with gps technology. It will be useful for displaying points on a map and the navigation may be inspiration for compass and distance based objectives. Geocaching.com is a website that facilitates people who wish to hunt or host a geocache and is the primary inspiration for this project. A geocache is a location based “cache” or container that users find. In the container there are often other items where you can take one in exchange for an item you currently have. Also inside the cache is a log that documents other visits to the geocache site. Online there is a virtual version of this log so that vandalism may be reported or comments can be made if it was too difficult to find. Too many reports of it being missing or too difficult to find may indicate that the geocache was vandalized and the host needs to remove it from the active database or provide proper maintenance to it.

I hope to add something similar for those experiencing difficulty with objectives.

By completing GPS Adventure I’ll produce a demonstration of GPS technology. This project aims at providing a framework for others to use and may be a step towards liberating GPS technology. Also the project is engaging and fun all while getting users in the world we already share.

**So just what is GPS Adventure anyway?**

GPS Adventure is a Mission/Adventure based GPS game. It will be a mobile Application for Android OS. Users will create missions for other users to participate in. Users are rewarded for participating in missions and for “hosting” missions. There will be types of missions those that take place in real time and those that are waypoint and objective based. Some possible real time events might be a race with various waypoints that you must tag in order to win or possibly something like capture the flag. The Missions are more geared towards single player interaction with the environment. A participant would be given certain objectives to carry out it might be given as another gps point on the map, a compass direction and/or distance, a riddle, or possibly taking a picture. Players will be rewarded points for completing these missions.

It is unclear at this point what the user would do with his or her points. It’s possible that they would unlock new objectives to be able to use for hosting a mission or perhaps they’d be able to buy or sell virtual items which they could hide or use throughout the world. It might also be used in a rating style system (similar to chess) or an experience point system (where users level up). I would like missions to carry a difficulty rating so the rating or level system would come in handy for that. My hope is that I could make it easy to add different aspects of the game or possibly allow people to add their own gps games or objectives.

**Features Needed (Primary focus)**

Users will be able to create missions from a mobile device and gain points when other users participate in their missions. Participation points will be awarded to users and their hosts when someone starts and completes an objective. Completion points will be awarded upon completion of the mission. These points will go both to the host and the user. Eventually I hope to balance these points for level of difficulty. Participation points should be small and there may be a different “bank” or denomination for hosting and participating. For a brief summary of the features I wish to include see Figure 1.

In order to award points for completing objectives there needs to be some sort of verification that an objective has in fact been carried out. In addition there needs to be verification that the objective is achievable. In this case that verification is from GPS and user feedback. User feedback would include a rating and difficulty assessment. During the difficulty assessment they can report that an objective is not possible to complete or subjects the user to unwarranted danger.

The android application and system will need to handle any GPS location related errors. It will need to be able to handle service related problems related to the mobile carrier (that is the data connection). My current thoughts are an “offline” mode where the phone updates the database when in range. It may also transmit the whether the phone had connectivity at the time an objective was complete. That way we get feedback regarding service in a given location. This feedback could possibly be used to identify places that are ok for live events.

Users will be able to update or modify a mission. When a user changes the mission in a way that modifies the difficulty that would mean that the mission needs to undergo a recertification period to determine the difficulty. This may be time based or participation based (or possibly a mixture of both).

The web service would need to facilitate other actions typical to having an account (i.e. registration, login, change password, change email, etc).

**Advanced Features (to be implemented if time permits)**

Users will be able to pick up virtual items as well as being able to create and obtain them. This might be a useful way to spend the points earned. It’s also possible that points will be spent creating objectives or using various types of objectives. Another possibility is to allow a user to craft virtual items from ingredients found at random (or purchased) throughout the world. Users may be able to sell their virtual items through the system. Users may also place their virtual items in the world. For a brief summary of the advanced features I wish to include see Figure 2.

If time permits users may be able to create public or private events (such as live games) and be able to share this event with their friends. Some additional live events may be included such as a waypoint race where participants race in real time to reach several destinations--it’s a lot similar to missions except that it takes place in real time. This may cause different technology requirements in terms of hosting the project. This feature would likely require either a p2p technology be implemented (in order to negotiate the winner/etc and determine real time status of the race) or a client-server technology. I would prefer client-server or some hybrid of the two.

Another live event would be something similar to capture the flag. The capture the flag based game is a game where your total points earned might contribute to how fast you are able to collect a flag. An example might be that someone that has 0 points would collect a point in 60 seconds where as someone with 1000 points could collect a point in 52-55 seconds. The more people on a point the less time it would take in order to collect. People from the opposing team in the area would cause a slowdown to occur, increasing the time involved with the collection process.

Another advanced feature might be to allow live games to be created. These games would be created from scripts. This is probably the lowest on the priority list and would just be “nice to have.” This would also likely be incredibly complicated. Unless it would help facilitate the development of the previously mentioned live events.

I would like to develop a website that allows users to make certain modifications to their adventures and to perform shopping cart like transactions and have those sent to their phone. They might also be able to create events or search for and join events. Users would also be able to spend points online.

**Other Features Considered**

I have also considered other features which might have been nice to include in the project but were removed because I believe they detract from the main theme. One such feature is support for geocaching. This would dip into geocaching databases online and import them into a users mobile phone if they select the option during a search. This would help automate the process of visiting a geocache and provide convenient features for supplying feedback for the cache. As I mentioned, I believe implementing support for geocache would detract too much from the goals and purpose of this application.

Another feature considered was a texting Service. This would allow those without smart phones to participate in some of the adventures if the creator used only text service compatible objectives. The priority of this objective is too low and I have decided to focus development for android.

**Technology Options**

The backend for GPS Adventure will be constructed with a database connected to a web service. There are a significant number of free technologies to develop the web service and the back-end as well as the front end (i.e. the web client and the android client). At this time it is uncertain which technologies will be utilized however I shall notate a current preference that is subject to change. For database the current preference is for MariaDB (4) which is a mysql replacement. Other options include postgreSQL(5) or GOODS(6). Currently the web service is likely to be developed with PHP(7), another option might be Seaside(8) (which would compliment the choice for GOODS). The current focus is mobile development for Android and the current development IDE is Android Studio(8). An alternative is Eclipse(9) with plugins to allow android development. For the website’s front end I may utilize Foundation(10) or Bootstrap(11).

**Current Challenges**

Some of the current challenges include security, uncertainty, and development. Security might be a challenge because the location information might be sensitive to the user. Uncertainty while participating in an adventure or event. These uncertainties are caused by lost signal with a wireless provider or lost GPS signal. The results would include confusion regarding whether an event ended or where a user is at in relation to a point required for an objective. Finally development comes with its own challenges (and it should). I’ve had some experience developing backends that were geared towards websites. I’ve worked with PHP and I’ve worked with Smalltalk; however, I have not worked with the Seaside framework. For database the challenge would be with objectives and ensuring that the database can accommodate the different types of objectives offered in this project (and possibly future requests). It is also critical that I select the proper technologies for the task and properly utilize the strengths within those technologies or frameworks while being aware of possible weaknesses.

**Related Works**

Can You See Me Now is a mixed reality game “in which online players are chased through a virtual model of a city by ‘runners’ (professional performers equipped with GPS and WiFi technologies)” (1). The creators present an ethnographic study of the game and hope that future designers can utilize the elements of uncertainty as an element of the game rather than a bug that will be ironed out later (1). The game uses a mixture of online or virtual players and physical players. The goal of the game is for the physical players to find the virtual players (1). The map of the area used is imported as a virtual map where the online players will hide from the physical players; the physical players traverse through the city with GPS and WiFi technology which updates the virtual map (1). The virtual players use arrow keys in order to navigate the virtual map (1). The players are considered caught when their GPS coordinates are within 5 meters of the runner(1).

They also present the different modes of uncertainty and in this game there were 2 sources for uncertainty: GPS and WiFi (1). For GPS there were problems with some areas not getting a GPS signal which created GPS blackspots (1). WiFi also suffered from occasional loss of connection and frequently a delay (1). These different states of uncertainty are certainly something to keep in mind for GPS Adventure especially during live events.

Walk2Build is a game is definitely an exergame. In this game users are motivated to walk by giving the user buildings that represent how far they walked each day. This is done by a step count rather than location based measurement. Their research outlines different methods in modifying a user’s behavior. For example, one might try to feed self-esteem as a way to motivate a user to continue participating (2). Another method is to use social sources in order to keep their motivation (2). Walk2Build used the “perception that people can use the performance of others to motivate themselves not only to start an activity but to keep it up over a period of time” (2). I hope to find ways to reward users in a way that keeps them sharing their favorite places in the world in interesting ways.

The classic Pac-Man was rendered in real life using similar principles as discussed for Can You See Me Now. In this game, users have GPS equipment in a natural campus setting. The project utilizes a PDA and a web server and transform GPS information into coordinates on a virtual e-map. The ghosts run using Dijkstra’s algorithm (for path finding) with increases in their speed for higher difficulties.

The most related live application is Tourality. In Tourality you have the option of playing others’ game sets or playing a game set created by the application. The object is finding these gps points and getting a virtual currency. In our area there are no game sets so we would need to create a game set or have the computer pick points nearby. These points are random so it may be unsafe to access all of the points. There doesn’t appear to be any motivation to create a game set. GPS Adventure wishes to provide incentive for both the user creating an adventure and with those one shares the adventure with (that is the participants).

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| **Features**   * Create, update, or “delete” (deactivate) Missions * Points by participation * Points for hosting * Add, modify, or remove objectives * Ability to complete and verify objectives * GPS error handling * Data connectivity error handling * Motivation for gaining points * Account creation, maintenance, and upkeep |

*Figure 1*

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| **Advanced Features**   * Purchase, craft, obtain virtual items * Place virtual items in the “real world” * Schedule and host public and private events * Share events with friends * Web interface * Live events * Games like capture the flag * Scriptable games |

*Figure 2*

**References**

[1] Benford, Steve, Andy Crabtree, Martin Flintham, Adam Drozd, Rob Anastasi, Mark Paxton, Nick Tandavanitj, Matt Adams, and Ju Row-Farr. "Can You See Me Now?" *ACM Transactions on Computer-Human Interaction* 13.1 (2006): 100-33. Print.

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[3] MariaDB. <https://mariadb.org/>.

[4] PostgreSQL. <http://www.postgresql.org/>.

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