A Seamful Game based on GPS Shadows

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1 Status report

1.1 Proposal

1.1.1 Motivation

The Global Positioning System or GPS has had a huge impact on our daily lives. It helps us navigate around unfamiliar areas with ease. While GPS is accurate most of the time, there are some areas like in buildings or under bridges where the accuracy can decrease. This is what we refer to as a GPS Shadow. Seamful design is the idea of making what might be a problem or frustrating as a benefit to the product.

1.1.2 Aims

[Clearly state what the project is intended to do. This should be something which is measurable; it should be possible to tell if you succeeded]

1.2 Progress

- Decided on a Technology Stack. Android Phone app on the frontend with a Node.js server and MongoDB database.
- Created a Logging app which created a dataset of GPS Shadows around the Glasgow University Campus
- Compared two different Geolocation APIs and made a decision on the LocationManager API in the android library
- Came up with some small designs of game ideas
- Started to make a minimum viable product for the game
- Deployed a Web Server on Railway.app

1.3 Problems and risks

1.3.1 Problems

One of the big problems so far was finding out how to get pure GPS locations. For example the first API that I used, the FusedLocationClient API, was not suitable because it sourced it's locations from both WiFi

and GPS. It was only until I found out about NMEA strings, that I managed to utilise the LocationManager API to get full GPS spots.

Another problem was that I didn't have as many GPS shadows when I made the switch to the LocationManager API. When I had used the FusedLocationClient I would have a lot of variation in the amount of shadows. It was especially apparent when walking around Kelvingrove Park. Therefore I had to alter my design of what kind of places you can hide in to places with a lot of public buildings

During my initial deployment of the project. I used a Django Application on a PythonAnywhere server. However since PythonAnywhere did not support WebSockets which would have been crucial when developing a game. I then moved the Django server onto a server on the railway.app platform. However since Django needs a special type of server to run I decided to switch to Node.js so that I can get WebSockets to work and to get access to MongoDB which allows for easy GeoSpatial Queries.

1.3.2 Risks

[What problems do you foresee in the future and how will you mitigate them?]

- I don't have a safeguard if a phone loses internet connection. **Mitigation:** I will do some research into techniques that will keep player data if it crashes
- I'm unsure of the ethical requirements of my evaluation **Mitigation:** I will read through the checklist when planning my evaluation
- I need to be aware about the computational constraints of a smartphone **Mitigation:** I will have a look at what computations can be done on my web server rather than on my phone to help lighten the load.

1.4 Plan

[Time plan, in roughly weekly to monthly blocks, up until submission week]

1.5 Ethics and data

Specify what ethical approval you need to do your evaluation and how you are approaching it. This is mandatory. Specify what data you expect to collect in your evaluation. Explain how this data will help you evaluate your project.

Options for ethics:

- This project does not involve human subjects or data. No approval required.
- I have verified that the ethics checklist will apply to any evaluation I need to do. I will sign and complete the checklist.
- I have sought ethical guidance from the School's ethics convener and I will:
  - Proceed under specific instructions from the Ethics convener (e.g. modified checklist).
  - Apply for College Ethics Board approval.
  - Other procedure (give details)