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

The project brief is to create a seamful game utilising areas where GPS Shadows are prevelant. Players will be able to use drops in GPS quality to hide in several different areas from players wishing to catch them. One of the aims of this game is to show where their signal from a GPS device will drop in quality, for example in buldings or under bridges etc. Once you know where there are GPS Shadows it should hopefully inform them of a good strategy to use when looking for hiding places.

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

- I struggled to find an API to get pure GPS locations instead of a mixture of WiFi and GPS. **Solution:** I found out about NMEA strings during my Research which led me to the LocationManager API which let me use pure GPS Locations.
- I didn't have as many GPS shadows when I made the switch to pure GPS Coordinates. **Solution:** I had to rethink how players would be able to find shadow e.g. under bridges and inside buildings.
- I had problems with deployment as my initial server didn't support WebSockets. I also used Django which was very difficult to deploy when you wanted to use WebSockets. **Solution:** I made the migration to Node.js and MongoDB which allowed me to deploy a WebSocket easily and I have better access to GeoSpatial queries.

1.3.2 Risks

- 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 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

- **Christmas Holidays** Finish a bare minimum minimum viable product tag game. Prepare Evaluation for the game
- **Weeks 1-2** Aim to have a first evaluation on the minimum game around this time
- **Weeks 3-6** Code up improvements to the game as discussed in the evaluation
- **Weeks 6-7** Evaluation of the final game
- **Weeks 8-11** Write Up and final submission of the project.

1.5 Ethics and data

I have verified that the ethics checklist will apply to any evaluation I need to do. I will sign and complete the checklist. I won't be collecting any personal data. I will be collecting location data and general opinions on how enjoyable the game was to play. The main reason why I will be logging locations is so that I can analyze any strategies used in order to try and win the game. The opinions on the game will help me determine whether I played a good game and to inform future design iterations. The evaluations will be carried out using the participants own mobile phone.