Requirements Analysis

Problem Specification

In a bid to meet the University of Exeter's net carbon zero impact goal by 2030 [1] we have been tasked with creating a web-based game to help combat emissions.

The core areas we identified for tackling this problem were:

- Reducing the amount of litter around campus which could cause a danger to wildlife and the surrounding environment.
- A reduction in carbon emissions from excess heating and electricity usage, especially in the older buildings around campus
- A reduction in carbon emissions from transport by students and staff travelling to the university.
- Reducing the amount of water used throughout campus.

As a group we felt that the first two of these areas would be the most suitable to be gamified as they can be affected all people at the university.

In order to increase the impact of the game we decided to focus on what we felt would be the easiest way that people would be able to decrease the overall impact of the university. We felt this would be best done between lectures, when people have spare time. As a group we noticed a disproportionate number of lights left on in rooms without automatic lights around campus when they were not in use. We also noticed that windows were frequently left open, leading to a reduction in the efficiency of the heating in that building. These are all very easy problems to fix and by encouraging users to perform these tasks we felt the environmental impact of the university can be reduced.

[1] "ENVIRONMENT CLIMATE EMERGENCY POLICY STATEMENT" University of Exeter. Technical report. Link accessed Feb 2023: https://www.exeter.ac.uk/media/universityofexeter/campusservices/sustainability/docs/Environment_and_Climate_Emergency_Policy_Statement

Requirements

Functional Requirements

- Leaderboard
    - This will provide the gamification within the application, allowing users to directly compete against their friends.
    - It will show a user's statistics and encourage them to perform more sustainable activities to get to the top of the rankings.

- Login
    - This will be used to authenticate a user so that points can be allocated to the correct player.

- Submission
    - This is how the user will prove that they have performed an action.
    - The user will be told to upload photos proving they have checked the room is being environmentally friendly by removing litter, turning off lights (where applicable), closing windows (where applicable) and switching off unused plug sockets.

- Location view
    - This will tell users where the points are to be located. These points will be higher in buildings less frequently visited and buildings with non-automatic lights and windows will be preferred.
    - A user will be told where they are now and how to get to the building.
    - A user's current location will be used to verify that they are submitting a room from the location in which they took the photo.

- Authentication of room submissions
    - This feature will be performed by gatekeepers in order to ensure that a user has performed the sustainable activities that were specified.
    - The gamekeepers will be able to remove points from players as well as ban them if they do not use the application for the intended purpose.

Technical requirements

- GPS
    - A user must be using a device with a GPS accurate enough that the application can tell which room they are in. This will be used for both the submission and directions to buildings around campus.

- Internet access
    - A user must be connected to the internet to submit a room. This should not be a large problem as the university has a well-connected wireless network for all students and staff.

Transitional requirements

- Database storage
    - The application must have a database with enough storage to handle the quantity of submissions and user information.
    - In the application's development state, a local database will be used which will have enough storage for test data, but a more scalable solution will be required when more users join.

- Web-based hosting
    - In the development stage the application will be hosted on local machines. However, for a larger roll out this will need to be hosted online.
    - The server will need enough memory to deal with requests from multiple users at once in parallel.

Operational requirements

- Sufficient gatekeepers
    - Sufficient gatekeepers must be available to authenticate submissions in order to reduce the delay of a submission to points allocation.
    - The gatekeepers will be admin users with the ability to block user's and dock their points.

- Proof of location
    - A list of the locations of all buildings around campus must be kept ensuring that a user is making a correct submission from the location intended.
    - A degree of error will be allowed when deciding if a user is in each building when making their submission in order to allow for GPS inaccuracies.