A route planning app for Scotland's friendliest city.

Human Computer Interaction 4 - Assessed Exercise 2015

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Introduction

Glas-Go! is a cross-platform route planning app that brings together Glasgow's subway system (SPT Subway) and bike-rental scheme (NextBike Glasgow). Users travelling around the city, guided by Glas-Go!, can quickly and easily identify a route that's right for them based on time taken, environmental impact, or amount of exercise which is then opened in their mobile phone's native maps application.

Design

Motivations

The project began with brainstorming ideas to figure out (a) the purpose of the app and (b) how to design it so that the purpose could be achieved. The results of this process can be distilled into a few simple ideas:

1. Make planning journeys in Glasgow easier.
2. Promote the use of public transport.
3. Raise awareness of the impact users' travel choices have on the environment.
4. Favour design for mobile interfaces, but remain platform independent.

The first decision we made was focusing on Glasgow-specific methods of public transport - namely the SPT Subway and the NextBike system. The subway has had a long history with Glasgow, opening in 1896 (in fact, it is the third oldest subway in the world, after London and Budapest). Despite being a much more recent addition to the city, NextBike has already proven to be a success. The MACH (Mass Automated Cycle Hire) bike sharing scheme launched with 31 stations in June 2014 ahead of the Commonwealth Games, and within one year of its introduction there was an expansion of 10 stations.

We also decided fairly early on against including support for buses or the wider rail network. They have very precise scheduling which changes on a regular basis and may have been tricky to work with given the time constraints and, perhaps more importantly, they already have country-wide apps catering to them. Private transportation (i.e. cars) was also excluded on the basis that it would go against the environmentally conscious theme we were trying to present; and anyway--most, if not all, maps applications already do this.

Walking was always going to be a component of any journey. The subway only covers a certain portion of the city, and despite being fairly prevalent, the bike stations aren't quite on every street corner. Adding a walk-only option was an obvious choice to make.

Interaction Design

With these considerations in mind, we began to think about how the application was going to support all of the things we decided, and come up with the following questions: what could the application do to promote environmentally conscious behaviour?; how else could we make planning journeys in Glasgow better?

Firstly, we considered where it would most likely be used. We anticipated that most of the time this would be when users are on the move, i.e. already travelling or just about to begin travelling to their destination. When also taking into account the ever increasing market share of mobile devices, prioritising mobile design, while enabling browser access, was the logical conclusion.

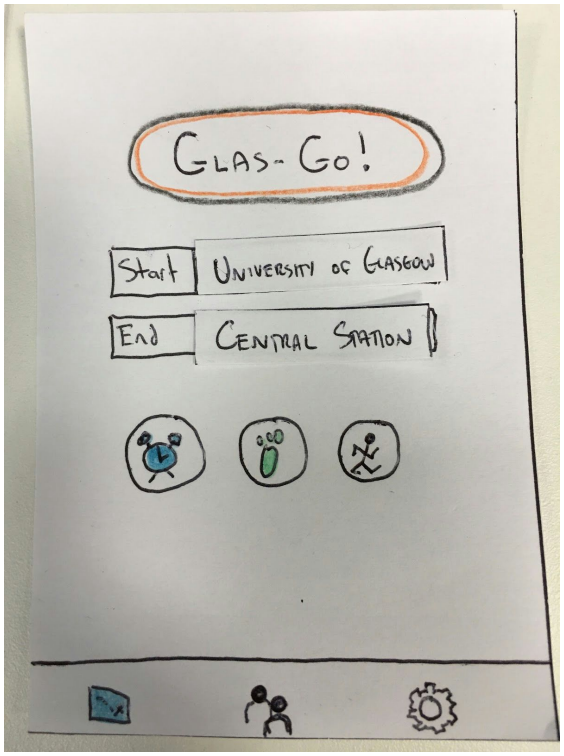
What would be the goal of an end user? Ultimately, they would just want better ways to arrive at their destination, not use the application for the sake of it. Take, for example, the National Rail train timetable finder: when you load up the page, it is set up in such a manner that you need only select which stations you are leaving from/going to (an interaction which is further sped up when using stations' 3 letter labels) and click go. To make our app be similarly straightforward, minimising the amount of interaction required to identify appropriate routes became a priority.

We came up with three "metrics" by which generated routes could be ranked: total time, anticipated carbon emissions, and expected amount of exercise. Users would pick one on the main screen, type their location and destination

Finally, to avoid recreating Google Maps, we decided to delegate the actual navigation to it. Our application would locate waypoints that should be included in the route (i.e. start/end + intermediary station locations) by locating the nearest subway or NextBike stations to the starting location and destination. However, as not everyone uses Google products, we thought it would be beneficial to launch the application on the device's native maps application--this allows users to set their preferred maps application device-wide and have our application pick up this setting.

Aesthetic Design

We sketched out a number of possible user interfaces once we had started to get to grips with the interactions. We extracted their best aspects to create the paper prototype shown below:



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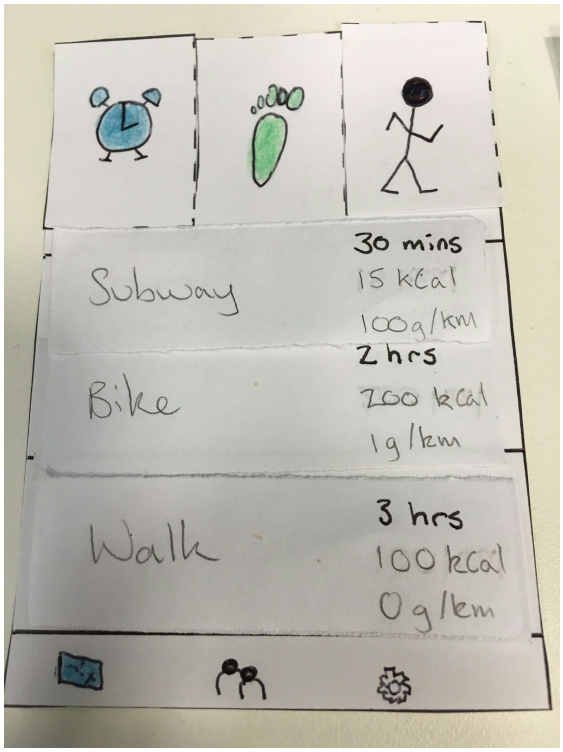
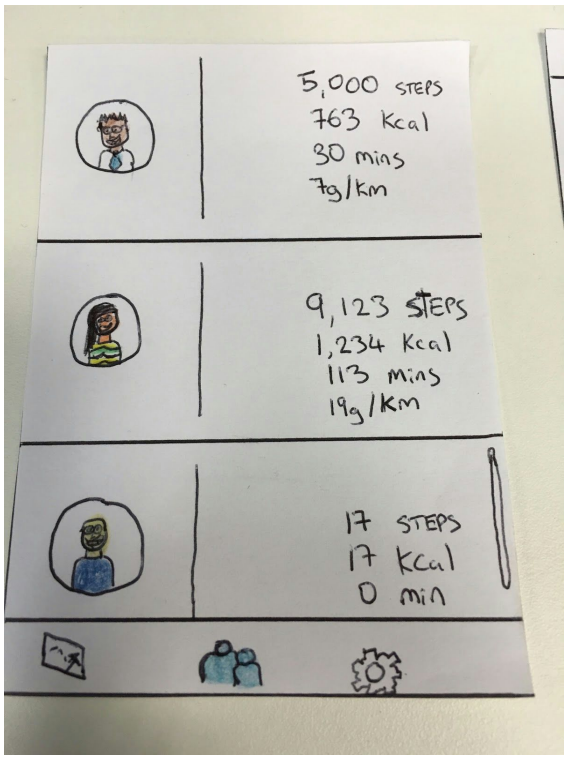


Image1. Homescreen/Travel tab

Image2. Routes list in Travel Tab



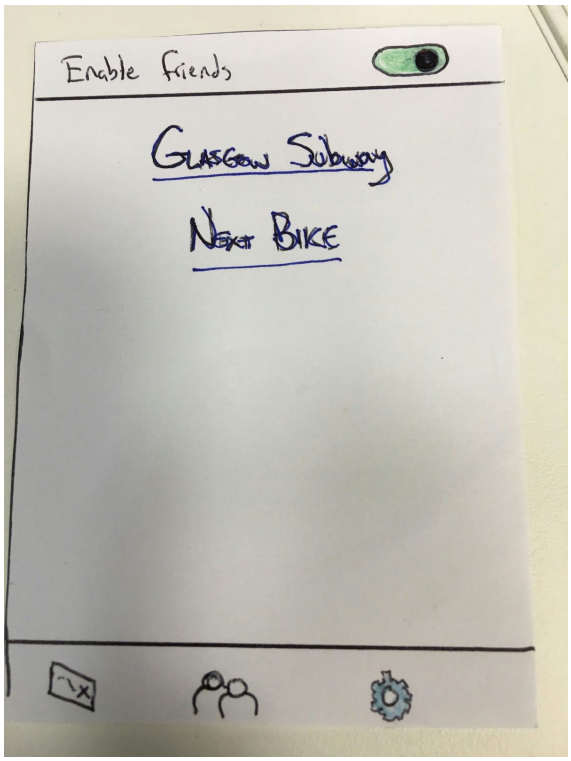


Image3. Friends tab

Image4. Settings tab

For details on the paper prototype evaluation, see the “Evaluation” section.

Feedback from testers not only confirmed many of our intuitions, they also came up with many new suggestions, some of which were worked into the final product. They include:

- Putting the route-preference label underneath the corresponding button
- Putting a number next to routes to signify rank.
- Adding colour themes
- Average metrics - tracking results over time. This introduces ethical issues, permissions etc. so why bother.
- Expanding information - Adding *extra* metrics depending on which ranking was used. Although we entertained the idea, we felt it was more important to present all of the information for all of the routes. We don’t know what other ranking things users will use, so it made less sense to hide away relevant information.

We also ended up dropping some features from the paper prototype.

- “Friends” tab - responses were mixed. Although some were in favour of it and could see the potential it had (suggesting competitions and badges, a la fitness apps), for others they didn’t care. There were also privacy concerns regarding others being able to see all the activity. Ultimately we felt that it wasn’t critical enough of a feature for us to develop at this time.
- Weather - changing the background of the app (from white) to reflect the weather (e.g. with raindrops) was an idea we came up with quite early on. However, the testers we trialled it on found that it proved to be too distracting, and detracted from the overall aesthetic of the app. Most people already have at least one weather app, or acquire weather updates from other places. In future development, weather alerts might be a useful feature, but further evaluation would need to take place.

Implementation

As mentioned above, the app was designed with a focus on mobile use. We used the following tools to make this happen:

- Cordova takes a web application and allows platform specific API access to enhance the mobile experience. This means developing one web application and being able to run it on a variety of platforms, including mobile (iOS, Android, Windows Phone and Blackberry), browser and even native Ubuntu.

- The Ionic framework was used to unify the look and feel of the application. It consists of mobile optimised HTML5, StyleSheets and some JavaScript functionality.

- Angular.js provides the ability to dynamically change aspects of the application even after the pages have loaded.

The implementation took all of the design aspects from the paper prototypes and refined them into succinct designs using html templates and the CSS styling provided by Ionic. There were a few changes that were necessary as a result of technological blockades rather than directly resulting from the paper prototype evaluations.

Evaluation

We only managed to get fellow Computing Science students to evaluate our final designs.

For the paper prototype evaluation, it was decided to carry out collaborative evaluation in order to gain the highest quality feedback that we could. All users were given the paper prototypes and followed more or less the same process:

1. Users were presented with the paper prototypes, showing them the main screen that they would see upon loading the application
2. We explained how the evaluation would work, informing the users that they could ask us questions if/when necessary
3. We explained what the purpose of the application was and

Paper prototype
Test Subject 1:

- Didn't know buttons were buttons
- didn't know what button symbols were/meant
- Didn't know what to do on homescreen
- didn't know what the tabs were
- friends feature might cause fat shaming or other negative responses

Test Subject 2:

- [clicked on button before destination selected.]
- We need more development of paper prototype.
- Total carbon emissions for method of transport instead of carbon emissions saved.
- Icons for mode of transport.
- How to choose?
- Presenting different info depending on selection

Test Subject 3:

- Immediate worry that destination/location boxes were login/password boxes
- Icons:
    - Alarm timer
    - Stops, walking, distance travelled
    - Distance travelled
- Click on one *before* destination/location [I'm not sure why I emphasised this bit]
- We should make sure that we emphasis switching between buttons @ the top of the page
- Number journeys so ranking is more explicit. -> "Fastest journeys"

- Settings might include units (e.g. miles/kilometers); colour themes (in particular a dark theme)
- Back button navigation consistency (which we already have, but it was emphasised)
- Routes in list could expand to give more information (this could include route info instead of directly opening maps or extra metrics)
- Icons
- Weather might be a distraction. Alerts? [Could build this in to walking/cycling routes, like a warning symbol or something]

Test Subject 4:

- Tried buttons - top-down!!!
- Entered
    - Thought exercise was walk
    - Not sure what icons at top are
    - Didn't notice bold when change route type
- Tapped friends
    - How see own profile, maybe at top of friends tab?
    - How to add friends?
    - Sort friends based on steps, local, etc.
    - Privacy?
    - Average metrics/day rather than overall
    - Interested to see own "badges" for personal achievements
    - E.T.A instead of time taken?

For the implemented evaluation we used a combination of collaborative evaluation and experimental evaluation. The three independent variables included colouring the preferred metric in the travel routes screen based upon the preferred route type, removing the route numbers from the travel routes screen, and re-ordering the metrics based upon the preferred route type.

Implemented evaluation

Test Subject 5:

- What do buttons mean?
- Consume versus burn calories/distance
- Having routes in different order - what's the point? Isn't it redundant?
    - [We explained]
- Colour, he liked.
    - There's a better sense that tabs/buttons have been changed.

Test Subject 6:

- He was very exploratory in how he tested the app
- Immediately jumped to settings
    - Suggestion: users could choose N best routes (i.e. there would be N results shown)
- Filled in form and immediately tapped on all the buttons.

- On results page, “Location → Destination” immediately below icons made them look like they were labels for them.
- However, because he tried out all the icons on the other page, maybe not have them on the results one. It’s more use to have them on one page, people could extrapolate as they get familiar with the app. It would avoid breaking the aesthetics of the app. Good for future design considerations.
- He can tell that it should work well on smaller screens, responsive design.
- **Maybe include a link to github repository on links section.**

Test Subject 7:

- Clean neat and polished. Excellent, given that she’s a professional web dev.
- Suggested adding a faded colour background for ranking the results. best would have least faded colour, worst would be almost white.
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Time constraints didn’t allow for a true field test, so we simulated one by asking people to undertake two evaluations of the app. The first was to get their initial impressions of the app, as if they’d just downloaded it and were familiarising themselves with it. The second was at least a day later, getting them to find a route to get an idea of how it would be used in anger.

Future work

- Routes concerning the subway would only make sense if it was in between the destination and location; routes with the bikes would include the closest stations to the start and end so it could be dropped off.
- We will also have to factor in the fact that the Subway has a time constraint in the form of start and end times, which differ by station and day of the week.
- NextBike has 24/7 access, but the number of bikes at a station isn’t constant. Indicating how many bikes were in a station was therefore an important consideration.

Conclusions

We feel that we have a solid design. A significant amount of work would be needed to turn this into a working product, but it could genuinely become a valid piece of work.

Appendices

Source code hosted on github - https://github.com/alexmtmorgan/hci4-assessed-exercise/

Full results of feedback form -
https://github.com/alexmtmorgan/hci4-assessed-exercise/blob/master/questionnaire_results.pdf