

UE Active Travel App

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Usability Engineering

Assignment 1 – Active Travel Application

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17 January 2020



'The Clever Commute App'

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1. Introduction

Active travel involves incorporating walking or cycling into a journey; an individual's daily commute provides various opportunities for active travel [1]. Our choice of transportation method has both positive and negative effects on our wellbeing and inevitably the environment [2]. Research shows that if we meet the recommended amount of physical activity, this can reduce the impacts of coronary heart disease, obesity, hypertension, depression and anxiety [1]. Sustainable transportation has been linked to lower CO₂ emissions [2]. Those who choose these methods of transportation are known as 'active commuters' [1].

Across Great Britain 68% of workers travelled by car (Figure 1) [3].



Figure 1: Percentage of mode of transport for Great Britain

How a commuter chooses their method of transportation is determined by a series of factors; purpose of commuting, time of the commute, convenience and the distance. Quantitative factors such as the commute time duration, monetary costs for fuel and parking and availability/reliability of travel times will be considered. Also, qualitative factors such as convenience and comfort, safety and opportunities of activities during travel [1] [4].

Research for this report has informed an in-depth analysis of considerations and requirements needed for the development of an effective active travel application. The application is underpinned by task analysis, which will ensure that the deciding factors as well as advantages and disadvantages of different methods has been considered and effective persuasive techniques have been implemented. Furthermore, user friendliness and accessibility are considered critical. The application is "Mind over Miles", its purpose is to suggest a more sustainable and healthier commute to/from work, and support and encourage the user to participate in these.

2. Task Analysis

Task analysis provides a detailed understanding of users current tasks and needs, for the effective development of a computer system which will aid users in undertaking these tasks [5]. A major disadvantage of not applying task analysis is the possibility that the software does not fulfil the user's needs, as to do this the system is required to match the users' tasks [6]. The task analysis also considered informal feedback from potential users (family, friends and colleagues).

No.	Task Analysis Item	Considerations	General feedback	Mind over Miles design
1	Who is going to use the system?	Status	Industries are extremely varied so app must suit a wide range of organisations	App is for employees of registered organisations. Ranging from small businesses to large, worldwide companies
		Demographics	Workforces contain range of demographics; again, the app must be inclusive of all	Suitable for all genders, age of employment (16 - 66 generally, although could be older). Any nationality but UK based and English language initially
		Physical ability/fitness level	Must suit all abilities so as not to disclude anyone	Fitness level - all
		Technical ability	Older generation generally less mobile savvy; may have very basic experience and require further help	Basic - app will be intuitive and simple to follow
		Hardware/software requirements	Most people have a smart phone, even if it's a basic one	Smart phone able to download applications and with built in GPS. Almost all smartphones have these requirements.

2	What tasks do users now perform?	Step count	A lot of people track their step count, share and compete with others	App will incorporate a step count of the user's commute
		Maps	Google maps most popular to plan journeys, check driving times and train times	App will use Google Maps to illustrate alternative commutes and provide instructions if the user chooses to use these
		Organisation fitness incentives	Organisations often have bike to work scheme and gym discounts	Work with organisations to incorporate employee benefits for those who are performing well (i.e. using more sustainable transport methods)
		Personal fitness incentives	A lot of people focus on calories burnt to lose weight	App will track calorie burn
3	What tasks are desired?	Track health, carbon emissions and finance	Want actual evidence of how alternative commutes will benefit, must be easy to understand	Encouragement to make more sustainable commutes by providing data on these elements
		Quantitative feedback of choosing alternative commute method		Feedback will be detailed and quantitative not just qualitative
4	What feedback is given?	Three types of feedback	Ideally a variety of feedback, not everyone is fitness-orientated	The app will provide three main forms of feedback: health, carbon emissions and monetary savings.

5	How are the tasks learnt?	Regular routine	It is often easy to forget to add input into apps, then loose interest in app	App will prompt the user for feedback when they arrive at work at the start of their day and when they arrive home after finishing work. Reminder prompts if not completed
6	Where and when are the tasks performed?	Work	Must be quick as organisations may have no phone rules. If you're busy, may not have time	One field feedback required from user when they arrive at work. Takes less than a minute. Instant feedback on commute in quick and easy to read format. Can be accessed later at a more convenient time/place
		Home	Also want this to be quick, as often rushing to cook dinner or do another task	One field feedback required from user when they arrive home after work. Takes less than a minute. Instant feedback on commute in quick and easy to read format. Can be accessed later at a more convenient time/place
7	Relationship between user and data	User-generated data	The app shouldn't be overly generic, instead made personal to the user	Data is user-generated based on their input regarding their transport methods as well as personal data to set up a user profile
8	How do you users communicate with each other?	Limited to monthly challenges	Good to interact with colleagues, makes it more interesting. However, not everyone wants to share their performance with others	Users only can communicate with other users (colleagues) during monthly challenges where they can go head-to-head, alone or in teams. If they don't choose to take part in the monthly challenge, then there is no

				communication between users
9	How often are tasks performed?	Twice a day on each workday	If app is focused on commuting, don't want alerts when not working	Commute data is input at the start and end of working day. Or alternatively, later at a more convenient time for the user. The app will record which days and times the user works so that alerts are only active on these days.
11	Potential downfalls	Inaccurate statistics	Inaccurate results or a faulty app may put people off using the app	The feedback statistics are based on the user entered data, if this is incorrect or inaccurate then feedback will also be correct or inaccurate. This is unavoidable
		Unsuitable route suggestions	If routes are wildly unsuitable, credibility of the app may be lost	Route suggestions may be unsuitable for users for several reasons - too expensive, injury or disability. However, there is an opportunity for users to fill in a transport profile; detailing exactly what transport they use and can use
		No signal	Some office locations are in remote areas without signal	Without GPS signal, routes or feedback can't be calculated. An option for manual input would allow cheating

12	What happens when things go wrong?	Phone Stolen or Loss of Data	Would like their data to be stored securely	The app requires username and password to log in. Therefore, it can be accessed on another device.
13	Who has access to the data?	Administration rights required to access user data; remote access is restricted to administrators	Do not want third party organisations such as advertisers to have access to data	The organisations can view this data in the form of monthly organization-wide statistics report, and the organisation will be encouraged to award employee benefits for good performance
14	What conditions may affect how a task is performed?	Weather conditions	Rain may affect the user's ability to read the map if they choose to take one of the suggested routes to their desired location.	The app can be used anywhere in the UK, in all types of weather conditions

Table 1: Task Analysis

Applying task analysis (Table 1) to the design process of this application, and gathering user feedback, has helped to improve comprehension as it simplifies the complexity of tasks, helps to develop tasks which are more productive, identifies the skills and resources required to complete the task and reduces the risks of any errors occurring. This will inform the prototype.

3. Paper prototype



App start up screen
Mobile prompt to enable access to GPS

Figure 2: App start up screen

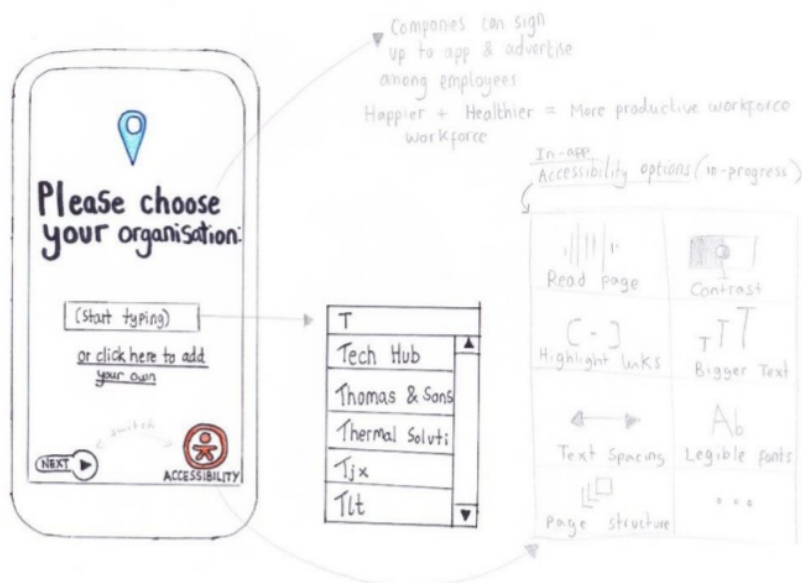


Figure 3: Choose organisation screen

User Profile

Username

Date of birth

Gender

Location

Timezone

Units

Email

Unique username
+ Add password

metric
imperial

Figure 4: Creating a user-profile

Commute Profile

Home
Set home

Work
Set work

Schedule
Set schedule

Transport
Set transport

Method of transport
Expenses (parking/tickets etc)
Restrictions (disabilities etc)

Search address

Add as Home

42 QUEENS LANE, BRISTOL
BS4 2DN

Search address

Add another work location

T4T, BRISTOL
BS1 1FR

WEEKLY SCHEDULE

✓ Mon	8:00 AM - 4:00 PM
✓ Tue	8:00 AM - 4:00 PM
✓ Wed	8:00 AM - 4:00 PM
✓ Thu	8:00 AM - 4:00 PM
✓ Fri	7:30 AM - 3:00 PM
○ Sat	Non-working day
○ Sun	Non-working day

Figure 5: Creating a commute profile

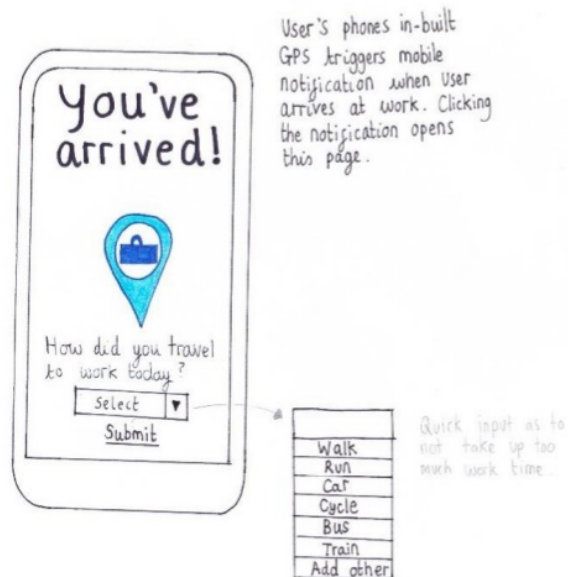


Figure 6: Entering commute to work

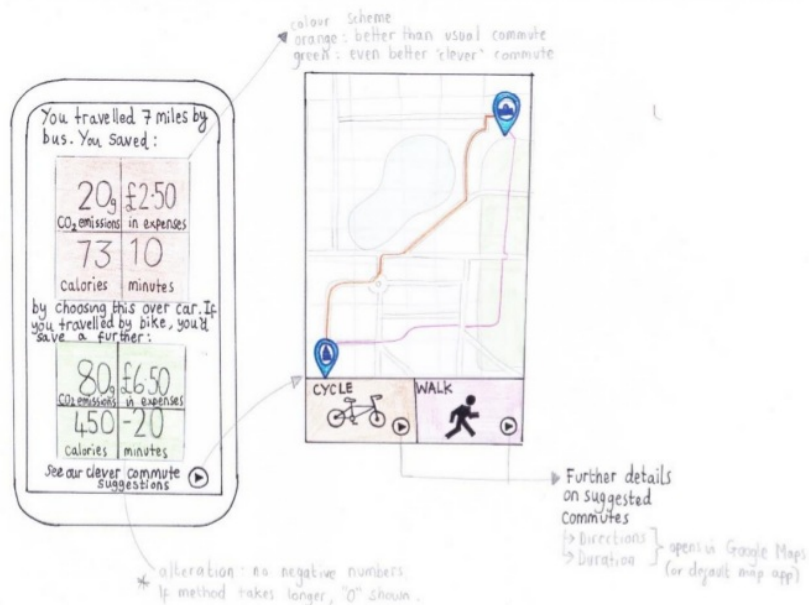


Figure 7: Feedback on the entered commute and further suggestions

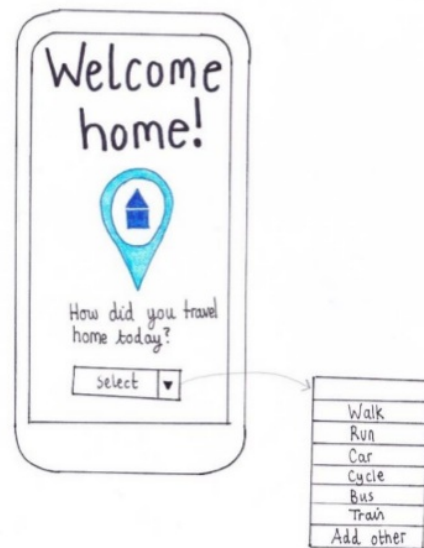


Figure 8: Entering commute from work to home

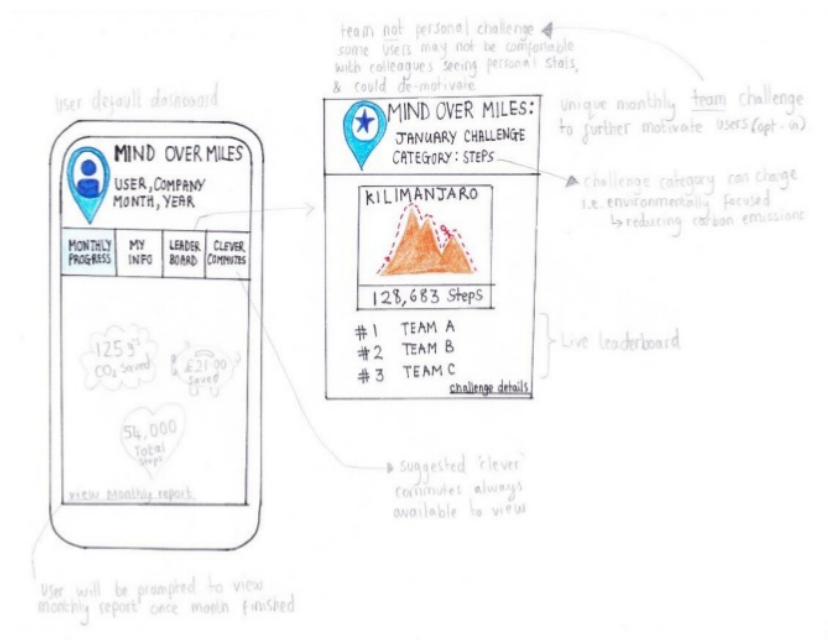


Figure 9: Main user homepage

4. Human Factors Theory

4.1. Theory of visual perception

The 'Constructivist Visual Perception Theory' has been applied to the application; this is based on individual differences of previous experiences which are active in perception, whereby the individual is directly involved in the process. Furthermore, users are drawn to stimulants within a new environment which are perceived through interpretations from prior experiences [7]. Applying this to Mind Over Miles, maps are utilised to display alternative routes the user can take. This can be through Google Maps. It also integrates traffic light colouring to indicate a hierarchy of routes; something almost everyone regularly comes across in the real world. Although it must be noted that this perception is subjective.

4.2. Human memory

In terms of human memory, it is important to reduce the stress on short term memory (STM), by providing tailored and enough, but not excessive, feedback as well as visual cues of the systems state. This is implemented through use of persuasive systems and providing feedback to the user, such as notifying them of their monetary expenses. Avoid developing systems that overload long term memory, for example requiring security questions for authentication purposes [8].

It is vital not to overload the STM, as the human brain is not adapted to abstract thinking. The STM can only handle 7 pieces of information which will disappear in 20 seconds. It is important that menus within UI design are restricted to 7 items [9]; Mind over Miles has 6.

4.3. Human reasoning

Transference theory has been applied as the user will navigate the UI based on their previous experiences with other interfaces, as existing knowledge learnt from previous application usage will be applied in the new application. This is due to the expectation that it will behave in the same way [10]. Mind Over Miles possess similar UI designs to many fitness apps like Fitbit as well as Google Maps, previous knowledge of these will support the user when utilising it.

4.4. Interface metaphors

Interface metaphors have been applied to the UI design to provide a user-friendly experience, as the interface is recognisable, enhancing its ease of use. Within the Mind Over Miles interface, metaphors such as a heart to symbolise favourite locations and a piggy bank to symbolise monetary savings, portray the systems functionality using similarities and ideas from the real word which the user is familiar with. Through this method the user can utilise existing knowledge about a given idea and apply it to the application [11].

4.5. Affordance

Affordances deliver cues to the user on how they can interact with the application. Within Mind Over Miles explicit affordance has been extensively utilised. Explicit affordance, for example arrows, have been utilised providing cues to the user to navigate to the next page, guiding the user "this way" as arrows do in the real world. This provides the user with successful interaction with the system and has allowed the user to immediately understand that they are required to click on it to interact. It is visually like a button in the real world, with an obvious clickable element. Implicit affordances are hidden and may be revealed through the users' actions. An example of this is the use of dropdown boxes which are utilised in the user's profile set up [12].

5. Walkthrough of prototype

Feedback given for Mind Over Miles is below.

My classmate's active travel application 'Mind Over Miles' is designed to provide users with healthier travel routes to work and home and allows them to view their monthly progress and take part in a monthly team challenge to compare their results with their work colleagues, which is optional. It is suitable for companies to sign up employees which promotes a happier workplace.

The interface was clear and concise and made it simple to follow what needed to be done to complete whatever tasks are required. Colour is also used appropriately to indicate different routes making them stand out. The use of consistent symbols throughout make the appearance more pleasing and are a good example of a metaphor in the system making it easier for the user to commit the system to long-term memory. The maps are also a good metaphor and emulate a real map with the paths and symbols for work and home made clear.

There are several good features in use that show this is a persuasive system. For example, social support with the team challenge, self-monitoring with the monthly progress and dialogue support with the suggested route. The application also provides good affordance with the use of menus and navigation that makes it easier to use. There are also accessibility options which make the app more user-friendly for those with reading or hearing difficulties.

The app also follows the 7±2 rule, with only necessary information displayed on the screen at a time so as not to overwhelm the user's senses and affect their short-term memory. The user is also given helpful prompts such as to view their monthly report once the month is completed and once they arrive at work or at home, they are automatically given a notification which takes them to a page to select their mode of transport. This means the user does not have to remember to do this themselves and eventually they will see it as part of their daily routine. It also means they are not losing any valuable time at work.

One thing I was unsure of is the use of the weekly schedule and where it links to the application. At first, I thought it may be to give the user their prompt to choose how they travelled to work at the time they set their arrival to work, but this is done through the phone's GPS system. My only thought is that it could be another extra feature just so the user is able to see their work schedule and if not, perhaps it could be made clearer what this is used for or even to remove it from the application if it is excess.

Overall, the app does well to achieve its goal of providing a more "clever commute" to the user. It is not restrictive and accounts for all modes of transport e.g. bus, bike and walking. It makes the process of choosing an active travel route much simpler and persuades the user to choose these routes by describing how much more time and money they could save and calories they could lose. By keeping monthly progress reports, they can see how they are improving their active travel and compare it with colleagues to keep motivated.

6. Evaluation of a class member's design

My peer's active travel application (see Appendix A) focuses on encouraging the user to choose further away parking facilities in order to generate more steps, burn more calories and earn points. It is a good concept; however further task analysis would improve app functionality. The app seems to have two purposes; to improve user fitness (through step count and calorie burn) and to suggest car parks further away from the users desired destination.

The user audience is limited to car-users and those who want to increase their steps or burn calories. Only car-users would benefit as it only suggests car park locations rather than utilising other forms of transport, for example it could also suggest an earlier bus stop. Also, users are only motivated through steps and calorie burn, which may not interest all potential users. There is no motivation to reduce CO2 emissions or save money. This is limiting the app audience and it should ideally promote more sustainable transport methods, rather than car use.

Furthermore, there is no indication of how car parks are suggested i.e. does this consider cost of parking or car park opening hours? Where is information gathered from? The app could use further user input to create more 'intelligent' suggestions i.e. user decides maximum parking charge or whether they require disabled or child parking spaces.

The design includes the use of interface metaphors and affordance to enhance user friendliness. Interface metaphors have been applied effectively, allowing the user to clearly understand the symbolisation of the button; the button containing the house icon returns the user to the home page and calories burned is represented by a flame, removing need for text. However, this home button is shown on the sign-up, log-in and homepage – where it is not required or unusable.

Affordance has been applied appropriately. For example, progress bars have been implemented providing an update of the users progress throughout. Affordance has also been used through drop-down boxes and a search bar. These implementations provide the user with visual cues on the app functionality.

After reviewing, arguably the most effective feature is the progress bar, which fills up as steps are generated. This feature provides the user with live feedback on their progress and can be utilised as a persuasive technique. In addition, text notifications are given in the form of speech bubbles, providing users with another form of interactive feedback. Lastly, the figure used to symbolise that the user has hit their daily goal is a good use of a persuasive system, as it alerts the user with a visual representation of a points token. The use of multiple feedback is positive, however arguably is excessive and would benefit from one clear form of feedback; simplicity is key. Steps and calorie burn are recorded daily; however, it would be useful to show long term progress through weekly and/or monthly feedback reports.

Users are rewarded and motivated through points; these can then be traded in for money off products. However, the app would have to generate some form of funding to offer this i.e. by charging to use the app or through advertising.

The application would benefit from the implementation of accessibility options, providing further support and assistance to those who require it. For example, a colour scheme more friendly to colour blind users or larger text for those with sight impairments.

It would also be advisable to review some of the app screens as they could be seen as overcrowded, which may overload the STM. For instance, there is no need to include the app description on every

screen as this takes up valuable space and increases clutter. Lastly, the application would benefit from considerations to a consistent colour scheme, name and logo design.

Overall, the concept of encouraging car users to park further away to increase fitness on their daily commute is very good, especially when most commuters today use car. Further task analysis, described above, would help improve the delivery of this idea.

7. Software prototype

PowerPoint was the main software prototype tool as it effectively allowed for a visual representation of Mind Over Miles. PowerPoint helps to tell a story through a storyboard format, so was appropriate for creating a prototype [13], and allows the developer to set the dimensions of the slide page [14] to replicate a phone screen, which is effective for producing a real-world visualisation of the application. Photoshop and Visual Studio were also used, mainly to edit images and create combo boxes for the user profile.

“Mind over Miles” is a clever commute app. Both the name and description indicate the purpose of the app, which is to provide ‘clever’ travel suggestions for commuters. The app provides detailed feedback on user’s daily commutes, suggests more sustainable and healthy commutes and rewards and enforces the uptake of these through positive feedback and badges.

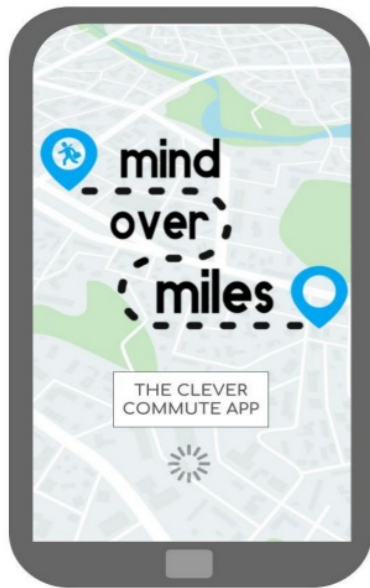


Figure 10: Start-up screen

The app “splash screen” (Figure 10), displays the app logo and tagline. This screen is crucial as it gives the user their first impression [15]. Although simple, it is attractive and informative; immediately telling the user, through the map background, logo and tagline, that this is a commute planning and mapping app. Locational pins are featured throughout the app to create a familiar brand and connectivity, they are adapted to the theme of the screen (Figure 11). Research shows that simple, well-defined objects are best at communicating [16].



Figure 11 Locational Pins

Colour is an extremely important and often underestimated part of app design. The predominantly blue colour scheme was chosen to prevent overwhelming the eye with too many colours, and also blue is often viewed as calming and positive [17]. The colour scheme was originally red but amended for these reasons, and also because research suggests that blue is the most effective colour for gaining a user’s attention whereas red is a colour which signifies danger or negativity [18].

The buffering wheel signifies the app is starting up and loading required data. When initiating for the first time, a mobile prompt will request access to the devices GPS.

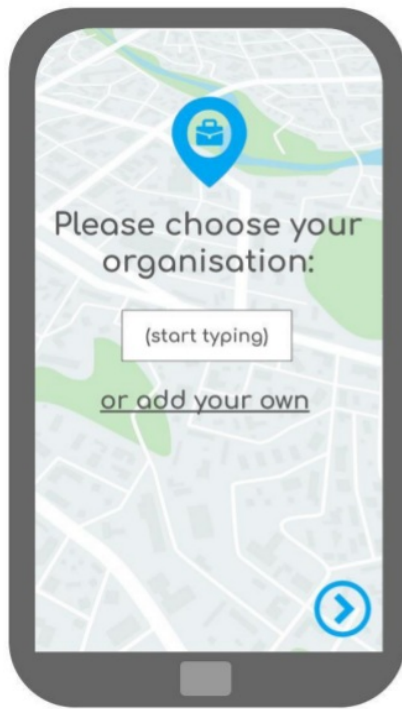


Figure 12: Adding Work Organisation

Proceeding start-up, a first-time user will be asked to select the organisation they work for or add their own (Figure 12). The idea is to promote the app to companies since a healthier workforce is shown to be a more productive workforce [19]. The app can provide useful statistics to the company (if workforce size is large enough to allow anonymity) on employee commuting habits.

The text box with the “start typing” is affordance as it provides the users with cues on how to utilise the app. It is made to stand out from the background as the focal point, drawing the user to the action required. Underlining text provides the user with a cue to click, giving the effect of a button. The map background is continued throughout the app, creating consistency and familiarity. The app is navigated using the obvious arrow button, indicating “this way”.

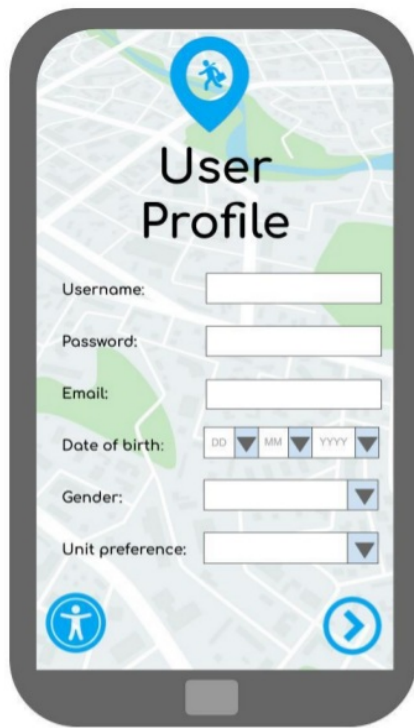


Figure 13: User Profile Registration

Next is setting up the user's profile (Figure 13). The design focus was facilitating quick and easy user input. This is done through the creation of combo-boxes which reduces the amount of user input required and improve clarity of what type of data is required. There is an in-app accessibility button, where users can adjust the app appearance and behaviour to suit their accessibility requirements (e.g. increase text size, adjust colour scheme, highlight links etc.)

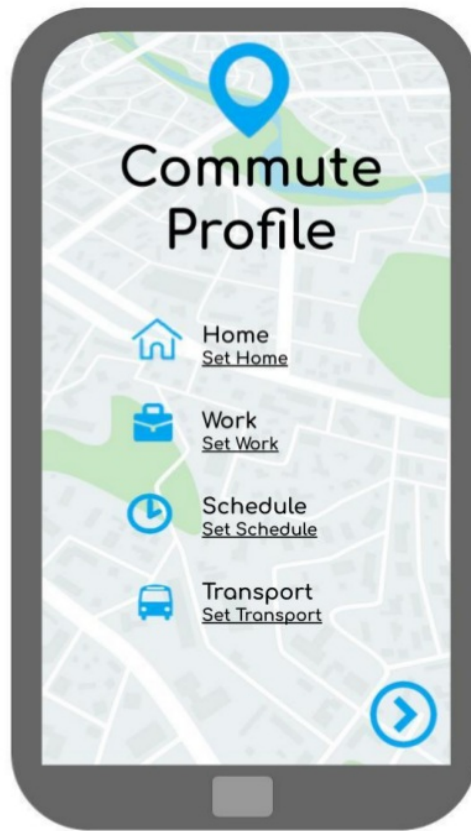


Figure 14: Commute Profile

Next is the commute profile (Figure 14), containing detailed information on the users commute to enable the app to accurately record these and provide feedback. Each section is symbolised by an obvious image e.g. clock image to represent schedule data. Again, utilising the “law of simplicity” meaning that clear and ordered objects are quicker and easier to process [20].

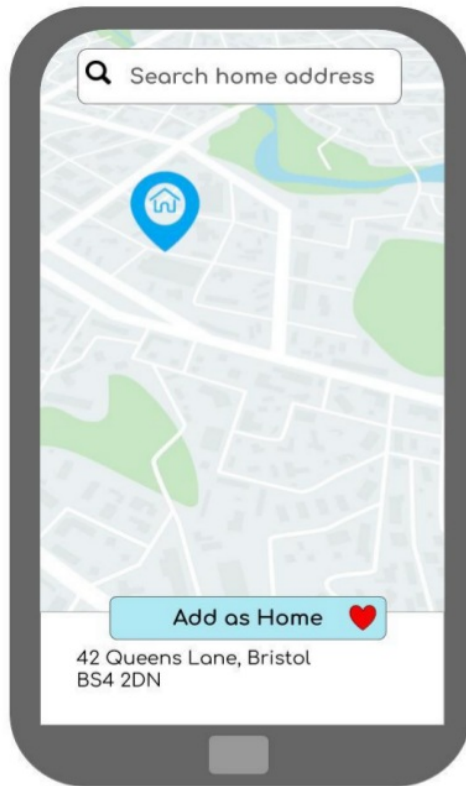


Figure 15: Setting home location

By clicking on the “Set Home” button, the user proceeds to a familiar and simple map system (Figure 15); something they are likely to have already used. Symbolisation is used to compliment text instructions and provide user hints e.g. the magnifying glass within the search bar, the home location pin and the heart to save the location. The user sets their home address so that the app knows when to collect feedback about their commute.

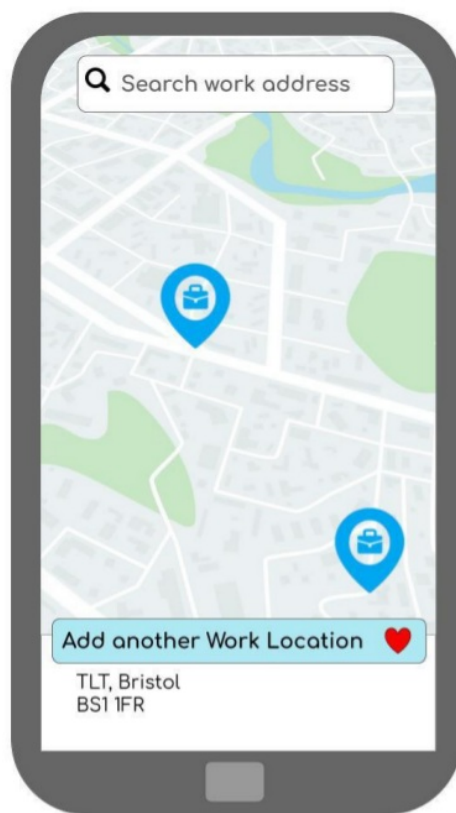


Figure 16: Setting Work Location

The “add work” button takes users to an almost identical map system; however, the location markers have briefcase symbols to represent a work location (Figure 16). The user has the option to add multiple work locations (“add another work location”); as it is common for people to travel between offices.

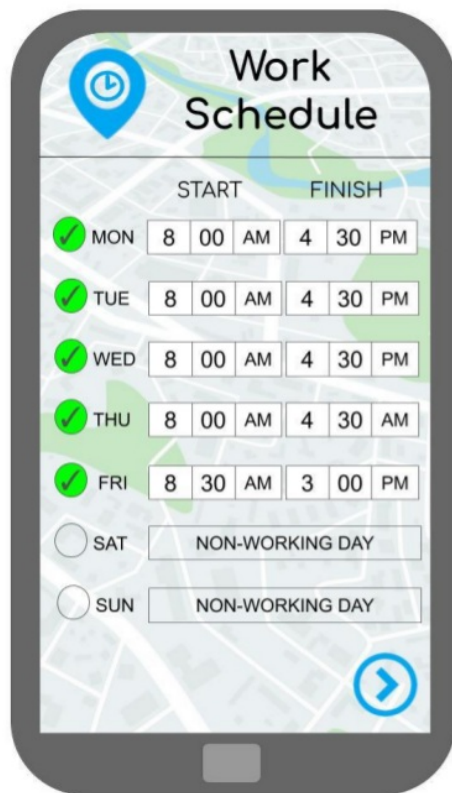


Figure 17: Setting Work Schedule

Next is adding the users work schedule (Figure 17). Input has been made as efficient as possible using scrolling buttons to choose the time and on/off buttons for day. The start/finish times are an interface metaphor, an alarm clock screen, and so are the green ticks indicating that the day is included. Non-working days are purposely displayed differently to provide contrast; separating them from working days. The purpose of the schedule is so that the app does not prompt the user for commute data on a non-working day.



Figure 18: Methods of Transportation

The last part of the “Commute Profile” is transport; where the user provides transport data to help the app become ‘smarter’ (Figure 18). This enables the app to suggest more suitable commutes and more accurate statistics. Data includes expenses associated with a transport method (e.g. parking) or that a commute method is not possible (e.g. they don’t have access to a bicycle), or not suitable (e.g. they have a disability meaning they can walk a maximum of 3 miles) etc. The symbols share colour characteristics to show they are all related as forms of commuting.

This concludes set-up.

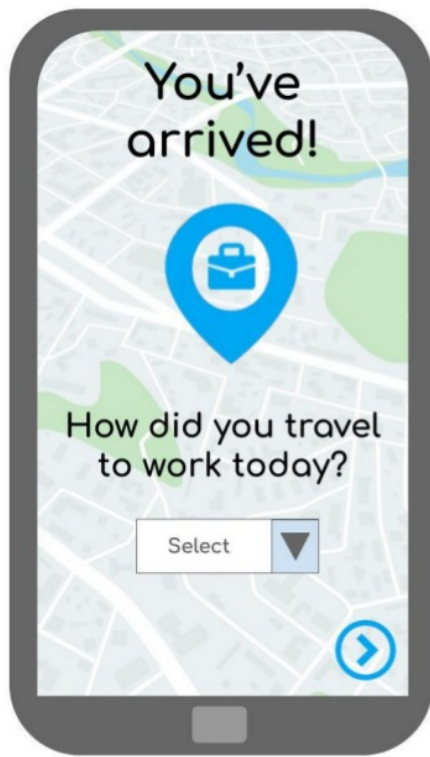


Figure 19: End of Commute

Each time the user arrives at their work location, a mobile prompt will ask them to enter their commute via this screen (Figure 19). To take up as little work time as possible, this screen only requires one form of input through a drop down. Alternatively, this can be completed at a more convenient time.

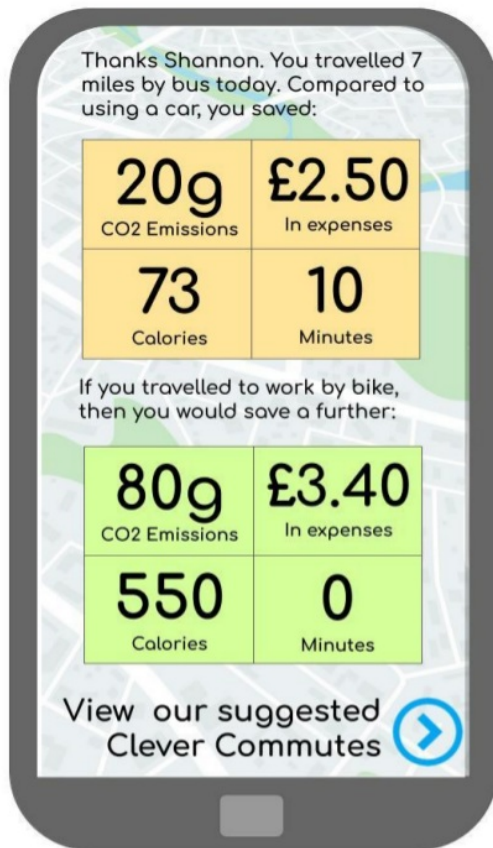


Figure 20: Commute Feedback

Upon entering their commute, instant feedback is provided (Figure 20), delivered in an easy to interpret table. The colour of the boxes reflects a traffic light system (red for negative, amber for ok and green for positive) to utilise positive reinforcement. In this case, the user travelled by bus; a more desirable method than car. However, the app also provides an alternative, more sustainable commute; in this case to travel by bike. It provides statistics as a persuasive method, made bold to stand out as the main message here. The user can proceed to the “clever commute” suggestions by clicking the arrow button. The feedback is enclosed in a box to indicate it is related to the same commute.

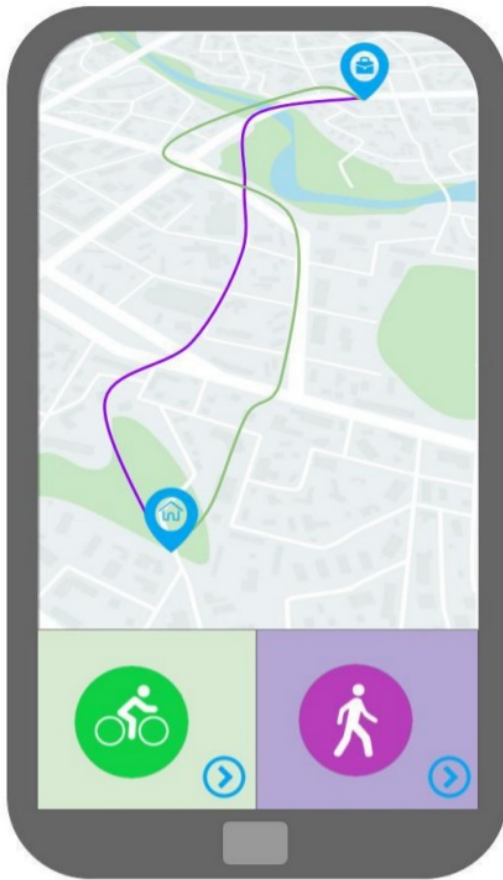


Figure 21: Commute Suggestions

The app will then present the clever commute suggestions to the user (Figure 21), they can view more detailed instructions by selecting a commute.

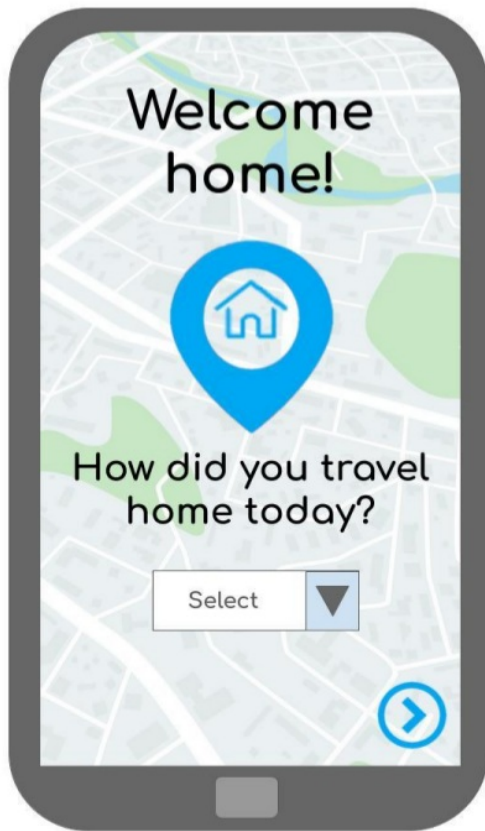


Figure 22: Method of Transportation Home

The user then runs through the same process when the app is notified that they've arrived at their home (Figure 22).

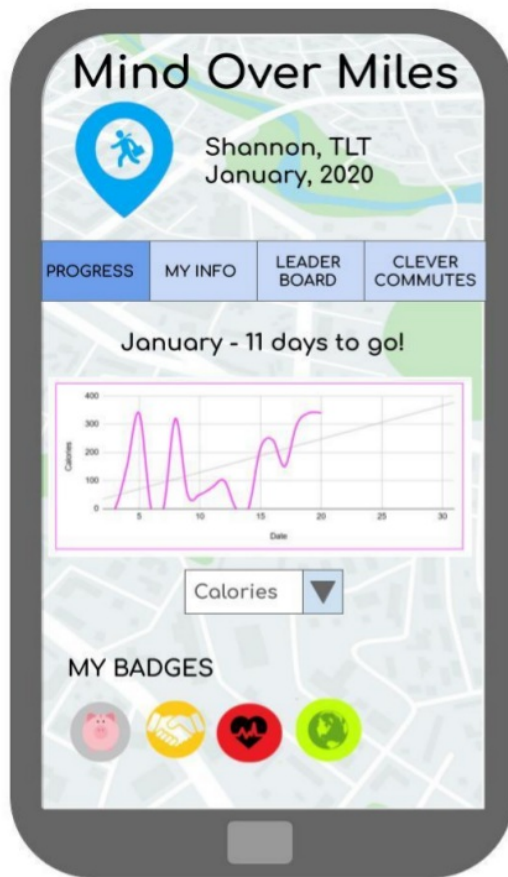


Figure 23: User Profile

Figure 23 shows the app homepage. The user default dashboard is comprised of individual blocks which make up the menu bar. Different shadings on shapes used so if it is a darker shade on the menu strip if gives the sense that that option has been clicked on.

Users can view live monthly feedback by toggling through charts for calories burnt, step count, CO2 emissions saved, and money saved; a range of motivational feedback and a self-monitoring system. Good performance in each of these will be awarded through badges (interface metaphors). These are categorised by type using colour e.g. green for environment, red for health.



Figure 24: January and February monthly challenges

Figure 25 shows examples of the monthly challenge screen, another form of motivation but also social interaction, providing friendly competition. This is opt-in, so the user does not have to participate.

PowerPoint has effectively created the Mind Over Miles software prototype within a timely manner. It supports the use of other software such as Photoshop and Visual Studio to work collaboratively to create the desired application prototype. PowerPoint allows you to set the dimension of the page reflecting a real-life size phone which supports the design of the UI. It provides icons and shapes which can be transformed into buttons, labels and user input boxes.

8. Evaluation of usability engineering techniques

Task analysis was invaluable in determining many key elements of the design; user identity, the tasks they'd need to perform and where, when and how they'd complete the tasks, and any issues they may encounter. Furthermore, the application of human theory was applied, stating that users will apply transference theory when using the application. Hence, google maps was used as the map service. In addition, Constructivist Visual Perception Theory was applied; again, drawing the conclusion that users will navigate their way through the app based on their past experiences with similar applications.

Applying human memory to the paper prototype helped develop a clear structure whereby pages are not overcrowded, and operations are not too long to complete. Interface metaphors enhanced user friendliness (e.g. symbols) and affordance provided valuable cues (e.g. drop downs). Only necessary items are shown on screen; everything adds value to the user experience.

One key change from the paper prototype was the removal of negative numbers; a decision was made not to give negative feedback for clever commutes e.g. if riding a bike takes 20 minutes extra, time saved is no longer shown as “-20”, to maintain positivity about more sustainable commutes. Changes have been applied to the challenge frequency; it was originally an annual challenge but changed to be monthly to provide continuous and refreshed encouragement for active travel. Feedback from potential users also highlighted that many wouldn't want their stats shared with colleagues; hence the challenge was made a team challenge not individual.

Overall, by applying usability engineering techniques, this allowed for key changes to be made in the design process. It helps to provide an in-depth analysis on the design, accompanied with task-analysis. This meant that the structure was thoroughly thought out and the requirements met. However, there is always room for improvement and perhaps further user feedback could assist. The next step would be to create a more sophisticated prototype in more advanced software (e.g. Visual Studio). The app could also be scaled out to other organisations, like universities to improve both student and staff commutes, and the addition of groups to share favourite commutes or enable 'commute-share' in the same sense as a car-share scheme.

To conclude, through task analysis and research into Human Factors, the Mind over Miles prototype essentially achieved its aim of supporting users to make 'clever' commutes and ensured usability by focusing on simplicity, continuity and familiarity.

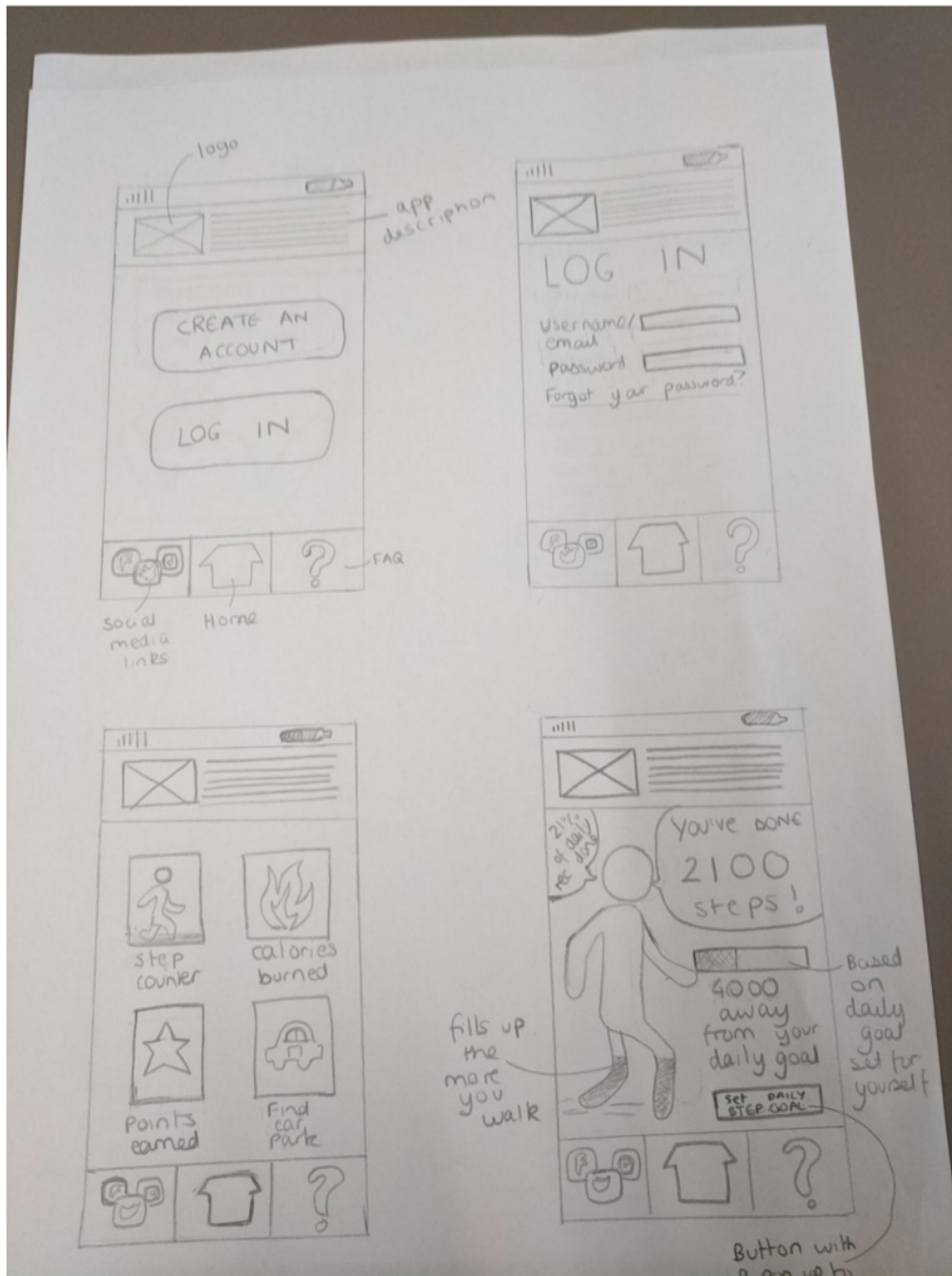
9. References

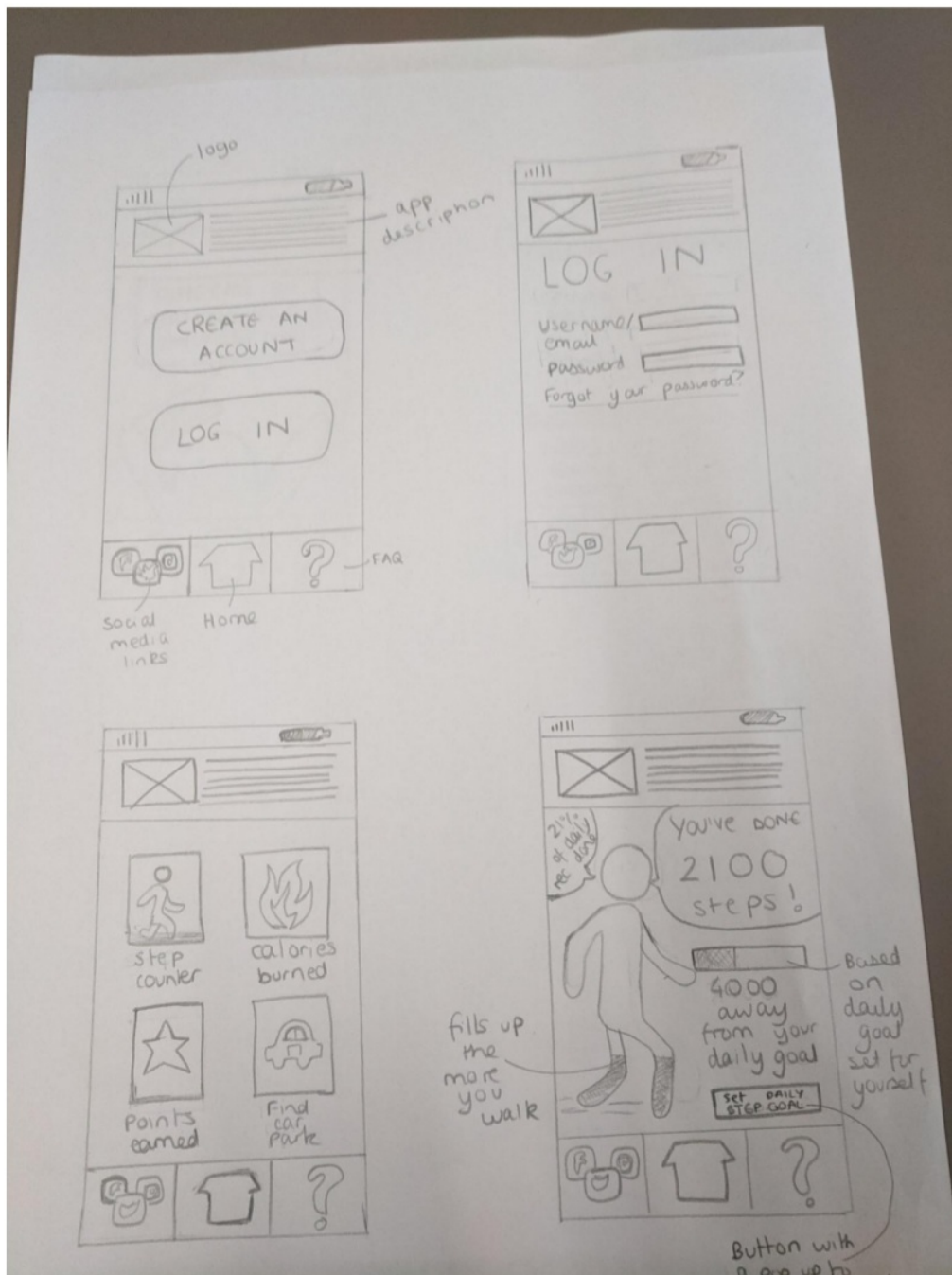
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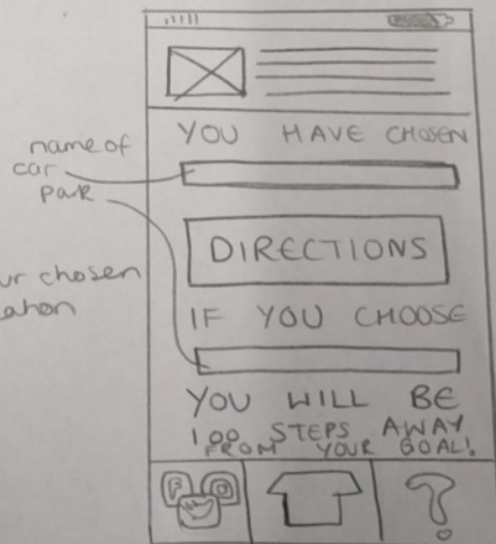
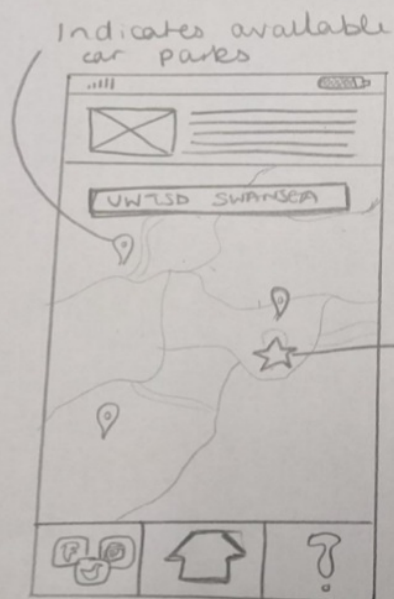
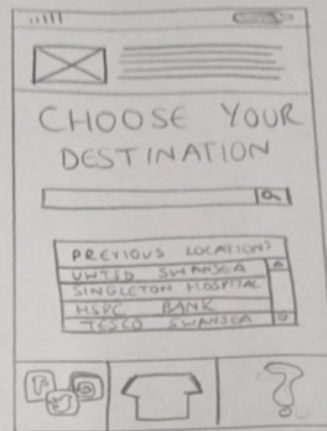
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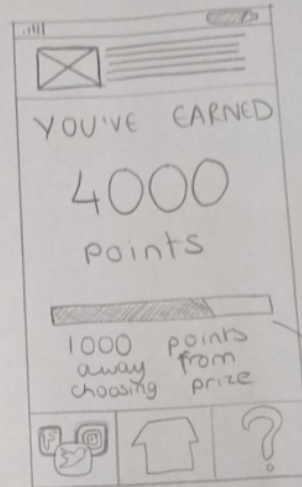
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Appendix A: Peer Paper Prototype









once full
leads to page
of options e.g.
money off products

FINAL GRADE

78/100

GENERAL COMMENTS

Instructor

Introduction: Brief and effective introduction to your chosen topic with good use of info sources and infographic illustrating the challenge..

Task Analysis: An in depth Task Analysis was shown. Topics could benefit from more thoughtful discussion - and evidences user involvement. A well structured presentation in an appropriate table format makes great points (but does sometimes mention the app).

Paper Prototype: An attractive Paper Prototype is included - an excellent feature of your assignment!

Human Factors: Evidence of research and application to specific design features is evident here. An improvement would be to show some of these features in cropped screenshots.

Review of Classmate's Design: A high point here was consideration of the purpose of the app in conjunction with its design and a well written and structured argument. References could have been included here, even for topics just discussed under Human Factors.

Software Prototype: Good paper prototype with an attractive implementation. Very good explanation for each design. While the map background looks attractive it could impact readability. A really comprehensive set of designs, again keeping the overall user goals in mind.

Evaluation: An effective review with the specific examples required.

Overall an excellent application of theory to create an attractive prototype and useful with excellent structure and explanation. Well done!

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