COMP2213 - Interaction Design Deliverable 1

Literature Review

Group6

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Introduction

It is a well-known fact that transportation is a key issue for our environment [1] and recent research has addressed some of the main issues with public transportation and how it could be beneficial to switch to a more sustainable option.

Shared Systems

The ride-sharing system aims to automatically match the drivers and riders in the shortest amount of time [2]. Thanks to the rapid development of the mobile internet, instant messaging between two sides becomes feasible, enabling door-to-door transfers to be achieved. This is the strongest competitive edge of the ride-sharing system, making it comparable with transportation by private cars [2]. Reducing the number of empty seats in the car during a trip can also mitigate the problem caused by excessive private traffic, such as traffic congestion and fuel wastage. However, the ride-sharing system will be less considered by people when it doesn't offer enough affordability and safety [2]. Also, the user experience extremely depends on the weather, road conditions, and the station buffer distance [3].

Flexible Transport Systems

A very efficient way of similar travel is Flexible Transport Systems (FTS) which unites many conventional ways of travel while also making it affordable and convenient [4]. This method is very effective as it is demand based, which helps cut costs and is sustainable. Another very important issue with public transport is the fact that it relies highly on the design of the place [1] and this involves a lot of people, from different areas of expertise [5] which may cause a clash between each group's viewpoints. A strong argument is that public transport plays a big part in the number of time citizens spend commuting [1] and it is also noted that choice may not be an option when using public transport [1,5]. Further research should also focus on how to incentivize public transport to not only make public transport more appealing but to also make sure it would be used. An example is gamification design driven by persuasive technology.

Persuasive technology

Persuasive technology is an approach to guide the public's performance[6] which means that it could be used in the interactive design aspect to improve public transport usage. In some areas taking a private car is the preferred choice for most people. Some persuasive techniques worth trying to include are Direct Appeal, Visualization, Gamification, etc[7]. According to B.J. Fogg, persuasive techniques can also lead to group effects[8], that is, individuals interacting with other individuals. Therefore, the proper use of persuasive technology could lead to a high probability of attracting people to take public transportation instead of driving cars privately. These approaches to changing people's habits are driving their feelings and emotions[6]. When people receive positive emotional feedback when taking public transportation, public

transportation will naturally be chosen by more people. Implementing different levels and types of persuasive techniques for different people will help personalize it for users and help convince them to continue to use public transportation[9].

Gamification

Gamification design is a persuasive technique that can efficiently impact human behavior [10]. This is mainly because gamification design can provide people with positive emotions to enhance autonomy[11], which results in individuals taking public transportation voluntarily. Compared to Flexible Transport Systems (FTS), gamification does not use expensive development costs to enhance the user experience. A simple example would be to stimulate social triggers by introducing a form of competition and rewards[7]. Gamification is a mechanism that allows users to create value in the process of using the program which can motivate them to use it further[11]. The implementation of gamification in the interaction design of public transportation allows users to choose to use public transportation more often. This is because the application of gamification provides them with psychological pleasure and satisfaction. BPNT(Basic psychological needs theory) is the key to making users get emotional value during gamification.

Basic psychological needs theory

Basic psychological needs theory(BPNT) explains how people derive pleasant emotions from an activity[12]. Based on the BPNT, the experiences of autonomy, competence, and relatedness to the person inspire personal intrinsic motivation[13]. Autonomy is the degree of willingness of individuals to participate in activities; effectiveness is the sense of success and efficiency of participating in an activity; relatedness refers to the degree of contact with other people when people participate in activities[14,15]. Promoting these elements, and the use of other BPNT practices in the interaction design stage of public transportation can lead to the inner satisfaction of users and thus enhance the sustainability of public transportation.

Conclusion

This literature review aims to revisit public transport in today's environment and to explore and analyze the innovative interaction design shown by existing shared systems and FTS, with sustainability as a primary objective. It also demonstrates the powerful potential of gamification design in the field of interactive design for sustainable transport, based on the premise of persuasive technology and BPNT. Further exploring the potential of gamification in interaction design and integrating it with sustainable transport is our primary goal.

Reference List

[1].Prandi, C., Nisi, V., & Nunes, N. (2017). Bus stops as interactive touchpoints. *Proceedings of the 12th Biannual Conference on Italian SIGCHI Chapter*. https://doi.org/10.1145/3125571.3125593

[2].Niels Agatz, Alan Erera, Martin Savelsbergh, and Xing Wang. 2012. Optimization for dynamic ride-sharing: A review. European Journal of Operational Research 223, 2 (2012), 295-303. DOI:https://doi.org/10.1016/j.ejor.2012.05.028

[3].Oliver O'Brien, James Cheshire, and Michael Batty. 2014. Mining bicycle sharing data for generating insights into sustainable transport systems. Journal of Transport Geography 34, (2014), 262-273. DOI:https://doi.org/10.1016/j.jtrangeo.2013.06.007

[4].Catia Prandi, Valentina Nisi, and Nuno Nunes. 2017. Bus stops as interactive touchpoints. *Proceedings of the 12th Biannual Conference on Italian SIGCHI Chapter* (2017). DOI:http://dx.doi.org/10.1145/3125571.3125593

[5].Todd Litman and David Burwell. 2006. Issues in sustainable transportation. International Journal of Global Environmental Issues 6, 4 (2006), 331. DOI:http://dx.doi.org/10.1504/ijgenvi.2006.010889

[6].Wan Nooraishya Ahmad, Nazlena Mohamad, and Ahmad Rizal. 2020. Understanding user emotions through interaction with persuasive technology. *International Journal of Advanced Computer Science and Applications* 11, 9 (2020). DOI:http://dx.doi.org/10.14569/ijacsa.2020.0110926

[7].Thedy Yogasara and Vania Edra Naomi. 2021. Designing persuasive application to promote public transportation use. *Jurnal Optimasi Sistem Industri* 20, 1 (2021), 22–32. DOI:http://dx.doi.org/10.25077/josi.v20.n1.p22-32.2021

[8].B.J. Fogg. 2003. Computers as persuasive social actors. *Persuasive Technology* (2003), 89–120. DOI:http://dx.doi.org/10.1016/b978-155860643-2/50007-x

[9]. Evagelia Anagnostopoulou, Babis Magoutas, Efthimios Bothos, and Gregoris Mentzas. 2019. Persuasive technologies for sustainable smart cities: The case of urban mobility. *Companion Proceedings of The 2019 World Wide Web Conference* (2019). DOI:http://dx.doi.org/10.1145/3308560.3317058

[10].Ronita Bardhan, Chaitra Bahuman, Imrankhan Pathan, and Krithi Ramamritham. 2015. Designing a game based persuasive technology to promote pro-environmental behaviour (PEB). *2015 IEEE Region 10 Humanitarian Technology Conference (R10-HTC)* (2015). DOI:http://dx.doi.org/10.1109/r10-htc.2015.7391844

[11].Ezgi Ilhan, Bahar Sener, and Hüseyin Hacihabiboğlu. 2016. Creating awareness of sleep-wake hours by gamification. *Persuasive Technology* (2016), 122–133. DOI:http://dx.doi.org/10.1007/978-3-319-31510-2_11

[12].Kai Huotari and Juho Hamari. 2012. Defining gamification. *Proceeding of the 16th International Academic MindTrek Conference on - MindTrek '12* (2012).
DOI:http://dx.doi.org/10.1145/2393132.2393137

[13]. Richard M. Ryan and Edward L. Deci. 2000. Intrinsic and extrinsic motivations: Classic definitions and New Directions. *Contemporary Educational Psychology* 25, 1 (2000), 54–67.
DOI:http://dx.doi.org/10.1006/ceps.1999.1020

[14].Ayoung Suh, Christian Wagner, and Lili Liu. 2015. The effects of game dynamics on user engagement in Gamified Systems. *2015 48th Hawaii International Conference on System Sciences* (2015).
DOI:http://dx.doi.org/10.1109/hicss.2015.87

[15].Michael Sailer, Jan Ulrich Hense, Sarah Katharina Mayr, and Heinz Mandl. 2017. How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior* 69 (2017), 371–380.
DOI:http://dx.doi.org/10.1016/j.chb.2016.12.033

COMP2213 - INTERACTION DESIGN DELIVERABLE 1

Interview Protocol

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INTERVIEW PROTOCOL

The appearance of Shared Transport and Flexible Transport Systems has helped sustainable transport to some extent. However, they are both limited by certain factors. Therefore, we try to use psychological design to motivate users to take the initiative to ride sustainable transportation.

We designed a semi-structured interview protocol, based on the objectives of our data collection phase, which would allow us to collect all the additional data and draw reasonable conclusions based on the data.

As our main study people's subjective perceptions of some gamification mechanisms. The target population for the interviews will include people who use public transportation with different frequencies. to determine whether they would be more motivated to use public transportation due to gamification.

Appendix (i)
Participant Information

Ethics reference number: 24744.A4	Version: 1.0	Date:
Study Title: Student interviews for COMP2213		
Investigator: ***STUDENTS TO INSERT THEIR NAME(S) HERE***		

Before the interview you shold know:

- Please read this information carefully before deciding to take part in this research. If you are happy to participate you will be asked to provide your verbal consent to take part. Your participation is completely voluntary.
- What is the research about? This research project is part of the COMP2213 group project. The research will be on related to: Sustainable Transport
- Why have I been chosen? You have been approached because you are known to the student(s) or because you have been identified by the students as being appropriate for an interview on one of the topics listed above.
- What will happen to me if I take part? You will take part in a short interview (~15-20 minutes). The interview will involve non-personal questions about your opinions one of the topics listed above. Interviews may be audio-recorded.
- Are there any benefits in my taking part? The study will add to the current knowledge on each topic, as well as being a valuable practical learning tool for the student(s) who are learning qualitative research techniques.
- Are there any risks involved? None beyond everyday life.
- Will my data be confidential? Please do not give any identifiable information during your interview. Your interviewer (student) will ask for your verbal consent to participate in the research. Because no identifiable information will be gathered in the interview, the students will retain anonymous interview transcripts and notes until the end of the semester.
- What happens if I change my mind? You may withdraw at any time and for any reason. You may decline to give your verbal consent and not take part in the interview without penalty.
- What happens if something goes wrong? If you have any concern or complaint, contact the COMP2213 teaching staff (r.gomer@soton.ac.uk), otherwise please contact Research Governance Office (02380 595686, Rgoinfo@soton.ac.uk).

Appendix (ii) Consent Form

Interviewee Name :	Interviewer Name :
Start Time :	End Time :

Explain the Consent Policy

Please read the following and indicate to the researcher verbally (i.e. yes/no) if you agree with the following statements:

Data Protection
I understand that information collected during my participation in this study is completely anonymous / will be stored on a password protected computer/secure University server and that this information will only be used in accordance with the Data Protection Act (1998). The DPA (1998) requires data to be processed fairly and lawfully in accordance with the rights of participants and protected by appropriate security.

I have read and understood the Participant Information and have had the opportunity to ask questions about the study.

I agree to take part in this study. If I want to skip any questions, I will let interviewer know.

I understand my participation is voluntary and I may withdraw at any time and for any reason.

If the participant has verbally agreed to the above, and consented to take part in the research, the study may commence.

signature

_____

INTERVIEW QUESTIONS
Interviewee's background information

1.Can you tell us your age?

2.What is your job?

3.How long does your daily commute to work/school take? (If the interviewee is a student or an employed person with a regular job)

4.Are you happy with your current way of commuting?

☐ Very Unhappy ☐ Unhappy ☐ (Neutral) ☐ (Satisfied) ☐ (Happy) ☐ (Very happy)

INTERVIEW QUESTIONS

5. Do you often take public transport for leisure activities (not work)?

☐ seldom ☐ occasionally ☐ as often as not ☐ usually ☐ always

6. What is the public transportation you use most often?

7. Have you ever felt inconvenienced or troubled by your current mode of transport?

8. How in-depth is your knowledge about the current environmental issues and do you think you are environmentally friendly?

INTERVIEW QUESTIONS

INTERVIEWEES GENERAL OPINIONS/ AND KNOWLEDGE OF SUSTAINABLE TRANSPORT

9. Do you think sustainable transportation can improve environmental problems such as global warming?

☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

10. Has your choice of public transport been influenced by your knowledge of environmental issues?

11. What do you think the advantages and disadvantages of sustainable transportation are?

INTERVIEW QUESTIONS

12. Are these shortcomings (issues) that are preventing or limiting your use of sustainable transportation?

13. Do you have any suggestions for improving these issues?

14. Have you ever been influenced by something that made you choose sustainable transportation? Please give an example of one of the influences.

15. When you travel with family or friends, are you more likely to use sustainable transportation?

INTERVIEW QUESTIONS

Interviewee's behavior, interactions and views
related to shared transport

16. Have you ever used shared transport? Please tick the following ways of shared transport that you have used.
- Ride-sharing(e.g. UberPool)
- Bike-sharing(e.g. The Beryl bike scheme)
- Scooter-sharing(e.g. Voi)
- Car-sharing(e.g. Car Clubs)
- Other forms of sharing transport (Please state:)
- None of the above

17. Have you ever considered other forms of shared transport?

18. On average, how often do you use shared transport?

Every day (7 days)

During weekdays (weekdays (5 days))

Two or three days a week (3-4 days a week)

One day a week (1-2 Days a week)

Never

Not sure

INTERVIEW QUESTIONS

19. Do you think shared transport has any advantages over private transport? What do you think is the most outstanding point?

20. What conditions would make you prefer private transport compared to shared transport when choosing your way of travel? Choose one or more:

Weather

Road condition (route)

Distance

Affordability

Other (Please state: [   ])

21. Eliminating which disadvantage would make you more inclined to recommend this way of transport with friends?

22. Have you ever considered other forms of shared transport?

INTERVIEW QUESTIONS

Interviewee's opinions on the cost and convenience
of public transportation

23. How long does it take you to walk to your destination on average every time after you arrive at a public stop?

24. Is your mode of transport direct (e.g direct train or direct bus) or do you need to switch during your journey? (How many switches? if they are required to switch)

25. Do you think public transportation takes a long time?

INTERVIEW QUESTIONS

26. Can you name some factors that affect your satisfaction with public transportation?

27. What do you think the current cost of public transport is?

1-Very Cheap

2-Cheap

3-Not cheap but not expensive

4- Expensive

5-Very expensive

INTERVIEW QUESTIONS

QUESTIONS ABOUT INTERVIEWEE'S DIGITAL EXPERIENCE AND OPINIONS ON OUR PROTOTYPEA

28. Have you ever used a smartphone app to take public transportation? (For example, UniLink, uber and trainline)

29. If you have used one, do you like the design of the app/s? If you haven't used them, what caused you to not use an app to take public transportation?

30. On a scale of 1 to 5, rate the apps you have used based on their usability and enjoyability respectively.
Enjoyability 1 2 3 4 5
Usability   1 2 3 4 5

WE ARE DESIGNING AN APPLICATION THAT WILL MAKE PUBLIC TRANSPORTATION FUN, PLEASE RATE THE FOLLOWING FEATURES BELOW:

31. If public transportation apps introduced medals, experience points, achievements, and other game components, do you agree that it would attract you to use public transportation more?

☐ Strongly Disagree   ☐ Disagree   ☐ Neutral   ☐ Agree   ☐ Strongly Agree

32. If a competitive aspect is added to the app for taking public transportation (a system ranking based on the total number of trips you take on public transportation). Would you say that it would attract you to use public transportation?

☐ Strongly Disagree   ☐ Disagree   ☐ Neutral   ☐ Agree   ☐ Strongly Agree

33. Would you be more enticed to use public transportation frequently if it gave you an opportunity to earn rewards such as a free weekly ticket/pass?

☐ Strongly Disagree   ☐ Disagree   ☐ Neutral   ☐ Agree   ☐ Strongly Agree

INTERVIEW QUESTIONS

34. Would it entice you to use public transportation more often if you had a chance to interact and socialize with the other passengers?

☐   ☐   ☐   ☐   ☐

Strongly Disagree   Disagree   Neutral   Agree   Strongly Agree

35. If there is a public transportation app that includes the above features, would you recommend the app to your friends?

36. Do you think this kind of app would be popular? Can you tell me why?

INTERVIEW QUESTIONS

37. What's your opinion about adding gamification elements to the public transport app?

38. If you could add a fun feature to a public transportation app which attracts people to take public transportation, what would you add?