
Augmenting Face-to-Face Interactions: Too Automatic Too Soon?

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ABSTRACT

This position paper provides critical views on automatic approaches to select and deliver content in systems augmenting face-to-face interactions. We argue that research on augmenting face-to-face interactions has largely skipped important questions on why people want or are willing to, share to collocated others, what content to present, and how to show the augmentations.

KEYWORDS

Social technologies, augmented reality, social media, user generated, automaticity

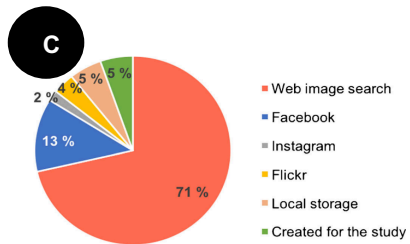
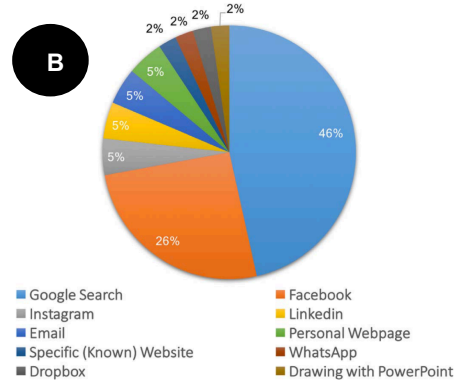
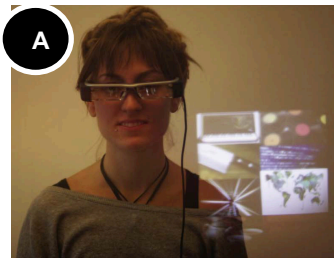


Figure 1. A) Digital Self shown through a HMD, B) Sources of chosen contents to Digital Selves used to augment face-to-face interactions among strangers in the study [8], C) and in the study [9].

INTRODUCTION

The upsurge of ubiquitous mobile devices has opened a digital revolution in the enhancement of social interactions amongst collocated individuals. These systems typically aim to improve awareness of people to connect with each other and facilitate the ice breaking phase and support people maintaining conversations [6,8,9,13,15,17,19]. In this position paper, we argue that research should take a step back in selecting and delivering augmentations automatically to research into the more subtle and critical factors of augmenting face-to-face interaction. Opposing this, our research presents a user-centric perspective of augmenting self-presentation rather than mining from existing social media resources as currently done in research systems [7,13,14]. Our approach to augmenting F2F interactions amongst strangers and friends is to use user-generated digital self-presentations, called Digital Selves. Digital Self is a research concept that was introduced in [12] and studied in [8,9]. Digital Selves are user-generated digital profiles, which can include any text and images the person wishes to share with others in their immediate vicinity. These Digital Selves can be accessed by any mobile device that allows the viewing of an image, for example through head-mounted displays – as illustrated in Figure 1a. By getting people to create their own augmentation, we investigate what content people choose to be part of their augmentations and how the augmentations impact on face-to-face interactions. From our understanding, these issues need to be figured out before we can start automatically import content from online social media to face-to-face interactions.

AUTOMATICITY IN SELECTING CONTENT TO AUGMENTATIONS

Many studies augmenting face-to-face interactions use social media as a resource for augmentations, examples include LinkedIn [13], Facebook and Twitter [7], YouTube [14]. However multiple studies show that when strangers are able to curate their augmentations, information that strangers are willing to share to others (typically strangers) is sourced outside social media accounts [8,9], as illustrated in Figures 1b and Figure 1c. Thus, the prevalent usage of existing social media accounts for the augmenting face-to-face interactions presents a very one-sided vantage. More so, that drawing from a singular account (as done prior [7, 13, 14] is nuanced as the information contained within these accounts differs a lot from network to network. Thus, although this information is presented online, it is not a straight forward assumption that people would like to share same things in face-to-face than they do in online social media. For instance, Leary et al. [10] found four different facets that people present in face to face interactions by studying a small subset of factors (i.e., familiarity and gender composition) that influence self-presentation: it could be that different augmentations are required for these contexts.

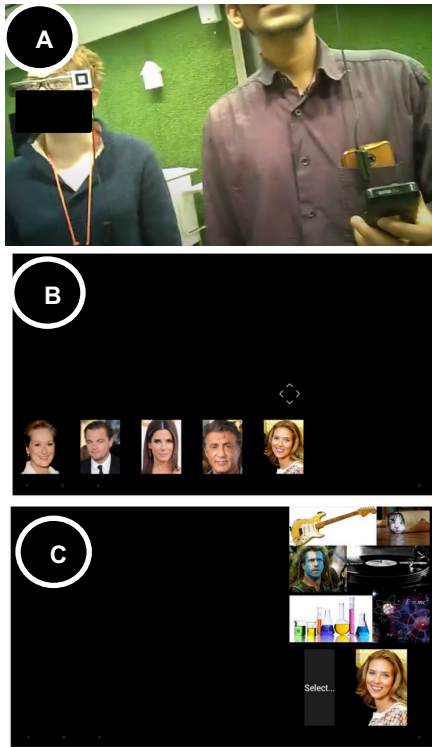


Figure 2. A) We investigated automatic techniques to display augmentations in pilot studies with wearable markers, B) and C) Screenshots of the Digital Self HMD application. Participants selected a Digital Self by first selecting the facial image of that person (B), The Digital Self of that person was then shown in the upper right corner of the display to avoid obscuring the person's face (C). Black areas can be 'seen through' by participants when viewed via the HMD.

While algorithmic matching has also been proposed [11], it assumes the purpose of the face-to-face interaction is known a-priori, so the algorithm can be tailored to match on the most relevant, similar, information between individuals. Yet, particularly in peoples the everyday social interactions between strangers, the purpose of interaction may not be known [3,20]. Moreover, by presenting only similarity between two individuals the diversity of face-to-face encounters may be limited, as individuals see only a 'filter bubble' of those they are similar to [18]. Finally, as Mayer et al. [11] have identified, the context of the situation can significantly alter who individuals would wish to connect with. Individuals may wish to connect with those they are similar with, or with those that they are otherwise dissimilar to. As with online media, digital augmentations with the same automatic recommendation algorithms may simply keep like-minded people together, whilst as noted by Mayer et al. [11], individuals may often be open to meeting others who are dissimilar. In many work situations, it is often necessary to work with others who are dissimilar, and understanding and supporting those differences may be as important as identifying and fostering similarities.

In summary, we do not argue that the automatic creation of profiles is not be needed for the future of face-to-face augmentations but that, we need to look at also supporting new ways for people to present information to each other. Yet, as it takes approximately 30 min for people to create a profile from scratch to strangers [8], this manual curation of augmentations may become quickly too laborious for users. Thus, one important question is how many different augmentations is needed, and how users want to curate the augmentations between different contexts between the two notions: automatic and user created.

AUTOMATICITY IN SHOWING AUGMENTATIONS

As well as the above, there are other issue in utilizing augmentations into face-to-face interaction. While there are research prototypes on pointing a camera towards another person to reveal content about that person (e.g., marker on the shirt) [4], this behavior can be considered impolite and rude, especially among strangers as it breaks normal social boundaries. Based on our previous pilot studies with such wearable markers (see Figure 2a) we found similar trends as prior. More so, even when just using gaze to view persons' augmentations participants felt unnatural in this approach. This resulted in our current approach, where the augmentations are manually selected by tapping portraits in the user interface (see Figure 2b), and not overlaid automatically with respect to users' faces or bodies [16]. The manual selection is not AR by strict definition, as the virtual content is not registered in 3D with the physical world [1], but is fixed with respect to screen coordinates (see Figure 2c).

Nonetheless, we have received a considerable amount of questions and critique as we are not utilizing the full potential of technology, by automatizing the overlay of augmentations with respect to faces and bodies. However, what we found was that a majority of people wanted to look at the augmentations before, physically looking at the other persons. We coined this technique *browsing*. Moreover, we found that this *browsing* behavior also occurred when people viewed other profiles who are not part of the conversation in a discreet manner [5,9]. We call this viewing behavior as *sneaky-viewing* [5,9].

In another finding, we found that in our studies participants who were in the same conversation, were often not all viewing the same Digital Self. This led to a collapse of common ground, requiring management work to access the correct Digital Self to 'repair' [2] and re-establish common ground. In such cases, an automatic approach, or ability to quickly 'sync' a common Digital Self amongst group members, would be beneficial. Further work on mechanisms to do this is required, incorporating sensors to determine automatically who is in the participant's group, and what the user's current role is (e.g. is he or she currently talking) is one approach.

In summary, our findings with manual selection help develop mechanisms that support automatic switching between augmentations. We argue that both methods are needed to allow people to browse and access the augmentations. Over several studies, it was also made apparent that fully manual viewing becomes impractical when user needs to browse a lot of faces. Defining and scoping these types of automatic showing mechanisms are not trivial, but are essential to further study augmentations in the larger group scenarios than conducted so far.

CONCLUSION

Our goal in this position paper was to provide a critical view from our experiences towards automatic selection and display of augmentations to face-to-face interactions. The provided examples show that the needs of users of Social AR should be explored before AR technology starts to direct our thinking towards what is technically possible. The selection and display of augmentations should be investigated in future systems augmenting face-to-face interactions designed for multiple different contexts (e.g., in multiparty situations). By investigating the needs of the users, we can avoid taking the automation step too early and too far and creating bad ethical norms around such technologies. Finding answers to fundamental questions on why people would like to use augmentations, what content they want to show, and how they use augmentations in face-to-face interactions should be explored more before automating the augmentation selection and delivery.

REFERENCES

1. RT Azuma. 1997. A survey of augmented reality. *Presence-Teleoperators and Virtual Environments* 4, August: 355–385.
2. Laura Devendorf, Joanne Lo, Noura Howell, et al. 2016. “I don’t want to wear a screen”: Probing perceptions of and possibilities for dynamic displays on clothing. *CHI*, 6028–6039.
3. Nicholas Epley and Juliana Schroeder. 2014. Mistakenly seeking solitude. *Journal of Experimental Psychology: General* 143, 5: 1980–1999.
4. Anna Fuste and Chris Schmandt. 2018. ARTextiles for Promoting Social Interactions Around Personal Interests. *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems*: 1–6.
5. Ilyena Hirskyj-Douglas, Mikko Kytö, and David McGookin. 2019. Head-mounted Displays, Smartphones, or Smartwatches? – Augmenting Conversations with Digital Representation of Self. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW: 32 pages.
6. Pradthana Jarusriboonchai and Thomas Olsson. 2016. Design and Evaluation of a Multi-Player Mobile Game for Icebreaking Activity. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 4366–4377.
7. Pradthana Jarusriboonchai, Thomas Olsson, Vikas Prabhu, and Kaisa Väänänen-Vainio-Mattila. 2015. CueSense: A Wearable Proximity-Aware Display Enhancing Encounters. *Extended Abstracts of the ACM CHI’15 Conference on Human Factors in Computing Systems*, 2127–2132.
8. Mikko Kytö and David McGookin. 2017. Investigating user generated presentations of self in face-to-face interaction between strangers. *International Journal of Human Computer Studies* 104, February: 1–15.
9. Mikko Kytö and David McGookin. 2017. Augmenting Multi-Party Face-to-Face Interactions Amongst Strangers with User Generated Content. *Computer Supported Cooperative Work: CSCW: An International Journal* 26, 4–6: 527–562.
10. Mark R. Leary, John B. Nezlek, Deborah Downs, Julie Radford-Davenport, Jeffrey Martin, and Anne McMullen. 1994. Self-Presentation in Everyday Interactions: Effects of Target Familiarity and Gender Composition. *Journal of Personality and Social Psychology* 67, 4: 664–673.
11. Julia M Mayer, Starr Roxanne Hiltz, and Quentin Jones. 2015. Making Social Matching Context-Aware: Design Concepts and Open Challenges. *Proceedings of the ACM CHI’15 Conference on Human Factors in Computing Systems*, 545–554.
12. David McGookin and Mikko Kytö. 2016. Understanding User Attitudes to Augmenting Face-to-Face Interactions with Digital and Social Media. *International Conference on Mobile and Ubiquitous Multimedia*, 285–296.
13. Tien T. Nguyen, Duyen T. Nguyen, Shamsi T. Iqbal, and Eyal Ofek. 2015. The Known Stranger: Supporting Conversations between Strangers with Personalized Topic Suggestions. *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems - CHI ’15*, 555–564.
14. Hiromu Ogawa and Pattie Maes. 2020. Smartwatch-based Topic Suggestions to Enrich Casual Conversations in Awkward Encounters. *ISWC*, 68–72.
15. Thomas Olsson, Pradthana Jarusriboonchai, Pawel Wozniak, Susanna Paasovaara, Kaisa Väänänen, and Andrés Lucero. 2019. Technologies for Enhancing Collocated Social Interaction: Review of Design Solutions and Approaches. *Journal of Computer Supported Cooperative Work* Feb.
16. Jason Orlosky, Kiyoshi Kiyokawa, Takumi Toyama, and Daniel Sonntag. 2015. Halo Content : Context - aware View Management for Non - invasive Augmented Reality. *Proceedings of the 20th international conference on Intelligent User Interfaces - IUI ’15*: 369–373.
17. Susanna Paasovaara, Kaisa Väänänen, Aris Malapaschas, et al. 2018. Playfulness and progression in technology-enhanced social experiences between nearby strangers. *NordiCHI’18*, 537–548.
18. Eli Pariser. 2011. *The Filter Bubble*. Penguin Books, London.
19. Aditi Paul. 2019. How Are we Really Getting to Know One Another? Effect of Viewing Facebook Profile Information on Initial Conversational Behaviors between Strangers. *The Journal of Social Media in Society* 8, April 2015: 249–270.
20. Marcus Sanchez Svensson and Tomas Sokoler. 2008. Ticket-to-talk-television: Designing for the circumstantial nature of everyday social interaction. *Proc. of NordiCHI ’08* 358: 334–343.