

"Cheers, mate!": Exploring the Usage of Glass-Mounted Wearable Displays for Social Interaction

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Figure 1: *CheersMate* features involving public and private wearable displays: (a) ingredient levels and instructions for mixing drinks on the private display, (b) drinking statistics screen on the private display, (c) default screen on the public display welcoming others, (d) two *CheersMates* clinking, and (e) shared statistics on the public display.

Abstract

Social events such as cocktail parties are valuable opportunities to build and sustain interpersonal relationships. However, meeting new people, the self-mixing of cocktails, and tracking one's beverage consumption can be difficult and intimidating. To support users during social events, we introduce *CheersMate*, a smart drinking glass that enables the simultaneous use of a private and a public wearable display. The private display provides cocktail mixing guidance to the user and shows personal consumption statistics during conversations, while the public display encourages social interaction by revealing the user's name and current drink. By clinking two *CheersMates*, the user can transfer additional information from the private to the public display, for example, showing the number of people the user has toasted with and the number of already consumed drinks. A pilot study with eight participants provides first insights on the acceptance of our concept and on the perceived usefulness as a social catalyst.

CCS Concepts

• **Human-centered computing** → **Collaborative and social computing devices**; *Ubiquitous and mobile devices*.

Keywords

Public Display, Wearable Devices, Social Interaction, Ice Breaking, Social Events

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1 Introduction and Background

Social gatherings, like cocktail parties, are important events to form and maintain social bonds. While these gatherings may often create opportunities for meeting new people and socializing with peers, they can also be intimidating, especially for those who are introverted or unfamiliar with other attendees. As consuming cocktails and their non-alcoholic equivalent, *mocktails*, are a fundamental ingredient for cocktail parties. Professional bartenders are not always available, especially at student cocktail parties. So,



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self-mixing drinks is an important skill that adds to the social experience. Because the beverages on such events range from simple single-serving drinks to more complex cocktails, self-mixing can become a complicated task that often requires assistance beyond what a written guide can easily provide [8]. Further, keeping track of the already consumed beverages or calories and, in case of alcoholic beverages, the alcohol intake, can be a tedious task at a cocktail party [3, 13].

Various approaches have been explored by other researchers to identify the alcohol intake and analyze the usage of public wearable displays in different scenarios. For example, AR HMDs have been used to detect the consumed alcoholic beverages [14] and even a normal smartphone in the pocket or a smartwatch have been used to detect different blood alcohol levels [9, 12]. Further, smart ice cubes can detect the alcohol concentration of a beverage and inform the user with integrated LEDs [5, 11]. LEDs integrated in a cup can also inform the user about the overall alcohol consumption and warn if it exceeds predefined thresholds [1]. To socialize with others at a party or conference, other researchers showed that public wearable displays can help the user connecting with other attendees. On digital badges, the user is able to show predefined ideas and opinions [2], pop-culture references [7], or animated images for self-expression [6]. Further, the user can inform other people about a disability that is not easily recognizable [4]. In an office scenario, public wearable displays attached to ear clips [16] or headphones [15] can inform people nearby about the current state of availability. Attached to a cup, public wearable displays can change the content based on the location of the user to show either private content, when sitting at the desk, or an image as a social catalyst, in places like the coffee kitchen [10].

In this work, we present *CheersMate*, a smart drinking glass designed as a playful companion for social events. It consists of a private display that is directed towards the user and a public display facing away from the user. The private display is intended as a personal space that provides statistics on one's own drinking behavior and assists in mixing drinks by giving instructions. With the public display, the user is able to share personal information to encourage social interaction and help break the ice with other party guests. The simultaneous use of these two displays is a key aspect of our idea. With a toasting feature — clinking two *CheersMates* — the user is able to transfer additional information, like the number of consumed beverages and the number of people the user has already toasted with, from the private display to the public display. In a small study with eight participants, we received first insights on the usefulness and acceptability of our idea of attaching a public and a private display to a drinking glass.

2 CheersMate Prototype

The *CheersMate* prototype (cf. Figure 1) consists of a 3D-printed shell with a handle into which a standard-size transparent drinking glass can be inserted. The shell has a slot for a smartphone which we use as private display and that faces the user when held in the right hand. The smartphone slides in from the top into a slot integrated into the shell so it sits securely and is easy to insert and remove. This design ensures that the user can remove the private display from the glass when they decide to leave the glass on a

table or when the user fears that other party guests might glance on the private display. We want the user to have full control over what information they disclose to other attendees. Facing away from the user, we placed an e-ink display that acts as the public display. Beneath the public display is a PN532 NFC module that acts as a reader, as well as an NFC tag to identify the user. Further, an ESP32, powered by a 3.7V LiPo battery, acts as the control unit and is connected to the smartphone via Bluetooth. An LED strip runs vertically along the inside of the *CheersMate* to provide visual feedback during toasting.

The private display runs an Android application. Initially, the user can input their name and their drinking goal for the occasion via the smartphone touchscreen. Then, the user can navigate to a predetermined selection of drinks to mix. After choosing a drink, the private display shows graduation marks as horizontal lines, guiding the user on how much of each ingredient to add (cf. Figure 1a). Once the user is done mixing, the statistics are updated accordingly. If the drink contained alcohol, the user is marked as unfit to drive. When not mixing a drink, the private display constantly shows statistics of the user's drinking behavior: the total number of drinks mixed with the *CheersMate*, the types of drinks and their counts, whether the user is still able to drive, and the number of people the user toasted with (cf. Figure 1b). Pop-ups comment on their drinking behavior. For example, if the user exceeds their drinking goal, the private display cautiously asks them if they are still fine, reminding them of their previously set goal. The public display's idle message shows the user's name and current drink, encouraging small talk (cf. Figure 1c). When two users toast, by touching each *CheersMate*'s NFC tag to the other's reader as shown in Figure 1d, the LED strips on both *CheersMates* light up, and the public displays show information from the private displays of the corresponding user: the count of people the user has already toasted with and the current progress on the user's drinking goal, potentially sparking further conversation (cf. Figure 1e).

The main idea of using a private and a public wearable display simultaneously is the possibility to share private information from the private display willingly to other people by showing them on the public display. We initiate the sharing of additional information by clinking glasses and thus transferring private information from the private display to the public display for a short period of time. This design encourages social bonding as the party guests can exchange small portions of non-critical private information. As this disclosure is initiated by the users, they have full control over when and with whom their information will be shared. Further, the *CheersMate* does not save the data of the user. As the information is only saved on the smartphone app, the user has full control over the information. The information shown on the public screen can be cleared by the user when leaving the party. When the user leaves the party and forgot to reset the *CheersMate*, the only information left is the name and current drink on the public screen.

3 Study Design and Results

To get first insights on the acceptance of the concept and implementation of *CheersMate*, we conducted a small think-aloud lab study in which participants tried the prototype for the first time. Each session involved two participants, who may or may not have known

one another beforehand. After providing informed consent, participants explored the functionalities of the private display, while being encouraged to express their impressions and thought processes. They familiarized themselves with the statistics screen and tried out the drink-mixing feature, where they had to select a drink from a given list and mix it according to the instructions provided on the private screen. They then had a short conversation of 5-10 minutes, supported by the public display, and tested the toasting feature. Following the interaction, each participant completed a brief interview. The interview collected demographic information as well as participants' habits regarding drink mixing and event attendance. Additionally, participants were asked to share their opinions on the *CheersMate* concept, its implementation, and potential use in private contexts. They were also encouraged to suggest possible improvements or additional features.

Eight participants (5 female, 3 male), aged 22–28 years ($M = 24.5$, $SD = 2.03$) took part in the study. On average, they attend 3-12 social events per year ($M = 5$, $SD = 3.52$), most involving unfamiliar people. Our participants reported preparing 1.64 mixed drinks per month on average ($SD = 1.7$, 0-5 drinks per month), which they noted requires more effort than consuming beverages without preparation. Seven participants strongly agreed and one agreed with the statement: "If I am offered a *CheersMate* at a party and other people are using it, I would also use it."

All participants highlighted the device's value as a social catalyst and the usefulness of the mixing assistance. P4 and P8 mentioned without prompting that they think that "the glass is a great ice-breaker." P6 noted they would not use the device if it required payment, while P2 suggested commercial potential: "in a party scenario, a [...] fee would be okay." Our participants further suggested adding customization options, like selecting the LED colors for the toasting feedback (P2, P4, P5, P8). Further, P3 suggested using the toasting feature to reveal the current relationship status on the public display, supported by changing the color on the LED strip to a specific color. Besides the usage on social events, P2 stated that the mixing-helper alone is "useful" and "cool enough" to use outside of social events. Overall, the participants appreciated the concept of revealing information from the private display on the public display and assessed it positively, describing it as helpful for socializing and meeting new people.

4 Conclusion and Future Work

We presented *CheersMate*, a smart companion for social gatherings that encourages social interaction, guides users when mixing drinks, and helps to keep track of drinking behavior. It contains two displays mounted to a drinking glass. A unique feature is that it combines a user-facing removable private display with a public display, which allows balancing information directed to oneself vs. others. In a preliminary lab study participants explored the capabilities of the device and were excited about the concept, in particular as an ice-breaker for initiating conversations. With this prototype, we propose the simultaneous use of private and public wearable displays where the user is in control of sharing information from a private wearable display to a public wearable display. We introduced this concept in a casual scenario and a playful way, but could

imagine that his concept could also be used in other settings. Especially in contexts where the owner of the device wants to share reduced information to other people due to knowledge gaps, we could imagine that this concept could be useful. As an example, we could imagine using this concept during doctor's rounds, where the doctor can see the medical record of a patient on a private wearable display while the public wearable display shows an image understandable to the patient, for example where the incision will be made for the operation.

As future work on the *CheersMate*, a field study of using *CheersMates* at a cocktail party would enrich the overall knowledge of how such a device could support social interactions, make new acquaintances, and whether the party guests have privacy concerns. Mini games, in which one has to toast to a certain number of people or performing different clinking sequences, might further nudge participants to interact socially. Different clinking sequences could also be used to select specific information from the private display to show on the public display. A field study could give insights regarding whether such a nudging mechanism is accepted or whether having *CheersMate* alone is sufficient to enhance social interactions.

Playfully socializing by showing the amount of already consumed beverages could lead to peer pressure or unintentionally nudge to increased alcohol consumption. This issue may be solved by revealing other information on the public display, like showing common interests to enhance the conversation with additional information about the people talking to each other. However, we could also imagine protecting the user from increased alcohol consumption by suggesting non-alcoholic beverages to mix when the user already had alcoholic beverages. Potential negative implications of visibility and exposure, and in particular the avoidance of undesirable consequences of using *CheersMate*, such as increased alcohol consumption, need further consideration. To improve glanceability and readability, the information presentation on the public screen should be more compact and the font sizes should be increased.

As sharing small portions of non-critical private information willingly, when the user decides to share, is a key element of our idea, ensuring that the private information on the private display is only visible to the user needs further consideration. As the private display is a smartphone that can be removed from the *CheersMate*, the user has the choice to remove the private display when they think others are glancing. However, this is contradictory to our concept of simultaneously using a private and a public wearable display. In such cases, we would rather suggest using common smartphone features like face recognition to unlock the device, ensuring that the private information on the private display is only shown when the user is looking at it and otherwise remains hidden behind a black screen. This could also prevent information from being displayed on the private display if the user accidentally uses the glass with their left hand, as we have currently developed our prototype for right handed use only.

References

- [1] Maxence Bobin, Hamdi Amroun, Margarita Anastassova, Mehdi Boukallel, and Mehdi Ammi. 2018. Smart cup for festival alcohol consumption awareness. In *2018 IEEE 4th World Forum on Internet of Things (WF-IoT)*. IEEE, Singapore, 718–723. doi:10.1109/WF-IoT.2018.8355099

- [2] Richard Borovoy, Fred Martin, Sunil Vemuri, Mitchel Resnick, Brian Silverman, and Chris Hancock. 1998. Meme tags and community mirrors: moving from conferences to collaboration. In *Proceedings of the 1998 ACM Conference on Computer Supported Cooperative Work* (Seattle, Washington, USA) (CSCW '98). Association for Computing Machinery, New York, NY, USA, 159–168. doi:10.1145/289444.289490
- [3] Melissa Cox, Beth Chaney, Leah McDonald, and Mary Beth Miller. 2022. Assessing alcohol use in situ: Correlates of self-report vs. objective alcohol consumption. *Addictive Behaviors* 129 (2022), 107278. doi:10.1016/j.addbeh.2022.107278
- [4] Humphrey Curtis, Ying Hei Lau, and Timothy Neate. 2024. Breaking Badge: Augmenting Communication with Wearable AAC Smartbadges and Displays. In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) (CHI '24). Association for Computing Machinery, New York, NY, USA, Article 914, 25 pages. doi:10.1145/3613904.3642327
- [5] Dhairya Dand. 2013. Cheers: alcohol-aware strobing ice cubes. In *CHI '13 Extended Abstracts on Human Factors in Computing Systems* (Paris, France) (CHI EA '13). Association for Computing Machinery, New York, NY, USA, 2795–2796. doi:10.1145/2468356.2479516
- [6] Felix Anand Epp, Anna Kantosalo, Nehal Jain, Andrés Lucero, and Elisa D. Mekler. 2022. Adorned in Memes: Exploring the Adoption of Social Wearables in Nordic Student Culture. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) (CHI '22). Association for Computing Machinery, New York, NY, USA, Article 364, 18 pages. doi:10.1145/3491102.3517733
- [7] Jennica Falk and Staffan Björk. 1999. The BubbleBadge: a wearable public display. In *CHI '99 Extended Abstracts on Human Factors in Computing Systems* (Pittsburgh, Pennsylvania) (CHI EA '99). Association for Computing Machinery, New York, NY, USA, 318–319. doi:10.1145/632716.632909
- [8] E. Scott Geller and Michael J. Kalsher. 1990. Environmental Determinants of Party Drinking: Bartenders vs. Self-Service. *Environment and Behavior* 22, 1 (1990), 74–90. doi:10.1177/0013916590221004
- [9] Hsin-Liu (Cindy) Kao, Bo-Jhang Ho, Allan C. Lin, and Hao-Hua Chu. 2012. Phone-based gait analysis to detect alcohol usage. In *Proceedings of the 2012 ACM Conference on Ubiquitous Computing* (Pittsburgh, Pennsylvania) (UbiComp '12). Association for Computing Machinery, New York, NY, USA, 661–662. doi:10.1145/2370216.2370354
- [10] Hsin-Liu (Cindy) Kao and Chris Schmandt. 2015. MugShots: A Mug Display for Front and Back Stage Social Interaction in the Workplace. In *Proceedings of the Ninth International Conference on Tangible, Embedded, and Embodied Interaction* (Stanford, California, USA) (TEI '15). Association for Computing Machinery, New York, NY, USA, 57–60. doi:10.1145/2677199.2680557
- [11] Hidenori Matsui, Takahiro Hashizume, and Koji Yatani. 2018. Al-light: An Alcohol-Sensing Smart Ice Cube. *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.* 2, 3, Article 126 (Sept. 2018), 20 pages. doi:10.1145/3264936
- [12] Andrew McAfee, Jacob Watson, Ben Bianchi, Christina Aiello, and Emmanuel O. Agu. 2017. AlcoWear: Detecting blood alcohol levels from wearables. In *2017 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, Scalable Computing & Communications, Cloud & Big Data Computing, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/CBDCom/IOP/SCI)*. IEEE, San Francisco, CA, USA, 1–8. doi:10.1109/UIC-ATC.2017.8397486
- [13] Rebecca Louise Monk, Derek Heim, Adam Qureshi, and Alan Price. 2015. “I Have No Clue What I Drunk Last Night” Using Smartphone Technology to Compare In-Vivo and Retrospective Self-Reports of Alcohol Consumption. *PLOS ONE* 10, 5 (05 2015), 1–15. doi:10.1371/journal.pone.0126209
- [14] Sibi Chakkaravarthy Sethuraman, Pranav Kompally, Saraju P. Mohanty, BKSP Kumar Raju, and Meenalosini Vimal Cruz. 2022. Cleo: Smart Glasses to Monitor Consumption of Alcohol and Cigarettes. *Springer Nature SN Computer Science* 4, 1 (12 Nov 2022), 53. doi:10.1007/s42979-022-01471-9
- [15] Dennis Stanke, Pia Brandt, and Michael Rohs. 2022. Exploring the Design Space of Headphones as Wearable Public Displays. In *Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems* (New Orleans, LA, USA) (CHI EA '22). Association for Computing Machinery, New York, NY, USA, Article 295, 7 pages. doi:10.1145/3491101.3519756
- [16] Dennis Stanke, Tim Duentel, Kerem Can Demir, and Michael Rohs. 2023. Can You Ear Me? A Comparison of Different Private and Public Notification Channels for the Earlobe. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies* 7, 3, Article 123 (sep 2023), 23 pages. doi:10.1145/3610925