

Poker Surface: Combining a Multi-Touch Table and Mobile Phones in Interactive Card Games

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ABSTRACT

In this paper, we introduce the design and implementation of a digital card game that combines mobile phone gestures and multi-touch tabletop interactions. Conceptually based on interactions in traditional card games, our Poker game application explores different natural ways of interaction, including touching the table as well as tilting, throwing, and shaking a mobile phone. By exemplarily translating traditional gestures into the digital domain, we provide a use case to discuss useful gestures combining mobile phones with tabletop surfaces, as well as to explore a private-public display setting for digital card games at interactive tables. Additionally, the mobile phone provides a tangible feeling similar to physical cards. The preliminary user study showed that users preferred using mobile phones for interaction compared to direct interaction on the multi-touch table.

Categories and Subject Descriptors

H.5.2 [Information Interfaces and Presentation]: User Interfaces – *input devices and strategies, interaction styles*

General Terms

Design, Human Factors.

Keywords

Mobile Phone, Interactive Surfaces, Gestures, Card Games

1. INTRODUCTION

Nowadays, mobile devices can serve as universal devices for many different applications. When equipped with accelerometers, they can be used for gesture input and are well suited for novel interactions with large screens, as for example done in [4]. Gestures are a natural way to interact, and we find unlimited examples in everyday life (e.g., see [2]), which can be taken as a starting point for the design of novel interactions with the digital. In this work, we started from natural interactions in a traditional card game. On this basis, we developed interactions with the digital in an augmented tabletop game. By using a mobile phone in combination with an interactive table, we explored the concept of private and public display areas for tabletop gaming experiences. The potential of small private screens with large public displays has been examined in previous research, e.g. [5]. The application area of augmented tabletop gaming is part of the research field “pervasive gaming” [1] that works towards a better integration of the digital into the physical world. First steps have been made to use motion interaction with mobile phones in pervasive games, e.g. [3]. Other related approaches have worked

on digitally augmenting card games [6].

In order to explore and evaluate a novel combination of intuitive interaction techniques at the tabletop display, we designed, implemented, and tested a digital Poker game. Our research addresses three topics: (1.) the design of embodied and intuitive interactions for particular tasks using mobile phone gestures and tabletop interfaces, (2.) the utilization of the benefits of combining private and public displays, and (3.) the exploration of the potential of tabletop and mobile phone interaction for digital card game applications. In this paper, we introduce a tabletop Poker game as an example for a digital card game using a multi-touch table and mobile phones.

2. DESIGNING A DIGITAL CARD GAME

Similar to other classical card games, in a Poker game players are seated around a table and use the tabletop as surface for the game. In addition to playing cards chips (small discs used in lieu of currency) are used as objects in the game. Based on the rules of the game (which exist in many variations) a player can *fold*, *check*, or continue *betting*. *Folding* may be indicated verbally or by discarding one's cards face up or down into the center of the game field. When a player *checks*, he declines to make a bet. A common way to signify *checking* is to tap the table, either with a fist, the knuckles or an open hand. For *betting*, players stack the amount they want to bet in the current round in front of them using the chips. During the game, players may play tricks (manipulations) with the chips.

2.1 Interaction in Poker Surface

We started from the interaction metaphors of a classical Poker game such as *folding*, *checking*, and *manipulating chips* and mapped them to the digital domain using a digital tabletop and mobile phones with built-in accelerometer sensor. The following sections describe the general setup and the design decisions about the interaction techniques with mobile phones as well as the interaction with the multi-touch table.

2.1.1 General Setup

For the main game setup, we used a multi-touch enabled tabletop surface (see figure 1). Players can distribute around all sides of the table. Each player gets his own private area for digital playing cards and digital chips on the table. Additionally, he can connect a mobile phone via Bluetooth to the table and use it as additional game console. As we employed mobile phones with built-in accelerometers, the phones can be used for gesture input and as a private display for showing a player's cards. To compare different interaction techniques, we developed one full set of touch-based interactions for the table and additionally a subset of gesture-based interactions with the mobile phone. Table 1 gives an

overview of the different interactions and their realization in classical, multi-touch, and mobile phone gesture modes.

Classical Poker Interaction	Multi-Touch Table Interaction	Mobile Phone Interaction
look into cards	double click on cards	hold the phone vertically/horizontally
check (tap table)	double click on the table	rotate the phone 90° left or right + shake the phone
fold (cards face up/down)	drag cards	hold phone face up/down + make a fold gesture
bet/manipulate chips	move chips with one finger/split or merge chips (double click or long click)	-
move/rotate a card	move with one finger/select with two fingers	-

Table 1: Mapping the interaction from the classical Poker game to tabletop and mobile interactions.

2.1.2 Interaction Techniques with the Table

Our aim was to map the interactions of the classical game to a multi-touch table based game version. Players can drag and move card/s and chip/s for betting as well as knock the table two times as in the classical game for checking. Beyond interactions in the original game, players can split a big chip into two or more chips with smaller value (e.g. split chip 100 into 2x chips 50) by double clicking on a chip, or the other way round, merge two chips into a chip with a bigger value by performing a long click (3 seconds) on the top chip.



Figure 1: The Poker game surface on a multi-touch table.

2.1.3 Interaction Techniques with Mobile Phones

Although the players can play the game just by using the multi-touch table, our focus in this research was to combine the multi-touch table interaction with mobile phones. So mobile phones are used as another option to play the game with having private displays to show a players hand. Besides, it provides a tangible feeling and allows the users to hold their “cards” in the hand. For looking into the cards, we implemented a natural tilting gesture: if the phone is held horizontally or has been placed onto the table, the cards’ faces are hidden; if it is tilted vertically the faces are shown (see figure 2a). Furthermore, we implemented gesture interactions for *folding* the cards, either with cards faces up or down: a quick horizontal movement of the hand towards the table tosses the cards onto the table and they digitally slide into the center of the tabletop (see figure 2b). The *checking* action can be performed by tilting the phone 90° to the left or right and by shaking the phone afterwards (see figure 2c). All interactions are shown in figure 2.

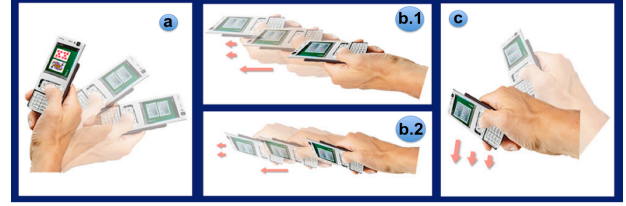


Figure 2: Natural gesture interactions with the mobile phone: (a) look into cards, (b.1) fold with cards open, (b.2) fold with cards closed, and (c) check.

3. USER STUDY AND RESULT

To evaluate our system, a user study was conducted with 21 participants with an average age of 24.9 years. All knew how to play Poker. The participants were divided into 7 groups and each group played the game twice, once directly on the table without the phone and the other time with the phone. It took around 30 minutes per group. At the end, participants were asked to fill out a questionnaire, which included how hard or easy it was to perform each interaction. Preliminary results showed that the users preferred the phone for interaction compared with interaction on the table and that it was easier for them to use the phone.

4. CONCLUSION

For recreating card games in the digital domain, mobile phones offer the opportunity to be used as private displays in a private-public display setting. Furthermore, with built-in accelerometers gestural interaction is possible and classical interaction in games can be mapped into the digital domain. In this research, we used mobile phones in combination with a multi-touch table and developed a Poker game, in which we mapped classical card game interactions. Our user study showed that performing the interaction with mobile phones was easy for the users and that they liked the phone as a device for private data.

5. REFERENCES

- Benford, S. Magerkurth, C. and Ljungstrand, P. Bridging the physical and digital in pervasive gaming. *Commun. ACM*, 48(3):54–57, 2005.
- Brereton, M., Bidwell, N., Donovan, J., Campbell, B., and Buur, J. Work at hand: an exploration of gesture in the context of work and everyday life to inform the design of gestural input devices. In *Proc. of AUIC 2003. International Conference Proceeding Series*, vol. 18. Australian Computer Society, Darlinghurst, Australia, 1-10, 2003.
- Chehimi, F. Coulton, P. “Motion Controlled Mobile 3D Multiplayer Gaming”, *ACE 08*, Yokohama, Japan, pp. 267-270, 2008.
- Dachselt, R. and Buchholz, R. Natural throw and tilt interaction between mobile phones and distant displays. In *Proceedings of CHI EA '09*. ACM, New York, NY, 3253-3258, 2009.
- De Luca, A. and Frauendienst, B. A privacy-respectful input method for public terminals. In *Proceedings of NordiCHI '08*, vol. 358. ACM, New York, NY, 455-458, 2008.
- Römer, K. and Domnitcheva, S. Smart Playing Cards: A Ubiquitous Computing Game. *Personal and Ubiquitous Computing*, 6:371–378, 2006.