

# User-Defined Game Control with Smart Glasses in Public Space

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## ABSTRACT

Without specific game controller and direct-touch, game control on Smart Glasses differs with existing console and mobile games. Although current game control set on Smart Glasses is explored by developers based on system limitation, the set is not reflective of user behavior. To create better game control, we presented an user-defined game control study in public space to collect user behavior. In all, 2448 game controls from 24 participants were logged, analyzed, and paired with think-aloud data for 17 commands performed with 3 interaction methods (On-Body, In-Air and Phone) and 2 glasses forms (Google Glass and Epson BT-100). Our findings indicate that users choose area relatively unobtrusive to perform the game control, and glasses form does influence how users creates game control. We also present a complete user-defined game control set with agreement scores and taxonomy. Our results will help designers create better game control sets informed by user behavior.

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## INTRODUCTION

### RELATED WORK

#### Game Control

#### Glass Input

#### Gaming in Public Space

#### User-Defined Gesture

### DEVELOPING A USER-DEFINED GAME CONTROL SET

#### Overview and Rationale

#### Game Task Set

Casual game is one of the game categories with most players[3], it is shown high potential in public gaming[5, 6, 2]. We choose top 90 casual games[8] from existing platforms, including PC, console and mobile games (30 games for each) by crawling and analyzing the sale and download count data from famous gaming websites[1, 9, 7, 4]. We invited 3 experienced game developer to review these top 90 casual games. They find out totally 26 game tasks, and removed 9 tasks which only be used once in specific games. At last, we get a general casual game task set with 17 tasks, which can completely support 90% of our top casual games. We describe our general casual game task set in Table 1.

#### Participants

#### Glass Forms

#### Interaction Methods

#### Procedure

### RESULTS

Our results include game control taxonomies, the user-defined gesture sets, user rating, subjective responses, and qualitative observations for each interaction methods.

#### Preference Between Interaction Methods

#### Behavior with Different Glasses Forms

#### Classification of Game Controls

#### User-Defined Game Control Sets

| #  | Description               | Used in Famous Game |
|----|---------------------------|---------------------|
| 1  | Single select             |                     |
| 2  | Vertical menu selection   |                     |
| 3  | Horizontal menu selection |                     |
| 4  | Move left and right       |                     |
| 5  | Move in 4 directions      |                     |
| 6  | Switch 2 objects          |                     |
| 7  | Move object to position   |                     |
| 8  | Draw a path               |                     |
| 9  | Throw an object (in-2D)   |                     |
| 10 | Note highway              |                     |
| 11 | Rotate an object (Z-axis) |                     |
| 12 | Rotate an object (Y-axis) |                     |
| 13 | Avatar jump               |                     |
| 14 | Avatar 3D move            |                     |
| 15 | Avatar attack             |                     |
| 16 | Avatar squat              |                     |
| 17 | 3D Viewport control       |                     |

Table 1. Summary of our general casual game task set.

*Agreement*

*Conflict and Coverage*

*Properties of the User-defined Gesture Sets*

*Taxonomic Breakdown of User-defined Game Controls*

## **Mental Model Observations**

*Social Acceptance and Control Area*

*Metaphor from Existing Game Control*

## **DISCUSSION**

*Users' and Designers' Gestures*

*Implications for In-Air Gesture Technology*

*Implications for On-Body Input Technology*

*Implications for User Interfaces*

*Limitation and Next Steps*

## **CONCLUSION**

## **ACKNOWLEDGMENTS**

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