Supporting touchpad gaming while preventing accidental activations while typing

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Abstract

Contact mitigation describes methods used to prevent accidental contact of a touchpad from being treated as intended movements. One common way of doing this is to disable the touchpad when keyboard input is detected. This works because users generally don't need to move the cursor when typing. However, games will often require simultaneous use of both the keyboard and touchpad, and therefore cannot be played on a touchpad using this kind of keyboard based contact mitigation.

This study proposes a new method of keyboard based contact mitigation which attempts to detect gameplay through patterns of keyboard input. When the system detects typing, it will disable the touchpad, but when it detects gameplay it will leave the touchpad open. This is superior to detecting games via active application because new games are created all the time, and it would be an unending task to manually create exceptions for every game.

Gaming detection was created through analysis of keys used in popular games of different genres in order to create as inclusive a method detection as possible without hampering the keyboards ability to detect typing. A study is currently underway to assess its ability to correctly evaluate whether real users are typing or playing a game, and whether users are able to detect that these determinations are occurring.

Background

This study will be based on previous market research:

This study examined the top 10 most played PC games from gaming platforms Steam[3] and Xfire[7]. These games categorized by genres and representatives were selected for analysis of their default keybindings. These keybindings were categorized by their function in the game, darker colors are used for more primary gameplay tasks, and lighter colors used for softer, menu driven and communication tasks.

After reviewing the keybindings for each game. the top-left alphanumeric region of keys along with space and modifier keys were selected as candidates to be non-contact mitigation triggering keys for the following reasons:

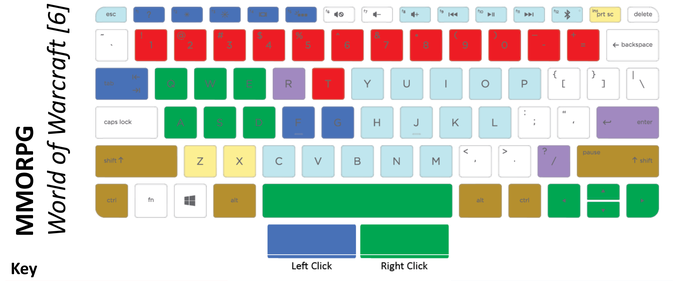
- The common use of the keys in gaming , especially as held-down keys such as movement keys.
- The chosen letters only consist of 41.34%[2] of the most frequently used letters in English writing. This allows a majority of the letters to still trigger contact mitigation measures when typing English words.

These considerations are more accurate for action and shooting games where the keys are often clustered around the WSAD keys and similar, but may be less useful for strategy games where keys are often lexicologically associated with their behavior (e.g. "M" = Move).

Additionally, in games, alphanumeric keys are often held to give continuous commands (e.g. hold "W" to walk forward. This behavior does not occur in normal typing as mass repeated letters do not occur in English, unless used informally for emphasis (e.g "nooooooo!"). Detecting this behavior may be indicative of game play. Note that modifier and function keys like "shift" and "delete" may be held in non-game use and cannot be used for this function.

Sample of Keyboard Layouts Analyzed

MMORPG *World of Warcraft [6]*



Key

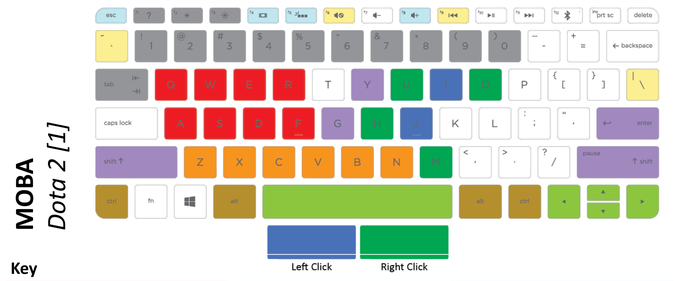
Attack	Menus and Inventory	World Interaction
Movement	Communication	Modifiers
Miscellaneous Commands		

FPS *Team Fortress 2 [5]*

Key

Attack/Reload	Menus and Inventory	World Interaction
Movement	Communication	Weapon Selection
Miscellaneous Commands		

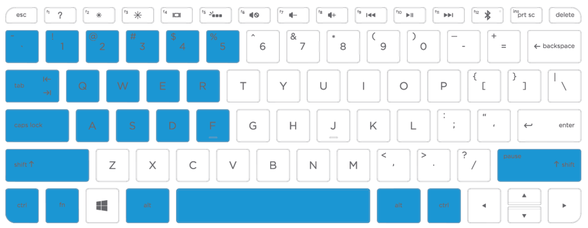
MOBA *Dota 2 [1]*



Key

Hero Commands	Menus	Map Interaction
Hero Movement	Communication	Group Control
Modifiers	Inventory	Map Movement
Miscellaneous Commands		

Selected configuration for upcoming study



Blue, non-locking keys will not disable the touchpad when pressed

Proposed research

A functional prototype of this patent-pending behavior is currently being developed [4]. It will use the following rules to determine whether or not to lock the touchpad when key input is detected:

1. If depressed key is a non-locking key: do nothing (except output the key).
2. If depressed key is a locking key: block all input to touchpad until L seconds after the key was released (This is the current behavior of all alpha numeric keys on a standard laptop).
3. If any alpha-numeric key (locking or non-locking is held for H seconds consider all keys non-locking until R seconds after the held key is released.

Participants
20 people who identify as PC gamers, and play both FPS and Strategy games
10 male and 10 female.

Equipment
2 HP Omen Gaming Laptops.

- One with gaming accidental contact behavior.
- One with typical accidental contact behavior.

Procedure

- Each participant will perform tasks on each unit in counter-balanced order.
- Participants will perform a pre-defined typing task where touchpad activity is measured.
- Participants will play a game in the fps genre (unlikely to cause problems for the gaming contact mitigation) and the strategy genre (likely to cause problems for the gaming contact mitigation). Any instances of the cursor locking up due to key presses will be recorded.
- Preference data and satisfaction will be reported by on a survey after each game is completed.

Expected results
This study hypothesizes the following results:

- Accidental contact errors while typing will not be significantly different between the two touchpads.
- Users will not notice a significant difference in responsiveness of the touchpad between the touchpads when typing or playing games.

References

[1] Dota 2 [Computer software]. (2013) Belleview, WA: Valve Software

[2] Norvig, P. (n.d.). English Letter Frequency Counts:Mayzner RevisitedorETAOIN SRHLDCU. Retrieved May 28, 2015, from http://norvig.com/mayzner.html

[3] Steam: Game and Player Statistics. (n.d.). Retrieved June 20, 2014, from http://store.steampowered.com/stats/

[4] Stoll, S. (2014) US Patent Application No. 84065484.

[5]Team Fortress 2 [Computer software]. (2007) Belleview, WA: Valve Software

[6] World of Warcraft [Computer software]. (2004) Irvine, CA: Blizzard Entertainment

[7] Xfire Top Ten. (n.d.). Retrieved June 20, 2015, from http://social.xfire.com/games