ABSTRACT

Alternatives using the Leap Motion to extend Mid-Air Word-Gesture Keyboards

Garrett Benoit, M.S.

Faculty Adviser: Michael G. Poor, Ph.D.

Abstract goes here

Alternatives using the Leap Motion to extend Mid-Air Word-Gesture Keyboards

by

Garrett Benoit, B.S.

A Thesis

Approved by the Department of Computer Science

_____

Gregory D. Speegle, Ph.D., Chairperson

Submitted to the Graduate Faculty of
Baylor University in Partial Fulfillment of the
Requirements for the Degree of

Master of Science

Approved by the Thesis Committee

_____

Michael G. Poor, Ph.D., Chairperson

_____

Bill Poucher, Ph.D.

_____

Brian Garner, Ph.D.

Accepted by the Graduate School
July 2015 (DATE TBD)

_____

J. Larry Lyon, Ph.D., Dean

Page bearing signatures is kept on file in the Graduate School.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

I want to express my great appreciation to several people. Acknowledgements.

Pour la rose qui fait important le temps qu'on perd

CHAPTER ONE

Introduction — purpose for study, significance of study, original contribution

In the first chapter, clearly state what the purpose of the study is and explain the study's significance. The significance is addressed by discussing how the study adds to the theoretical body of knowledge in the field and the study's practical significance for communication professionals in the field being examined.

Ph.D. students also must explain how their research makes an original contribution to the body of knowledge in their discipline. They also should address the significance of the study for mass communication education.

It is especially critical that this chapter be well developed. Without a clearly defined purpose and strong theoretical grounding, the thesis or dissertation is fundamentally flawed from the outset.

1.1 Motivation

1.2 Definition

1.3 Gestures/Text Entry: Past, Present and Future — rename this and subsections (Related Works)

1.3.1 A Brief History

1.3.2 Current Trends

1.3.3 Future Plans

1.4 Problems, Challenges, Limitations — rename this section

1.5 Solution Scope — rename

CHAPTER TWO

Literature Review — related works, describe and analyize previous works, what is known/not known, leads to hypotheses

The purpose of the study should suggest some theoretical framework to be explained further in this chapter. The literature review thus describes and analyzes previous research on the topic.

This chapter, however, should not merely string together what other researchers have found. Rather, you should discuss and analyze the body of knowledge with the ultimate goal of determining what is known and is not known about the topic. This determination leads to your research questions and/or hypotheses. In some cases, of course, you may determine that replicating previous research is needed.

2.1 3 dimensions beyond desktop — rename

2.2 Interaction

2.2.1 Gesture-based Interaction — similar to introduction materials

2.2.1.1 Mid-Air Gestures.

CHAPTER THREE

Methodology — describes/justifies data gathering methods, how data is analyzed

Pilot 1 – Changes for study: - Simplified keyboard used (removed enter, removed space, changed location of backspace) - keyboard mod - disallow backspace of correct letters - keyboard mod - Removed having to press a key for confirmation of word (now confirmation on "release")

Pilot 2 – Changes for study: - Change to intermittent exit surveys - UP IN THE AIR - remove stylus for mid air keyboards and use finger instead - UP IN THE AIR - change controller to WGK?? - UP IN THE AIR - don't force person to be correct??

This chapter describes and justifies the data gathering method used. This chapter also outlines how you analyzed your data.

Begin by describing the method you chose and why this method was the most appropriate. In doing so, you should cite reference literature about the method.

Next, detail every step of the data gathering and analysis process. Although this section varies depending on method and analysis technique chosen, many of the following areas typically are addressed:

–description of research design internal validity external validity

–description of population and description of and justification for type of sample used or method for selecting units of observation

–development of instrument or method for making observations (e.g., question guide, categories for content analysis) pre-test reliability and validity of instrument or method

–administration of instrument or method for making observations (e.g., interviews, observation, content analysis)

–coding of data

–description of data analysis statistical analysis and tests performed identification of themes/categories (qualitative or historical research)

3.1 Word Dictionary choices

3.1.1 why we want similar words

3.1.2 algorithm used vs frechet distance

3.2 Word-Gesture Keyboard Construction

3.2.1 Leap Motion — Needs to be referenced in intro

3.2.2 Writing the Code — rename

3.2.3 Designing various WGKs

3.2.3.1 Separating words — rename (figure out ordering).

3.2.3.2 Separation of motor space and display space — rename (figure out ordering).

3.2.3.3 Size of motor space / User calibrated — rename (figure out ordering)

.

3.2.4 Word-Gesture Recognition

Lack of recognition and reason for it. Simulated recognition.

3.3 WGKs

3.3.1 Controller WGK — Need to see if we want to change the implementation to a Controller WGK from std controller

3.3.2 Surface WGK

3.3.2.1 Touch screen.

3.3.2.2 leap surface emulation.

3.3.3 Mid-Air WGKs

3.3.3.1 static.

3.3.3.2 dynamic.

3.3.3.3 bimodal.

3.3.3.4 pinch gesture emulation.

3.4 Study/Experimental Design

CHAPTER FOUR

Results and Analysis

4.1 Text-Entry Rate

4.2 Errors

4.2.1 MWD

4.2.1.1 not modified.

4.2.1.2 modified.

4.2.2 KSPC

4.2.2.1 not modified.

4.2.2.2 modified.

4.2.3 Total Error Rate

4.3 Frchet Distance

4.3.1 modified vs nonmodified

4.4 Interaction with Inputs

Use table to show the various times, distances, accuracy etc

4.5 User preferences

CHAPTER FIVE

Discussion, Future Work and Conclusion

5.1 Discussion

5.1.1 Calibration

5.1.2 Reasons stylus was used instead of hands

5.1.3 Reasons that I didn't implement a word-prediction algorithm for word-gesture keyboard

5.1.4 issues with entrance/exit of touch plane

Solve the problem of entering/leaving the touch plane (we move along a sphere) so when moving away from the touch plane, you often hit the key above what you're leaving on.

5.2 Future Work

5.2.1 image processing, any keyboard

5.2.2 augmented reality adaption

5.2.3 using sphere techniques to better determine the leaps position on a surface

5.2.4 with better leap detection, use hand instead of stylus

5.2.5 would word-gesture controller-based keyboard be better for consoles

5.2.5.1 Use WKG with controller.

5.2.5.2 Use gesture controller for text entry.

APPENDICES

APPENDIX A

Code

This is an example of an appendix. Perhaps for code listings or large tables or notation guides.

APPENDIX B

Vita

This is another example of an appendix. Perhaps for listing your CV. Or giving examples of having multiple appendices.

BIBLIOGRAPHY

Banerjee, A., J. Burstyn, A. Girouard, and R. Vertegaal (2012). Multipoint: Comparing laser and manual pointing as remote input in large display interactions. In *International Journal of Human - Computer Studies*, Volume 70(10) of *CHI '11*, pp. 690–702. Elsevier Ltd.

Cockburn, A., P. Quinn, C. Gutwin, G. Ramos, and J. Looser (2011). Air pointing: Design and evaluation of spatial target acquisition with and without visual feedback. In *International Journal of Human-Computer Studies*, Volume 69(6), pp. 401–414. Elsevier Ltd.

Devoe, D. (1967). Alternatives to handprinting in the manual entry of data. In *IEEE Transactions on Human Factors in Electronics*, Volume HFE-8(1), pp. 21–32. IEEE.