

Voice Key Board: Multimodal Indic Text Input

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ABSTRACT

Multimodal systems, incorporating more natural input modalities like speech, hand gesture, facial expression etc., can make human-computer-interaction more intuitive by drawing inspiration from spontaneous human-human-interaction. We present here a multimodal input device for Indic scripts called the Voice Key Board (FKB) which offers a simpler and more intuitive method for input of Indic scripts. FKB exploits the syllabic nature of Indic language scripts and exploits the user's mental model of Indic scripts wherein a base consonant character is modified by different vowel ligatures to represent the actual syllabic character. We also present a user evaluation result for FKB comparing it with the most common input method for the Devanagari script, the *InScript* keyboard. The results indicate a strong user preference for FKB in terms of input speed and learnability. Though FKB starts with a higher user error rate compared to *InScript*, the error rate drops by 35% by the end of the experiment, and the input speed of FKB is found to be 81% higher than *InScript*. Our user study results point to interesting research directions for the use of multiple natural modalities for Indic text input.

Categories and Subject Descriptors

H.5.2 [User Interfaces]: User interface management systems; Voice I/O; Natural language; D.2.2 [Software Engineering]: Design Tools and Techniques - user interfaces;

General Terms: Algorithms, Human Factors

Keywords: multimodal systems, text input, voice keyboard, human-computer-interaction, syllabic scripts, Indic text.

1. INTRODUCTION

The lack of a good system for Indic text input has been one of the primary barriers to penetration of computing systems in India. Keyboards for Indic text input have proven unnatural, and difficult to learn and use. Multimodal systems [1] which use multiple modalities like speech, touch and gestures for interaction, potentially require very little learning and are less

intimidating because they use modalities which are natural to our everyday human communication. We are therefore motivated to explore the use of multiple modalities to address the problem of Indic text input.

Indic scripts such as Devanagari, used for Hindi and other Indic languages, are defined as "syllabic alphabets" in that the unit of encoding is a syllable, however the corresponding graphic units show distinctive internal structure and a constituent set of graphemes. The formative principles behind them may be summarized as follows [2]:

- graphemes for independent (initial) Vs (vowel)
- C (consonant) graphemes with inherent neutral vowel *a*
- V indication in non-initial position by means of *matus* (V diacritics)
- ligatures for C clusters
- muting of inherent V by means of a special diacritic called *virama*

Most Indic scripts have of the order of 600 CV units and as many as 20,000 CCV ones in theory, although only a much smaller subset (especially of CCV units) is used in practice. The V diacritics and ligatures for C clusters are not standardized in some scripts. Therefore, standard QWERTY keyboards as means of text input in Indic scripts such as Devanagari, Tamil etc., as well as other syllabic scripts like Sinhalese and Thai, face unique challenges due to script complexity and the sheer size of the syllable set. Complex keyboard layouts for Indic script input add to the already existing complexity and unfamiliarity of traditional desktop user interfaces, and further raise the barrier to adoption by lay users.

In this paper we describe the Voice Key Board (FKB). In order to enter a CV character, the user presses the key corresponding to a consonant C on the keyboard while simultaneously uttering the syllable CV in speech. This results in information from the two modalities (keyboard and speech) which are both supplementary and complementary in nature. The accurate recognition of C from the keyboard can be used to disambiguate recognition of the spoken CV syllable.

The paper is organized as follows. We review related Indic text input work in Section 2. We describe the Voice Key Board system in Section 3. Some comparisons with an existing system and user evaluation results are presented in Section 4. We conclude with discussion, summary and next steps, in Section 5 and Section 6.

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Voice Key Board Multimodal Indic Text Input

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Voice Key Board Multimodal Indic Text Input:

Reviewing **Voice Key Board Multimodal Indic Text Input**: Unlocking the Spellbinding Force of Linguistics

In a fast-paced world fueled by information and interconnectivity, the spellbinding force of linguistics has acquired newfound prominence. Its capacity to evoke emotions, stimulate contemplation, and stimulate metamorphosis is truly astonishing. Within the pages of "**Voice Key Board Multimodal Indic Text Input**," an enthralling opus penned by a highly acclaimed wordsmith, readers attempt an immersive expedition to unravel the intricate significance of language and its indelible imprint on our lives. Throughout this assessment, we shall delve to the book is central motifs, appraise its distinctive narrative style, and gauge its overarching influence on the minds of its readers.

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Table of Contents Voice Key Board Multimodal Indic Text Input

1. Understanding the eBook Voice Key Board Multimodal Indic Text Input
 - The Rise of Digital Reading Voice Key Board Multimodal Indic Text Input
 - Advantages of eBooks Over Traditional Books
2. Identifying Voice Key Board Multimodal Indic Text Input
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Voice Key Board Multimodal Indic Text Input
 - User-Friendly Interface
4. Exploring eBook Recommendations from Voice Key Board Multimodal Indic Text Input
 - Personalized Recommendations
 - Voice Key Board Multimodal Indic Text Input User Reviews and Ratings
 - Voice Key Board Multimodal Indic Text Input and Bestseller Lists

5. Accessing Voice Key Board Multimodal Indic Text Input Free and Paid eBooks
 - Voice Key Board Multimodal Indic Text Input Public Domain eBooks
 - Voice Key Board Multimodal Indic Text Input eBook Subscription Services
 - Voice Key Board Multimodal Indic Text Input Budget-Friendly Options
6. Navigating Voice Key Board Multimodal Indic Text Input eBook Formats
 - ePub, PDF, MOBI, and More
 - Voice Key Board Multimodal Indic Text Input Compatibility with Devices
 - Voice Key Board Multimodal Indic Text Input Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Voice Key Board Multimodal Indic Text Input
 - Highlighting and Note-Taking Voice Key Board Multimodal Indic Text Input
 - Interactive Elements Voice Key Board Multimodal Indic Text Input
8. Staying Engaged with Voice Key Board Multimodal Indic Text Input
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Voice Key Board Multimodal Indic Text Input
9. Balancing eBooks and Physical Books Voice Key Board Multimodal Indic Text Input
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Voice Key Board Multimodal Indic Text Input
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Voice Key Board Multimodal Indic Text Input
 - Setting Reading Goals Voice Key Board Multimodal Indic Text Input
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Voice Key Board Multimodal Indic Text Input
 - Fact-Checking eBook Content of Voice Key Board Multimodal Indic Text Input
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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