
Inviscid Text Entry and Beyond

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Abstract

The primary focus of our workshop is on exploring ways to enable inviscid text entry on mobile devices. In inviscid text entry, it is the user's creativity that is the text-creation bottleneck rather than the text entry interface. The inviscid rate is estimated at 67 wpm while current mobile text entry methods are typically 20–40 wpm [19]. In this workshop, participants will discuss and demonstrate early work into novel methods that allow very rapid text entry, even if such methods currently are quite error-prone. In addition to submitting a position paper, participants are strongly encouraged to bring a demo to present during the workshop's interactive Show-and-Tell session. As well as exploring new entry methods, the workshop will discuss experimental tasks and evaluation methodologies for researching inviscid text entry. Looking beyond the speed of entry, the workshop will explore often overlooked aspects of text entry such as user adaptation, post-entry correction/revision/formatting, entry of diverse types of text, and entry when a user's input or output capabilities are limited. Finally, the workshop serves to strengthen the community of text entry researchers who attend CHI, as well as provide an opportunity for new members to join this community.

Author Keywords

Text entry; text input; mobile interaction

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Background

Text entry is central to our interaction with computers and this is no less true for mobile use than traditional computer use. Whether it be social networking, writing documents, composing love letters, or writing business emails, text forms the core to much of our interaction. Currently text entry on mobiles is artificially limited by the input methods and is often frustratingly slow and erroneous. In 2014, Kristensson and Vertanen [19] challenged the text entry community to reach the inviscid text entry rate — the rate at which our ability as humans to compose text is the limiting feature rather than the entry method being a restricting pipe to the flow of our ideas. They estimated this rate to be 67 words-per-minute (wpm), much higher than the typical mobile text entry rates of 20–40 wpm reported in studies.

Mobile text entry is a fundamentally challenging activity for users: our fingers are too blunt an instrument for accurate entry on small devices (known as the “fat finger problem” [13, 22]), flat glass devices give too little feedback (e.g. [12]), and people are often entering text while on the move or in busy environments (e.g. [5, 11]).

Together these problems make mobile text entry slow and error-prone. To compensate for this, powerful language models are often used to predict a user’s entry based on the linguistic context (e.g. [26]) and to enable novel text entry approaches (e.g. [27, 1]). However, these language models can introduce “auto-correction mistakes” where apparently random, and sometimes socially inappropriate, words are inserted into the input stream instead of the intended words (e.g. [16, 21]). This forces users to trade-off

speed of entry against checking both their own entry and the model’s predictions. This constant checking comes at a considerable cost: in terms of keystroke models, one mental response to check an entry takes about the same time as entering an entire word at 20 wpm [2, 7]. The checking for and, sometimes, embarrassment of sending incorrect text is also a major frustration to users that can restrict their use of mobiles. At the very least, it impairs interaction.

While targeting the inviscid rate for plain text entry challenges us to produce fast solutions, there are wider issues associated with text entry on mobiles that need to be addressed to give users powerful, fluid and task-appropriate text entry. Prominent amongst these are supporting correcting, editing and reworking text (e.g. [9, 23]), formatting of text (e.g. [6]), supporting personalization and context-awareness (e.g. [8, 14]), and supporting entry of non-alphabetic characters and non-Latin characters (e.g. [10]).

The inviscid challenge raises methodological issues for the evaluation of text entry interfaces. While some recent work has started to look at composition tasks (e.g. [25]), the domain is still largely dominated by controlled lab experiments in which users copy set phrases (e.g. [20, 24]). While copying phrases provides a controllable and reproducible task for studies, this approach effectively eliminates the composition mental load that could artificially inflate claims of speed (e.g. [15]). Furthermore, the controlled setting eliminates much of the real-world context that affects entry (e.g. location, mobility, recipient, and nature of the message).

This workshop aims to address two key questions:

- How do we develop fast and fluid text entry methods that support a wide-spectrum of text entry activities?
- How do we evaluate these text entry methods appropriately?

Organizers

The organizers are all widely published experts on text entry. They have all published extensively in the HCI text entry community and often collaborate with researchers from a variety of communities, such as Augmentative and Alternative Communication (AAC), Natural Language Processing (NLP), and speech recognition.

Keith Vertanen is an Assistant Professor at Michigan Technological University. He specializes in designing intelligent interactive systems that leverage uncertain input technologies. This includes input via speech, touchscreens, and eye-gaze. A particular focus of his research is on systems that enhance the capabilities of users with permanent or situationally-induced disabilities. Dr. Vertanen is the main contact person for this workshop.

Mark Dunlop is a Senior Lecturer at the University of Strathclyde. He has been publishing in mobile text entry since 1999 and is currently running a research council project on text entry for older adults. His interests include both the underlying algorithms for smarter predictive text entry and novel solutions for user input on varying devices. As well as academic research, he has conducted usability studies on mobile text entry for commercial developers.

James Clawson is a Post-doc researcher at the Georgia Institute of Technology. His thesis research focused on improving text input on mini-qwerty keyboards. In addition to studying mini-qwerty keyboards, his text entry publications include investigations of chording, on-the-go usage, eye's-free text entry, automatic error correction, and the attentional demands of inputting text on mobile devices.

Ahmed Sabbir Arif is a Postdoctoral Research Fellow at Ryerson University. He holds a Ph.D. in Computer Science from York University. His doctoral research focused

on the prediction and the reduction of the impact of errors in text entry. In addition, he has worked on a wide-range of projects, both independently and in collaboration with academic and industrial research labs. He has published papers on predictive, pressure-based, gesture-based, non-madic, and multi-modal text entry, error prevention, and metrics for text entry.

Per Ola Kristensson is a University Lecturer in Engineering Design in the Department of Engineering at the University of Cambridge and an Honorary Reader at the University of St Andrews. He co-invented and helped commercialize the gesture keyboard text input method (known as ShapeWriter/T9 Trace/FlexT9 and Swype). He has published papers on text entry via styli, touch-screens, speech, and multimodal signals.

Website

Our workshop website is located at <http://www.textentry.org/chi2016>. The site includes the call for participation, a copy of this workshop proposal paper, and links to the organizers. Details of the one-day workshop program will be posted once details are finalized. The website also provides details about how to subscribe to the text entry research mailing list that will be established prior to the workshop.

Pre-Workshop Plans

We have written a Call for Participation that we will send to several mailing lists, such as CHI-ANNOUNCEMENTS, but also to specialist AAC, NLP, and machine learning lists in an effort to solicit broad participation. To this end, we will also identify text entry researchers outside HCI who may be interested in participating and encourage them to write a position paper. Position papers will be peer-reviewed by at least two workshop organizers. Final acceptance decisions will be made at a program committee teleconference

meeting. All authors will receive detailed reviews.

For authors planning to demo a text entry method at the Show-and-Tell session, where feasible, we will coordinate advance distribution of prototypes to other participants. The advantage to authors of preparing a prototype in advance is that they will likely get higher quality feedback from other workshop attendees. This is especially true as it relates to the learnability and long-term performance potential.

Workshop Structure

This is a full one-day workshop. It will be structured as a series of three panel discussions and an interactive Show-and-Tell session. Each panel focuses on a particular theme:

1. **Inviscid entry methods.** This theme focuses on plausible but perhaps preliminary work into entry methods that allow users to enter text at very fast rates. This theme might include topics such as abbreviated input, bimanual input, input strongly influenced by a user's context, etc.
2. **Experimental methodology.** Inviscid text entry seeks the free flow of information from a user's brain into the computer. This panel discusses issues related to the experimental tasks and methodologies most appropriate for comparing and benchmarking inviscid text entry methods. This theme might include discussion about how to break away from the text-copy task which dominates text entry research.
3. **Going beyond entry speed.** This theme aims to explore topics that are often neglected in text entry research. This theme might include topics such as supporting post-entry formatting/correction/revision, entry of diverse types of text (numbers, symbols, multiple languages, texting language), entry when a user's capabilities are limited due to situation or disability, learning from a user's past successes or failures, etc.

Each panel discussion will last 80 minutes and will have a moderator and a group of panelists. The moderator will introduce the topic and panelists will give a focused position statement. The moderator will then chair a discussion between panel members and the audience on the topic. Panelists will be chosen based on their expertise, submitted paper, and ability to create a diversity of opinions.

The Show-and-Tell session is a new feature of this year's workshop. We strongly encourage authors of position papers to bring a working prototype of their work. During the Show-and-Tell session, other workshop participants will be able to try out different entry methods or evaluation approaches. We anticipate this will provide participants with valuable feedback and stimulate ideas for future improvements. Where feasible, we will coordinate distribution of participants' demo apps prior to the workshop. This has the potential for allowing participants to receive deeper feedback based on others having spent a more substantial time working with a particular method. If enough participants submit prototypes in advance of the workshop, we will organize an informal "bake-off" during the Show-and-Tell session to test methods head-to-head.

As some participants may not have work of the nature or maturity to be demonstrated, the Show-and-Tell session will also have poster presentations. This will provide participants, especially newcomers to the field, an opportunity to obtain feedback about their current work as well as spark new collaborations and stimulate ideas for future directions. The Show-and-Tell session will last for two hours.

At the conclusion of the workshop, we will have a 30-minute discussion summarizing the day and soliciting feedback from participants about this year's workshop as well as ideas for future events.

Post-Workshop Plans

We expect several important outcomes from this workshop. First, this workshop continues our effort to build a community of text entry researchers centered at CHI. Currently text entry researchers are scattered across different communities and often are unaware of progress made in neighboring fields. We know the interest is there and this workshop will help leverage the momentum we gained during the previous successful text entry workshops held at CHI'12 [18], CHI'13 [17], CHI'15 [3], and the CHI'14 text entry SIG [4].

Second, authors of accepted workshop papers will be encouraged to place their position paper on the workshop's website. Additionally, we will encourage participants with demos to submit a short video for inclusion on the website. We will offer to record and edit videos of demos during the Show-and-Tell for participants who would like to have a video published but have not produced one on their own.

Third, we hope the workshop will yield a variety of future-looking visions of inviscid text entry interfaces. While such work may be preliminary, when presented in concert, the visions may constitute an interesting survey of the possibilities and highlight future research directions. Workshop participants will be encouraged to combine their preliminary work from their position papers to create a cohesive joint publication for submission to a suitable venue.

At the end of the last session, participants will fill out a survey about their experiences at the workshop including whether participation influenced their decision to attend CHI'16. We will also solicit feedback on possible themes for future workshops and ideas for other community events. Towards our community-building goal, workshop participants will be encouraged to join a text entry research mailing list that we will establish prior to the workshop.

Call for Participation

Workshop website: <http://www.textentry.org/chi2016>

Early submission deadline: **December 11, 2015**

Normal submission deadline: **January 13, 2016**

We invite position papers for the CHI 2016 Workshop on Inviscid Text Entry and Beyond. This one-day workshop offers an interdisciplinary forum for both practitioners and academics interested in text entry in its many forms and varieties.

A particular interest this year is on exploratory work into inviscid text entry. In inviscid text entry, it is the user's creativity that is the text-creation bottleneck rather than the text entry interface. We welcome early work into novel methods for very rapidly entering text, even if such methods currently are quite error-prone. We are also interested in experimental tasks and evaluation methodologies for investigating inviscid text entry. Finally, we welcome topics going beyond entry speed, e.g. learning from a user's prior successes or failures, post-entry error-correction and formatting, entry of diverse types of text, and entry when a user's input or output capabilities are limited.

Participants will be selected on the basis of the quality of their position paper. At least one author must register and attend the workshop. All workshop participants must register for both the workshop and for at least one day of the CHI 2016 conference. Participants will be invited to present a position statement on at least one panel. Participants are strongly encouraged to bring a demo and/or poster to present during an interactive Show-and-Tell session. For further information, see our workshop website at <http://www.textentry.org/chi2016>.

How to submit:

- Write a position paper in the CHI Extended Abstracts Format (maximum four pages excluding references). Papers should include a brief biography. If you plan to participate in the Show-and-Tell session, describe what you plan to present.
- Email your position paper in PDF format to textentry2016@gmail.com

Important dates:

- Early submission deadline: December 11, 2015.
- Early acceptance notification: December 21, 2015.
- Normal submission deadline: January 13, 2016.
- Normal acceptance notification: February 12, 2016.
- Workshop: May 7 or 8, 2016.

Organizers:

- Keith Vertanen, Michigan Technological University, USA.
- Mark Dunlop, University of Strathclyde, UK.
- James Clawson, Georgia Institute of Technology, USA.
- Per Ola Kristensson, University of Cambridge, UK.
- Ahmed Sabbir Arif, Ryerson University, Canada.

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