
Storyphone: An IVR System to Connect People Through Storytelling

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Abstract

Oral storytelling remains a powerful way of preserving important cultural anecdotes and helping us see from a different perspective. Mobile technology now provides an increasingly accessible method of capturing and communicating stories to a global audience. This paper presents Storyphone, an interactive voice response system (IVRS) built to capture oral stories from around the world. Storyphone users can call in to either contribute their stories to the archive or listen to stories submitted by others. Our proposed system is a novel use of mobile technology to help us appreciate differences through oral storytelling.

Keywords

mobile technology, connecting, storytelling, interactive voice response, cross-cultural

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

As globalization and technology begin to homogenize our lives, we lose sense of what makes us different from each other. Unique aspects in a globalized world

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blend into a uniform culture. One way to preserve and encourage an understanding of our differences is through storytelling.

Throughout history and across the world, stories have held onto unique facets of human lives that connect the past, present, and future. Oral storytelling as an ancient tradition has the power of preserving culture and passing it on to surviving generations. In addition to cultural preservation, oral storytelling allows us to intimately express our individuality through meaningful events in our lives. As populations begin to migrate and homogenize, stories of cultural significance are forgotten. If we are to both preserve and appreciate our differences around the world, there must be a medium for users to share their stories globally.

Mobile devices are the most promising form of technology to accomplish this. Although the Web has potential to connect people from around the world and distribute their stories globally, its reach is not as diverse as mobile devices. A 2008 study reported only 1.5 billion Internet users compared to 4.1 billion mobile phone subscribers worldwide [4]. 60% of these mobile phone subscribers live in the developing world. Leveraging mobile technology would allow for more diverse story content from people in various parts of the world.

To maximize the reach of mobile devices would require the use of purely voice and keypad interaction since nearly all mobile phones have these capabilities.

Our goal for this project is to preserve and build a greater understanding of our differences through a novel use of oral storytelling. More specifically, we want

to address challenges inherent in an IVR system developed to facilitate the tradition of storytelling.

Initial Investigation

To begin our research, we conducted a focus-setting meeting to narrow the scope of this year's design problem for CHI. Our team members came with ten to fifteen post-it notes containing questions, potential ideas, and important topics to address when trying to understand how the world could better appreciate differences. Through an affinity diagramming process of categorizing our notes, we chose to explore mobile technology and its potential in supporting storytelling.

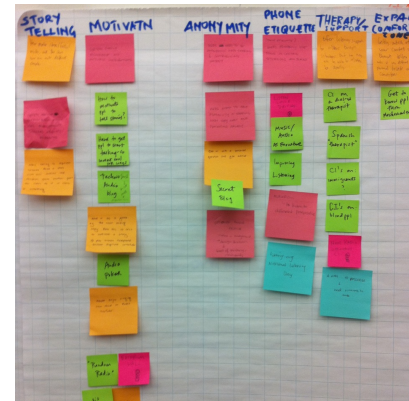


Figure 1. Part of our focus-setting affinity diagram that helped us narrow down the scope of the design problem.

We began our ethnography by focusing on issues of privacy and comfort levels when recording over the phone. To investigate the willingness of people in developing nations to speak about personal events or stories over phone, four phone interviews were conducted. All participants belong to the low-income group in India and spoke different languages despite

residing in New Delhi. Two users were male taxi drivers while the other two were female housekeepers. They are non-English speakers with minimum to no computer experience, but had all interacted with an IVRS system in the past. To encourage longer responses, the interview scripts included scenario examples when asking the users questions about their daily work lives [6, 7]. For instance, instead of “Do you enjoy being a taxi driver?”, the interviewer would say “Taxi drivers tend to travel quite a bit and meet different people. How do you find being a taxi driver?” Asking questions that included these lead-ins prompted participants to give more than lengthier responses than yes or no.

Despite not knowing the interviewer, participants in this study were all comfortable with sharing their names and background. They were also very responsive when asked to share interesting stories from their work life.

In addition to the four interviews discussed above, seven interviews were conducted with people in the U.S. to explore whether they would be comfortable using a phone system to share stories. All of the interviewees were immigrant, non-native English speakers and had access to either landlines or cellphones. All of them had used IVR systems. Three of them were over the age of 60 and retired, two were middle aged and two were younger than 30 years old.

We found that interviewees from this group were receptive to sharing stories. After sharing a story, some expressed interest in listening to other stories on the same topic. Although they were comfortable with their story being shared, five of the seven were not comfortable with it being associated with their name

and identifying details. Users seemed willing to share stories and in some cases expressed enjoyment in the process.

Related Work

Oral Cultures

There has been much work in exploring IVR systems as an interaction tool within the developing world, particularly with low literacy and oral users. Best practices have been suggested for building tools for oral users [6]. It builds out competencies that low-literacy, or oral users have that can be leveraged when designing such systems. It also investigates how information is managed in such cultures, specifically how it is organized, transmitted, learned and remembered. Interestingly, they use stories as a means of conveying information or instructions, rhythm to help recall, additive conjunctions and redundancy to allow listeners to be able to access instructional material multiple times.

Speech Recognition vs. Touch-Tone

Although using free form natural language speech for input seems like a natural choice for such interfaces, research has found that this is not the case. Grover et al have found that users encounter frustration because speech recognition technology is not always accurate and leads to errors that are hard to recover from [3]. Also it is not available in many languages and limits scope for multi-language deployments of IVR. They also found in other studies that numerical literacy was more widespread and as such users had strong success for touch-tone interactions than voice recognition interactions [2, 5]. Furthermore, users felt that touch-tone provided them with more privacy especially when it came to dealing with financial and medical data.

Design Process

Personas

We began conceptualizing a design for a storytelling system by first coming up with personas. These helped us capture the needs and motivations of our users based on the findings from our phone interviews. In brief, these personas are:

- Huang Lee is a Shanghai based textile manufacturer. He built his business from scratch and takes pride to tell the story of his success and does not have privacy concerns while divulging his personal information. Huang owns multiple mobile phones, has a landline phone connection as well and is comfortable communicating in Mandarin as well as English.
- Asima is a Bangladehi immigrant residing in New Delhi, India. She works as a housekeeper and owns one landline phone primarily for communicating with her daughter living in a distant city. Asima values her privacy highly and prefers not to speak of her personal or work details much. She only speaks a local Bengali dialect and would love to hear stories of other people from Bangladesh.
- Ana Iqbal is an elderly immigrant from Pakistan currently residing in the United States. Due to reasons caused by poor health, she stays at home for most of the day. She speaks fluent Urdu, Hindi and English and owns a smart phone. After being away from her roots for many years, she would love to feel connected with the people of Pakistan again by hearing stories from people in the country.
- Sandy is a second-generation immigrant from Korea and has always lived in the United States. She briefly visited Korea a few times, but feels disconnected from her roots and wishes to hear more about the

people there and the way they live. Sandy is fluent in English and Korean and would really like to hear stories from people in Korea so as to feel more connected the next time she visits the country.

From the personas it was clear that our design would need to address the privacy concerns of Asima, allow Huang to tell his story as well as appropriately connect Ana and Sandy with the people from Bangladesh and Pakistan.

Storyphone High Fidelity Prototype

Our idea leverages both open source software and mobile technology to produce a cost-effective solution for preserving and celebrating people's differences. Storyphone allows people like those in our personas to call in, capture their oral stories, and listen to stories from other people. Our prototype consists of an actual IVR system built using Asterisk, free software that transforms a computer into a communication server [1]. To optimize usability before building, we drew from relevant literature on oral cultures and IVR systems. We chose to produce a touch-tone interaction instead of speech recognition as previous work has shown more accuracy with touch-tone systems [3]. In designing the automated voice system script, we took into account heuristics from literature on oral culture theory [6]. For instance, instructions were given in a conversational tone as in "I'll provide you with instructions on how to record a good story" instead of "The following instructions will ensure you record a story of good quality." We felt that considering heuristics like this would optimize the user experience for literate users, but especially for non-literate users in oral cultures.

Upon calling Storyphone, the user is greeted by a quick message we recorded about the project. Then, options are given to either record a story (by pressing 1) or listen to a story (by pressing 2). In our prototype, pressing 1 leads to a recording session that is first guided by further instructions on starting, stopping, and pausing the recording, and how to access the instructions again. Selecting the option to listen to a story by pressing 2 plays a random story recorded by another storyteller.

Evaluation

We conducted usability tests to measure the intuitiveness of the system. Eight participants were selected to participate in think-aloud studies. Participants were informed to think aloud while using Storyphone as if they were alone in the room talking to themselves. They were specifically tasked with recording a story of any topic to the system. We encouraged them to talk through their actions as they performed them. Each participant was given one attempt to accomplish the task. Interviewers refrained from answering questions until the end of think-aloud session. Findings from these eight sessions gave us insight to how to produce the next iteration.

While a majority of the users were able to successfully complete the task, three participants failed to record their story to the system. One participant encountered difficulty in starting a recording and gave up. Another two each vocalized a story, but terminated the call before pressing 9 to save the story.

We interpreted the common breakdowns as a result of insufficiently clear instructions from the system. Some changes to the next iteration include the ability to skip

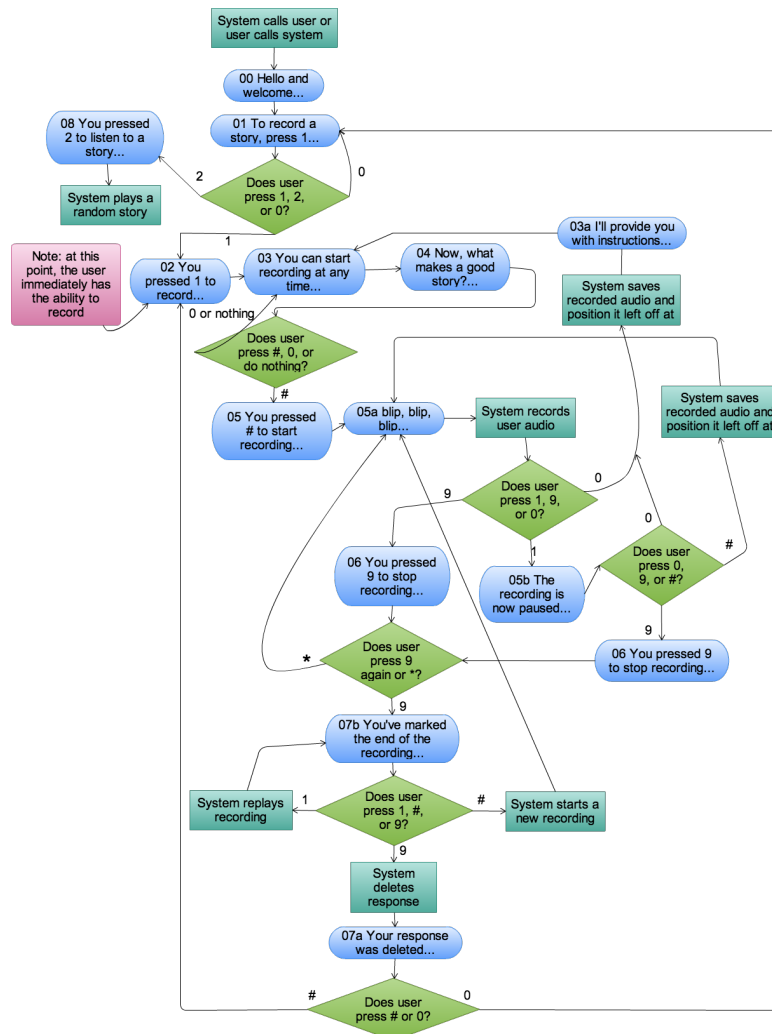


Figure 2. Flow-chart diagram of Storyphone’s touch-tone interactions. We used this to develop the first prototype on Asterisk.

the instructions and begin recording immediately upon pushing the # key. Two things can be done to avoid accidental termination of the phone call resulting in an unsaved story. The first simply reads a line of instruction for how to stop recording immediately before the system begins to record. The second solution requires that the system automatically save the partially recorded story and allow the user to resume recording upon callback. We expect that addressing these issues in the next iteration will produce a nearly flawless IVR system for the same user population.

Although we considered non-literate users early on in the process by taking into account oral heuristics, our usability studies did not test for them. This was mainly because we did not have easy access to these populations. However, we hope that future iterations on Storyphone will also be able to test the IVR system on users in non-literate populations.

Conclusion

Our IVR system allows more than 4.1 billion mobile phone subscribers around the world to contribute stories and listen to stories from different people. We found, primarily through phone interviews, that people are generally willing to share personal events and stories from their lives as long as they remain anonymous. Results from our evaluations show a need for further iterations on Storyphone to take into account users in non-literate cultures and non-English speaking populations. However, we believe Storyphone

is the first IVR system built to capture the global tradition of oral storytelling.

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Citations

- [1] Asterisk Systems. <http://www.asterisk.org/>.
- [2] Bidwell et al, Designing with Mobile Digital Storytelling in Rural Africa. *ACM CHI (2010)*, April 10-15 2010, 1593 - 1602.
- [3] Grover et al., Designing Interactive Voice Response (IVR) Interfaces: Localization For Low Literacy Users. <http://www.meraka.org.za/pubs/sharmagrover09designinginteractive.pdf>
- [4] I. T. Union. ICT Statistics, http://www.itu.int/ITU_D/ict/statistics, Apr 2010.
- [5] Lerer et al, Evaluation of IVR Data Collection UIs for Untrained Rural Users. *ACM Dev (2010)*, Dec 17-18 2010.
- [6] Sherwani J. et al, Orality Grounded HCID: Understanding the Oral User. *Information Technologies and International Development 5 4*, Winter 2009, 37-43.
- [7] Terkel, Studs, *Working: People Talk About What They Do All Day and How They Feel About What They Do*.