A Parrot Gone Viral

Speech-based Viral Entertainment for Low Literate Telephone Users in the Developing World

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Information & Communication Technologies for Development (ICT4D)

A new field with lots of interest

Much more than just technology development

– Anthropology
– Sociology
– Public Policy
– Business
– Politics
– …
## ICT4D Landscape

<table>
<thead>
<tr>
<th></th>
<th>Healthcare</th>
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## Spoken Language Technologies for Development (SLT4D)

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The Case for SLT4D

PCs are not feasible for low-literate masses
  • Non-affluent cannot afford them
  • Unskilled cannot operate them
  • Stable electricity, Internet etc. cannot be relied upon
  • Low cost phones may be a feasible solution

Low-cost phones often only support voice & SMS
  • Video not feasible
  • Graphical interactions not always possible

Text is problematic for low literate users
  • Speech may be the only viable interaction paradigm
User Interface Hurdle

Most ICTD projects focus on core development areas

- Health
- Agriculture
- Education

But the low-literate audience is often inexperienced with technology and speech/textual user interfaces

How to train the general population to use Speech Interfaces???
Solution

Smyth et al. [2010] described the remarkable ingenuity exhibited by low-literate users when they are motivated by the desire to be entertained, and concluded that such powerful motivation “turns UI barriers into mere speed bumps”
Hierarchy of Cyber-Needs

CAMPAIGN: Amnesty, HRW

LEARN: Wikipedia, TED

SHARE: Facebook, Twitter

TALK: Email, instant messaging, blogs

HAVE FUN: pornography, BitTorrent, YouTube
Our Goal

Systematically develop *Viral Entertainment* as a vehicle for dissemination of development related telephone based services (e.g. healthcare, education, agriculture, education)

• **Introduce and popularize** speech interfaces
• Use Entertainment as a **Viral Conduit** for delivering core development services (**Payload**)
• Setup an **Experimental Testbed** for testing speech interface choices
• *and*, provide **Entertainment**
Geographical Region
Our Team...

Lahore University of Management Sciences (LUMS)
Punjab, Pakistan
(Left to right) Umar Saif, Mansoor Pervaiz, and Samia Razaq

Carnegie Mellon University (CMU)
Pittsburgh, PA
(Front to back) Agha Ali Raza and Roni Rosenfeld
(Not pictured) Tina Milo, Hao Yee Chan, Guy Alster

Intro  Goals  Polly  Analysis  Plans
Polly

Polly is a telephone-based, voice-based application which allows users to make a short recording of their voice, modify it and send the modified version to friends.
Voice Effects

Original Voice: Professor Roni Rosenfeld

1) An *I-have-to-run-to-the-bathroom* effect

2) A *drunk chipmunk* effect

3) Converting the voice to a *whisper*

4) Adding *background music*

5) The original, *unmodified* recording
This brief video depicts a typical user interaction with Polly

**USER INTERFACE**

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Pilot Launch

- Pilot tested in Lahore in early March 2011
- Seeded with **two** office workers at LUMS
- Test lasted **two weeks**
- User base increased to **32**
- We then stopped Polly and **gathered feedback by interviewing the users**
- Software flaws detected and fixed
Main Launch

• Launched on March 31, 2011, at 1:00 PM Pakistan Time
• **Seeded with the 32 users** who had participated in the pilot launch
• We made no further attempts to solicit users
• We kept Polly up for **22 days during which it amassed 2,032 users** who took part in **10,629 interactions**

System Failures
Polly experienced multiple down times due to **power/ internet failures and administrative reasons**

We shut Polly down after 22 days for reasons described later.
## Breakdown of Interactions and Users

<table>
<thead>
<tr>
<th>User Initiated</th>
<th>System Initiated (delivery)</th>
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<tbody>
<tr>
<td>User made new delivery requests</td>
<td></td>
</tr>
<tr>
<td>during interaction</td>
<td>4,340</td>
</tr>
<tr>
<td>User made no delivery request</td>
<td></td>
</tr>
<tr>
<td>during interaction</td>
<td>2,444</td>
</tr>
<tr>
<td>Total</td>
<td>6,784</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Call Initiators</th>
<th>Call Receivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>New delivery requests made</td>
<td></td>
</tr>
<tr>
<td>during call</td>
<td>525</td>
</tr>
<tr>
<td>No delivery request made</td>
<td></td>
</tr>
<tr>
<td>during call</td>
<td>476</td>
</tr>
<tr>
<td>Total</td>
<td>613</td>
</tr>
</tbody>
</table>
Usage growth pattern
(Active Interactions Only)

Days when Polly was active

Number of active interactions

Intro  Goals  Polly  Analysis  Plans  Carnegie Mellon University
Usage growth pattern (Active Users)

Days when Polly was active

Number of active Users

- **SF**: System Failures
- **Intermittent Problems**

Colors:
- **Blue**: Users
- **Red**: New Users
Usage growth pattern (by gender)

Days when Polly was active

Number of interactions

Intro   Goals   Polly   Analysis   Plans   Carnegie Mellon University
User Retention

A small but non-negligible fraction of long-term users...
User Retention

Percentage of users still active

Days after a user’s first interaction with Polly
Activity by Time of Day
We shut down Polly on April 22, 2011 at 3:00 AM, after 22 days, because:

1. We had a single telephone line; the system was saturating during peak hours, resulting in busy signals.
   - We did not want users, especially new ones, to be frustrated in their interactions with our system
2. The international call charges were becoming a significant financial burden for us.

So, we did a *graceful* shutdown.
Post Shutdown: People Miss Polly!

- Some users were still calling Polly 40 days after its shutdown when we finally stopped monitoring the calls on May 31, 2011.
- We received 1276 calls during this period made by 310 individuals.
- 117 out of these callers were new users.
- A significant number of users kept calling repeatedly, as many as 46 times.
Feedback Summary

<table>
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<th>Feedback Type</th>
<th>Fraction of Messages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interface/functionality related feedback and complaints:</strong></td>
<td>49%</td>
</tr>
<tr>
<td>too long turn-around time of message delivery; poor call/sound quality; busy network; too short message recording time; increase/rearrange sound effects etc.</td>
<td></td>
</tr>
<tr>
<td><strong>General appreciation including mentioned reasons such as:</strong></td>
<td>47%</td>
</tr>
<tr>
<td>a way to connect to friends; a means of having fun; free service etc.</td>
<td></td>
</tr>
<tr>
<td><strong>Confused Users:</strong></td>
<td>7%</td>
</tr>
<tr>
<td>pressing keys or saying “hello”</td>
<td></td>
</tr>
<tr>
<td><strong>Irrelevant feedback including:</strong></td>
<td>5%</td>
</tr>
<tr>
<td>songs; messages for friends; irrelevant messages for Polly etc.</td>
<td></td>
</tr>
</tbody>
</table>

Most of the people were eager that the service should continue and improve.
Feedback Summary
(Additional)

• Ideas for new voice modification effects
  • female/child voice modification
  • laughter and giggling
  • Scary voice
  • Background effects like sad music, rain drops, sound of a train, wind blowing etc.

• A application similar to Polly just for ladies

• Several suggestions to improve user interface including:
  • Rerecord
  • Rapid access to effects of choice
  • Options to go to the previous menu and to end the call etc.

• Additional suggestions included:
  • An accessibility software for blind that could be used on less expensive mobile phones
  • A software that could identify and filter out foul language in a message
User Demographics
(Gender, as determined by listening to the audio)

Among Polly’s 773 Active Users:

- Male: 74%
- Female: 14%
- Undetermined: 12%

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User Demographics
(Age)

Number of Users

Age (estimated by listening to recordings)
User Demographics (Language of recording)

Languages

- Urdu: 1618
- Punjabi: 1337
- Unclear: 346
- Mixed: 141
- English: 57
- Pothohari: 17
- Saraki: 6
- Arabic: 2
- Pashtu: 2
User Demographics
(Socio-economic levels)

According to the transcribers’ best estimates:

• vast majority of the callers come from a socio-economic class similar to that of the originally-seeded low-skilled office workers

• with an educational level that does not exceed theirs (approximately 5th grade and below)
What were the recordings used for?

Number of recordings:

- Informational: 1903
- Hello-Hi: 886
- Unclear: 490
- Profane: 236
- Song: 87
- Humor: 78
- Romantic: 75
- Poetry: 9
- Complaint: 1
- Political: 1
Effects Chosen by Users over Time

Number of recordings over time for different effects:
- Bathroom
- Chipmunk
- Whisper
- BG Music
- Original

Days after a user's first interaction with Polly
Additional Findings

• **Word-of-mouth spread**
  Of Polly’s **613** Call Initiators, **291 (47.5%)** placed their first call before receiving any calls from Polly.

• **Users training others**

• **Polly’s use as a platform for redress of grievances**
Future Plans

- Polly come back!!!
  - Stability and Capacity
  - Sustainability
    - Local deployment
    - Subsidized (bare bone) vs. unsubsidized (premium)
  - Help menus
  - Speed Dial

- Payload
  - A development oriented service to be introduced using Polly
Payload Options

Health care

Agriculture

Entertainment

Job Search

Commerce

Education

Our Strategy:

Entertainment → Employment → Education (job skills)

Intro  Goals  Polly  Analysis  Plans

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Payload Options

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- Posted by Jobs Careers 23 August, 2011
- Categories: Helpers and Supporting Jobs in Pakistan, Jang Newspaper Jobs, Jobs in Lahore, Jobs in Pakistan, Newspaper Jobs Pakistan
- Tags: Drivers, Jobs in Pakistan, Lahore

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