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# Real-time IVR platforms for under-resourced contexts

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**Abstract**

Interactive Voice Response (IVR) systems have been extensively studied in HCI4D literature, and continue to be an area of ongoing interest. However, much of the discourse is around asynchronous IVR platforms. We want to advance the value and potential benefits in utilising synchronous IVR platforms, based on work that we are undertaking (currently in the health domain). We are also interested in investigating the applicability of scalable platforms (IVR or otherwise) in multiple cultural contexts, discussing our current plans for deployments across rural contexts (in India, Lebanon, and UK) and invite collaborators who are keen to contribute in this area.

**Author Keywords**

HCI4D; ICTD; IVR; community; mHealth; resource-limited settings; India; design; user experience.

**ACM Classification Keywords**

H.5.m [Information interfaces and presentation (e.g., HCI)]:  
Miscellaneous

**Introduction**

Existing research has shown the latent qualities of voice-based platforms to enable dialogue between community members [15, 16, 6]. This is particularly so in under-served and under-resourced contexts, where due to a variety of

socio-economic reasons, widespread illiteracy renders text-based interfaces useless [2, 14].

The ICTD community has been quick to realise this and has designed and developed a variety of aural and visual platforms for such contexts [3, 11, 17]. The paper will focus on aural platforms, as that is the scope of our current work. Our current design and deployment context has been within mHealth, but in future we see its applicability in other areas too. Current literature suggests that people in under-served contexts prefer aural platforms to other types, especially so when it is speech-based, since that is a natural form of communication [12].

However, previous work has focused especially on asynchronous aural platforms [13, 19, 15]. This has been for a variety of reasons e.g. resource-constraints, ease of development and use, and sustainability. Common application areas have been health dissemination (especially in the field referred to as mHealth), citizen participation, knowledge sharing, and entertainment. What is common in all these approaches is that the platforms here have utilised asynchronous interactions as an approach.

### **Voice platforms for Community Health**

mHealth is an emerging area at the intersection of health and mobile technologies, that has especially been given a lot of focus in ICTD [4, 1, 10]. Interventions have spanned simple text based ones to IVR-based automated reminder calls. We feel however, that the key aspects of healthcare: the dynamic patient-physician interaction and social-support, much lauded in traditional healthcare, are often lacking in such platforms. A synchronous model of interaction, that can facilitate this kind of interaction and community engagement will be of much benefit to health practitioners in this area. Such a model is not designed to be a direct

replacement for in-person interactions between healthcare providers and those in need of such services, but rather, it is a platform that can supplement such a relationship.

As such, we believe that there is much to be learned from cross-cultural collaborative research. Although the contexts that HCI4D researchers are engaged in might be different, there are underlying principles that can influence and positively affect approaches in under-served or under-resourced contexts other than one's own. This is particularly true, for example, in Global Health, where different contexts have their own battles to fight, however they are united by common aims in promoting health and wellbeing.

Radio shows are very popular in the under-served contexts we have done prior research in (other areas where similarly findings have been highlighted are discussed in [8]). We were inspired by this, and the local uptake of community radio, to design a radio chat show model of interaction for our ICTD oriented research. A radio chat show model provides a rich real-time sharing and communication platform. The radio show host can not only use the platform to disseminate information to listeners, but can also do other tasks that engage participants e.g. ask the listeners to call in and ask questions, and facilitate knowledge sharing between participants.

A strong cultural practice like Radio shows, and their ubiquity can be used to promote community health, as we have explored in our current work. What we mean is that the radio show model can be taken advantage of to create a platform where listeners can actively engage each other, and enable creating and sharing knowledge locally [7].

### **Our experiences in Radio-based platforms**

A radio chat show model for under-served contexts sounds promising, but how can it be made cheaply available? How

can we replicate the sophisticated and expensive studio set-up used by radio hosts in a rural Indian setting? These are the questions we grappled with when developing the platform. We designed and deployed an application in our initial foray into such a Radio-based platform. We deployed this initial prototype of the platform in two rural villages in North India last year. Very briefly, the design of the platform is described below.

The topics for the radio-based discussion were chosen by the representative host according to the needs of the immediate context: maternal health and Diabetes. We envisaged the registration and running of the radio show to be done by an ASHA/ANM or other community health representative who wished to be the 'Radiohost'. Community members who wish to join the show (henceforth referred to as callees) were added to the show either manually by the host or by asking the interested party to call a pre-configured number (which was made freely available at point of access).

By utilising a cheaply available modern smartphone (e.g. Android-based phones), we developed an application that can be used by the radio show host. 'Sehat Ki Vaani' is based on a client-server architecture. The server consists of a SIP telephony software running in the cloud. There are two kinds of clients: Radiohost client and the callees. Radiohost client allows the host to run the radio show. The Radiohost client does this by sending a request to the server to call the callees registered for the show.

When the Radiohost connects to the show, they are given various controls to run the radio show e.g. starting/stopping the show, allowing callers to speak (unmuting callers who wish to speak, and muting callers who have finished speaking), viewing the list of connected callers etc. The callees can use any type of phone e.g. standard GSM phones or

feature phones. When they participate in the show, they are encouraged to ask questions by pressing a digit on their keypad. This alerts the Radiohost on the Android application, and they can see a list of callees who want to speak and choose to unmute a particular listener. When the callee has finished speaking, they are muted again.

#### *Challenges in deploying Synchronous platforms*

When we deployed, we encountered a number of technological and social challenges. We encountered obstacles like limited internet connectivity, and this did affect the shows sometimes, creating lags (for instance when the host unmuted a listener who wanted to contribute, there was a delay of a few seconds on a few occasions). Another problem we encountered was the intermittent GSM signal which caused the callers to drop out on occasion. This was resolved by repeatedly retrying the number of the listener until a connection was established. We hope to resolve these issues in the next iteration by adding more resilience to the system.

The social problems were problems encountered by the Radiohosts in managing a radio show. They were experienced health activists with little previous experience with digital technologies and voice-based platforms. There were a number of times during the show, when there would be an awkward pause. These usually happened after the Radiohost issues a call for questions to be put forward and none of the callees responded, or when the Radiohost was unsure on how to answer unexpected questions. We felt this could be improved with better interface design, some pre-show training, and gaining experience running a few shows. Even within our trial, after a number of shows, the hosts began to gain confidence. In their words, the more they used it, they grew less and less intimidated by the format.

## Future Work

### *Improving the platform*

We wish to give more control to the Radiohosts while at the same time not overwhelming them with the interface. This will include providing guidance to the Radiohost on when to ask questions using visual cues, so as to minimise periods of silence. This may additionally involve having controls that let the Radiohost fill these silent periods with pre-recorded 'filler material', which may involve trailers for other shows, a quick Public Service Announcement, thanking the callees for taking part etc. We are also investigating non-text based interfaces for the Radiohost, utilising low-literacy design principles so that they can effectively run a show using a visual UI.

Currently the shows are not stored for sharing, but we would like to investigate novel approaches to share and make the elements of the show that are valuable to members of the community available in an accessible format. Often referred to as 'object-based media', we are still working on this, and invite others interested in this post-production stage of content creation to help research this further.

### *Crossing Borders*

We have detailed a description of our initial work with this platform, and a brief report on the planned improvements. We are planning to extend the capabilities of this platform, and use it beyond the scope of healthcare, and envision its use in other rural under-served, under-resourced contexts. Other issues we are currently investigating, include the scalability of such a platform in other contexts. We are collaborating with healthcare providers and local stakeholders in the context of informal tented settlements in Lebanon housing Syrian refugees, and also in the context of under-resourced rural areas in the UK.

The contexts described above have very different socio-cultural characteristics. However, they share a common need for sustainable community-oriented platforms that can be used by health and education activists. As such, we are seeking researchers interested in investigating scalable platforms. At the very least, we can learn lessons from cross-cultural collaboration and knowledge exchange.

We are well aware of the ICTD research out there critical of common biases and faulty design strategies in interventionist ICTD [9, 18], and much of what we do is influenced by their work. Scalability, and working in cross-cultural contexts, requires a critical approach to avoid the failures that have been previously highlighted in the field [5] (and from our own experiences). However, we think there is still a case to be made for such platforms, which while not a force for good in themselves, can be used as such in the hands of the right people.

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