Designing an Interactive Voice Forum for Small Subsistence Farmers in Rural South Africa

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Abstract - This paper presents work in progress of the design and implementation of an interactive voice system which acts as a tool guiding the subsistence farmers on how to grow and tend their crops. A mobile phone as a device of communication is used in this system to disseminate information to the farmers in rural areas. Subsistence farmers in rural areas face various challenges concerning crop production, crop diseases, farming methods, and fertilizers to use. This system therefore, intends to address such challenges through a telephony based system. A successful collection of data and design of the database has been completed.

Index Terms—IVR, voiceXML, Telecommunication networks, Asterisks, subsistence farming.

I. INTRODUCTION

Many times Agriculture is seen as a useless activity especially when one does not have enough resources to help him improve the standard and quality of service. Subsistence farmers, who mainly reside in the rural areas of South Africa, are the ones who are feeling the pressure since they do not have enough and required resources which can help them improve their farm production. Knowledge and a better background is one of the most important tools of farming that they need to acquire about farming practices. Since the common language used in Eastern Cape, which is our case study area is isiXhosa it is the language that the system will be implemented in.

This project aims at resolving issues related to agriculture; since almost all of the rural subsistence farmers of South Africa are illiterate making use of the phones will be of an advantage to them. Since mobile phones are widely used almost every farmer can easily access them thus they serve as the communication platform in this case.

The remainder of this paper is organized as follows: In Section II we present the background of the project. We present the implementation and system architecture in Section III. In Section IV we provide the benefits of the system. We present the conclusion and future work in Section V.

II. BACKGROUND

Nanavati et al [5] implemented an Interactive Voice Response (IVR) system that helps farmers improve farming in rural India. Their project implemented the same type of system whereby the user/farmer is required to listen to a recorded voice which talks about how to improve farming in rural areas of India. However, it lacked the search facility and farmers had to listen to questions sequentially starting with most recently posted. Any answers would be played subsequent to the question, with no option to skip ahead to the next question. It was not implemented in isiXhosa.

Jette et al [6][7][8][9][10] on the other hand have implemented an IVR system that performs Function Promoting Therapies (FTP) in patients with measurable functional limitations. The intensions of their system were good as it used the new data collection models such as Computer Adaptive Testing (CAT) and sensitive data however it lacked security in terms of who accesses it therefore could not be regarded as reliable. They also used English as medium of communication while in this work; we use the local language isiXhosa.

James et al [11] proposed a system that monitored the abuse of alcohol drinking especially to people who are still under medical treatment. The users were examined three times a day by the system. The system could not guaranty whether the interviewee was telling the truth about his/ her drinking status for the day. However, we propose a system that helps farmers in rural areas and rely on certain device features to get accurate information from them about the challenges that they face.

III. IMPLEMENTATION AND SYSTEM ARCHITECTURE

The subsistence farmers or the users of the system are at the first stage of the system being deployed as Figure 1 shows. The users interact with the system using phone buttons as a link to the recorded information and are able to navigate into the system. The Asterisks WAMP Server [1][4] uses the phone buttons punched by the user to link them to the information recorded. It assigns every submenu recorded a button linked to it. Voice eXetensible Markup Language (VXML) [2][3] software performs data conversion in isiXhosa, which all of the targeted people are speaking. Database contains all the necessary information about the challenges that subsistence farmers of South Africa are currently facing such as crop diseases and farming methods. The recorded information is then retrieved by the user (farmer) if it is available in the database but if it is not there then the Asterisk Server directs it to the administrator of the system (extension officer) for more information pertaining to the missing information needed by the user. The administrator responds back to the user of the system offering the missing information required by the subsistence farmer. This is shown in Figure 2 below.

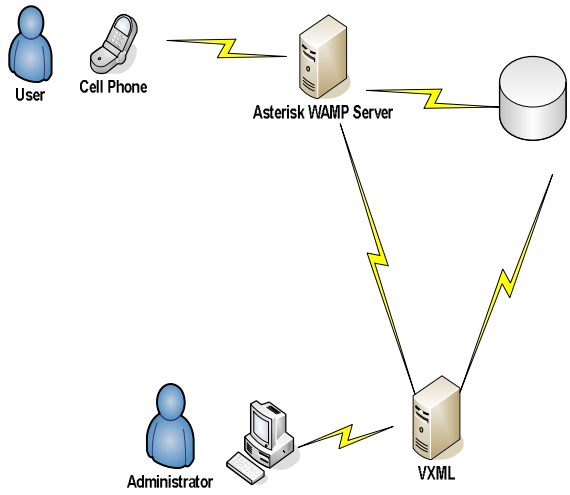

Figure 1: System Architecture

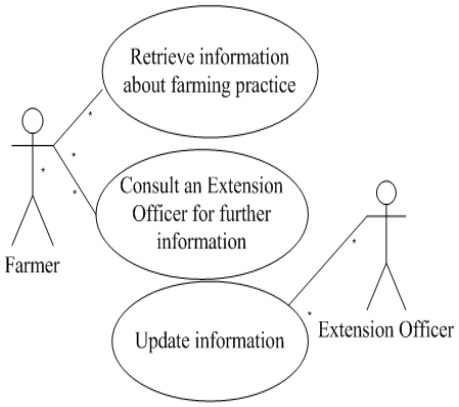

Figure 2: Use Case Diagram of the system

We conducted a preliminary case study in Dwesa area, in Eastern Cape Province of South Africa about what challenges they face and whether they would welcome our system. It was an overwhelming response to the affirmative (95% of the interviewed sample), which encouraged us to continue with this work.

IV. BENEFITS OF THE SYSTEM

Subsistence farmers are the most ignored lot of the farming community in South Africa. Most of them are also illiterate and live in rural areas, which lack most of the basic amenities. This system therefore brings the following benefits: the system will ensure availability of information to the farmers in their own language and at their own convenience using a device of their choice (i.e., mobile phones, PDAs, etc); quick and faster retrieval of information; reliability; simple to understand and use; improves the farming practices thereby leading to quality and high yield in crop production, which improves food security in rural areas.

V. CONCLUSION AND FUTURE WORK

This paper presented an IVR system that helps provide necessary information about farming practices to rural subsistence farmers in South Africa. We provided the system architecture and an implantation of the system showing the preliminary results of overwhelming support of our project among the rural community of Dwesa.

In the future, we intend to complete the system implementation, perform usability testing and deploy our system. It will also be interesting to find out the user responses and effects of the system on rural food security situation in South Africa.

REFERENCES

[1] Software "*netbeans and wireless toolkit*" [online] Available
[2] en.wikipedia.org/*wiki/**VoiceXML***
[3] *www.**vxml**.org/*
[4] *http://www.sum.com*
[5] R. Birner and J. R. Anderson. How to make agricultural extension demand-driven? Technical report, International Food Policy Research Insititute, November 2007.
[6] Jette AM, Haley SM, Coster WJ, Kooyoomjian JT, Levenson S, Heeren T, Ashba J 2002 Late Life Function and Disability Instrument: I. Development and evaluation of the disability component. J Gerontol A Biol Sci Med Sci 57A:M209-M216.
[7] Jette AM, Haley SM 2005: Contemporary measurement techniques for rehabilitation outcome assessment. J Rehabil Med 37:1
[8] Wainer H 2000 Computerized Adaptive Testing: A Primer. Mahwah, NJ: Lawrence Erlbaum Associates Publishers
[9] *http://www.bostonpeppercenter.org/IVR%20Development%20Project.pdf*
[10] Anton, R. F., Moak, D. H., & Latham, P. The Obsessive Compulsive Drinking Scale: A self-rated instrument for the quantification of thoughts about alcohol and drinking behavior. Alcoholism: Clinical and Experimental Research, 19, pp. 92– 99, 1995.
[11] Bohn, M. J., Barton, B. A., & Barron, K. E. Psychometric properties and validity of the Obsessive–Compulsive Drinking Scale. Alcoholism: Clinical and Experimental Research, 20, pp. 817–823, 1996.

BIBLIOGRAPHY

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