



Android Based Interactive Service for Self – Learning on Set Top Box

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ABSTRACT

Indian Television users are witnessing digitalization that is set to enhance their viewing experience. The television digitalization is set to make set-top-boxes ubiquitous devices that will transform our perception of TV and viewing experience. With this happening TV will play a greater role in nurturing India through interactive ETV broadcasts as detailed in existing system.

The proposed framework will work on the application which will enable support for lecture-on-demand. This will help the users for Self – learning while at home through Interactive services provided on the Set Top box. The proposed application shall work on Android Set Top boxes and will provide users with the details of the video. It will also consist of tests which will enable them for self-evaluation.

Keywords: *Interactive TV (iTV), Android Set-Top Box, Lecture-on-demand*

I. INTRODUCTION

Television is the most important device which is used by each and every individual at their home ^[1]. This television can be used as a medium for entertainment, infotainment as well as edutainment. It is providing resources such as Educational programs available to nurture India.

ETV programming in India first started in the year 1961 as “Secondary School television project” since then there has been continuous efforts on this front. Ministry of Human Resources (MHRD) with Indian

Space Research Organization (ISRO) and various national \ regional agencies have contributed to the idea of setting-up a virtual university on TV popularly known as Gyandarshan ETV broadcasts. Efforts have also been made to harness FM radio for imparting education popularly known as Gyanvani^[2].

At Present MHRD with Indira Gandhi National Open University (IGNOU) as the nodal agency is running a bouquet of four satellite based ETV channels that provide round the clock service aiming at primary, secondary, higher and technical education, tele-counselling, tele-lecturing dedicated to educational and developmental needs of the country ^[3].

A. Advantages over web-based learning:

With 150 million total Internet users in India, the Internet penetration is merely 12% ^[4] as compared to TV penetration at 65% ^[5] and that of mobile at 26% ^[6]. The upfront infrastructure cost incurred for computer and internet are high for an average income family in India, while Television is affordable and accessible in every corner of the country. Moreover, a learner must be computer literate for web-based learning while there are no such constraints for Television based learning. The simple interface of remote control for interactivity does not require computer knowledge.

On the other side M-Learning (Mobile Learning) learners face several technical challenges like connectivity, battery life, multiple content formats, multiple mobile operating systems, limited memory etc. These constraints don't limit the learning through Television and educational contents like quiz,

information on particular topic, summary of lectures are best delivered through Television.

B. *Need for interactive TV learning service:*

The process of learning mainly involves an active mind which demands the attention of the learner who is having curiosity to learn new things but Television has always been perceived as a passive medium. Current digital television offers interactivity rich multimedia experience which answers to this essential problem of delivering long Distance teaching through Television medium. It encourages viewers interact with the TV and to participate in the active learning environment.

II. DIGITAL TELEVISION

A. *What is digital television?*

DTV refers to the new television broadcasting technology in which the programme data is broadcasted in digitized packets to the viewer's set-top-boxes or Integrated TV sets (IDTV). Compared to analogue television digital television offer greater number of channels, better quality of picture and sound, subtitles, Teletext and interactive services.

B. *What is interactive TV and Middleware?*

Interactive TV describes a number of techniques that allow viewers to interact with television content as they view it ^[7]. This is achieved by a software layer that sits on top of the set-top-box hardware layer and manages the interactive services called the set-top-box Middleware. Middleware gives the set-top-box the GUI look and feel that differentiates two boxes of same hardware platform from different service provider.

Multimedia Home Platform (MHP) ^[8] is an open standard for Interactive Digital Television defined by the DVB consortium. It defines generic interfaces between interactive applications and the set-top-box hardware. It enables broadcasters to deliver engaging forms of television programming and interactive content while maintaining high availability and reliability.

MHP standard broadly classifies applications as follows:

1) *Enhanced Broadcasting:*

Broadcast only applications are the ones which allow users to interact with but does not start

communication from set-top-box, such as Games which need interaction.

2) *Unidirectional Interactive:*

Unidirectional interactive applications make use of return channel from the set-top-box to the backend server, such as submission of Quiz score.

3) *Bi-Directional Interactive Internet:*

Bi-directional interactive applications are that make use of return channel as full-duplex communication often allow unrestricted access to the Internet from set-top-box.

C. *Methods of delivering interactive application*

1) *Broadcast*

The application and its meta-data are broadcasted in Digital Storage Media Command and Control ^[10] Object Carousel with Signaling Tables encapsulated in a MPEG-2 compliant Transport Stream ^[9]. The set-top-box is notified of the incoming application through the signaling information that is delivered by an Application Information Table (AIT). AIT contains all the necessary information required by the receiver to run the applications and notify the viewer of available applications in meaningful way.

The dynamic updates to the applications are delivered through a mechanism of Stream Events. Stream Events are also used to synchronize the application with the programme.

2) *Internet Protocol*

Interactive Applications signaled in AIT but not broadcasted in carousels can be alternatively downloaded over the return channel.

D. *Bi-directional interactivity*

The bi-directional communication is required when the viewer wants to send back some data to the broadcaster e.g. Poll results, Quiz score etc.

The advance terrestrial and satellite set-top-boxes support return channel through GSM / GPRS / 3G / Wi-Fi / Ethernet etc. methods as specified by DVB e.g. Videocon Satellite HD DVR DSR 4611 comes with an Ethernet and a USB port, the USB port in future may also allow plugging USB 3G Dongles.

Television-rating-points (TRP) data collection over return channel may serve as an incentive to promote bi-directional interactivity for many service providers;

this may also help subsidize the additional operational cost of return channel.

Urban areas that are well connected to Internet may utilize existing broadband connections over Ethernet port and the rural areas where the Internet at home is almost nonexistent may opt for Mobile GPRS \ 3G. Digital video recorders (DVR) will also allow viewers to schedule their learning as per their convenience.

E. *Android Set Top Boxes*

An Android SetTopBox contains an Android operating system which allows user to watch videos from the internet on your TV. Most of these devices have Google Play Store already installed. It enables user to install applications on the set top box using Google Play Store^[12].

For most of the part, the products have access to the same apps and perform functions found on any other Android device. It can run Android apps, including a web browser and various games^[13].

III. INTERACTIVETV SERVICES

Interactive TV services are popularly branded as ACTIVE services by Indian DTV service providers. These allow viewers to do more with their TV rather than just sit back and watch the programmes or zap through the channels.

Types of Interactive TV Contents:

1) *Electronic Programme Guides (EPG)*

EPG allows the viewers to interact with TV to get additional information about the current and future programme.

2) *Video on Demand (VoD)*

VOD allows to viewers to interact and make a request for a particular video programme or movie.

3) *Interactive Application (iTV)*

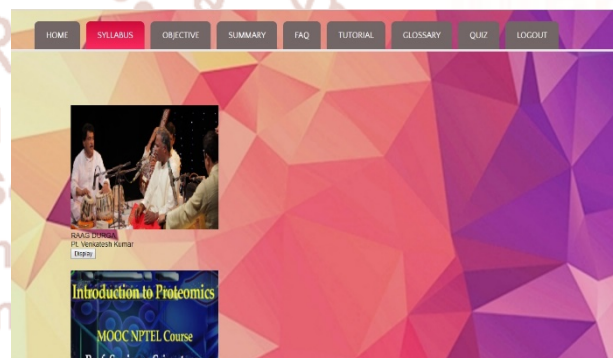
Interactive applications are not bounded to any particular functionally rather it depends on the application what functionality it provides like an interactive application could be a Game, EPG, VOD, Super Teletext etc.

IV. THE LEARNING APPLICATION FRAMEWORK

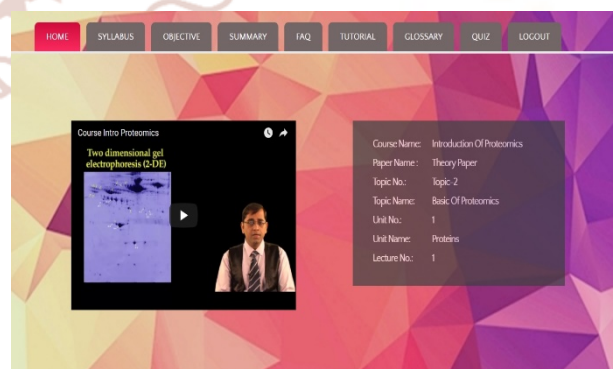
The application framework is a template for disseminating E-Learning content through television in 87 subjects^[11]. It enables the learner viewers to actively participate in the learning process through TV remote. The typical screens presented to the viewer are

- Login/Register Page
- Syllabus
- Home Page
- Objective
- Summary
- Frequently Asked Questions
- Tutorials
- Glossary
- Quiz (MCQ) – four options for each question

The first page is the Login/Register Page followed by the syllabus page which provides user to choose the required video i.e. Lecture – on – demand facility.

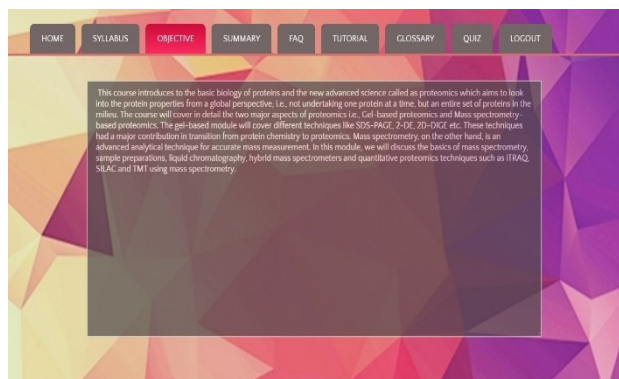


The home page is the third screen presented after the syllabus to the viewer on the application's launch. It has a scaled down video window on the left half and the additional lecture information on the right.

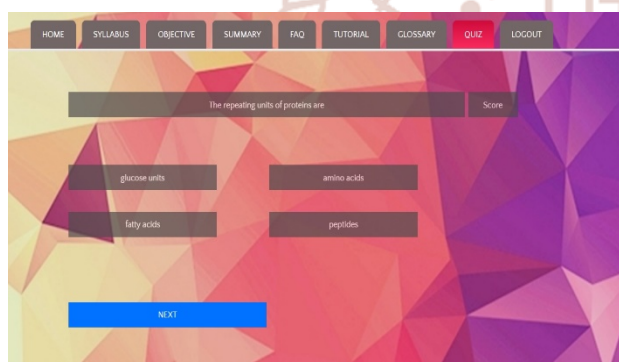


The text screens like Objective, Summary, FAQ, Glossary, Tutorials, etc. provides the viewers with the outline, synopsis, clarification of common doubts, reinforce the taught subject and familiarize with the

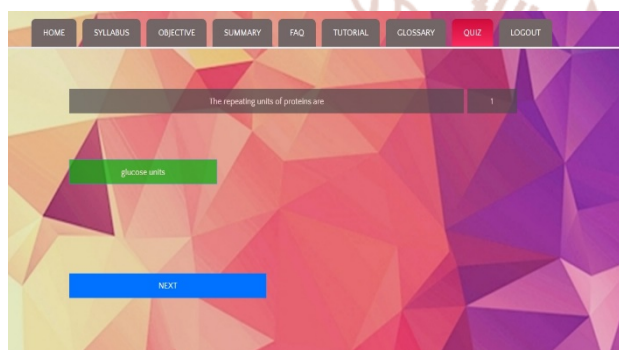
subject's terminology and clarify general misconceptions of the current subject lecture video.



Quiz encourages learner to take-up self-assessment and submit the score through return channel. It can also be synchronized with the programme so that the question changes in immediately as in the programme. The submitted score is handled by a web application located on a remote server.



After selection of the correct answer the following screen shows up.



CONCLUSION

The television digitalization is set to make set-top-boxes ubiquitous devices that will transform our perception of TV and viewing experience. With this happening TV will play a greater role in nurturing

India through interactive ETV broadcasts as detailed in this paper.

This framework enables users the support for lecture-on-demand, learner-mentor interaction through text based interface during the live sessions and will explore potential of Set-Top Boxes having Android.

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