

Developing In-Flight Entertainment System using Flex technologies

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Summary

Since early years of traveling by air, there was a need for in-flight entertainment and it changes its form throughout the decades. In last 20 years phrase in-flight entertainment exclusively refers to the electronic system installed in commercial airplanes to provide passengers with movies, music, news, games and other digital entertaining material. In this paper we are proposing IFE system developed using Adobe Flex, the latest state-of-the-art software development platform with excellent designing capabilities.

KeyWords

In-flight entertainment, Flex

1. INTRODUCTION

Since early years of traveling by air, there was a need for in-flight entertainment and it changes its form throughout the decades. In the very beginning, flying several kilometers above the ground level and looking down through the windows was entertaining enough. Soon after that, airlines' started providing food and drinks for their passengers, and considered utilization of modern technology for the purpose of entertainment. This was needed especially on lengthy transatlantic flights when passengers see nothing but ocean below and quickly got bored. In last 20 years phrase in-flight entertainment exclusively refers to the electronic system installed in commercial airplanes to provide passengers with movies, music, news, games and other digital entertaining material.

Achievements in airplane engineering today resulted in bigger and faster airliners which are able to connect almost any two airports in the world in a single flight. Airplane becomes place where few hundred people are kept not only for one or two, but even ten or more hours. Traveling such a lengthy flights at a height of 35 000 feet, in a noisy cabins, with no fresh air, passengers may experience physical and psychological difficulties. From takeoff till landing passengers spend almost all their time sitting in their seats having no opportunity for any activities.

Flying above the clouds, at speed about seven times faster than we usually travel in the car on the highway in plastic-aluminum tube together with 150 thousand liters of one of the most inflammable liquid known to humankind and occasionally experiencing turbulence, usually brings fear instantly and for most of the people flying in the airplane is considered dangerous. Six percent of the Americans avoid flying at all.

To eliminate boredom, flight phobia, stress and generally to make passenger overall flying experience better, airlines', airplane manufacturers and IFE hardware manufacturers work together constantly on improving in-flight entertainment.

To get fast and smooth IFE system we are proposing Lumexis FTTS (fiber to the screen) hardware infrastructure. This low cost, low weight, high speed and high reliability hardware will be a foundation for the system, and it will contribute a lot to overall good system performance. And for the software this IFE system will be developed using Adobe Flex, the latest state-of-the-art software development platform with excellent designing capabilities.

2. RELATED WORK

a. Technologies and trends

Manufacturers who develop most of IFE systems today are: Panasonic Avionics Corporation, Rockwell Collins Passenger Systems and Thales Avionics Systems. These three companies are leading in research, development and production of IFE systems around the globe.

Anantha (2002, p. 3) [1] listed following technologies used in present-day IFE systems and identified by World Airline Entertainment Association (WAEA); Digital Content Management, smart cards, satellites, displays, wireless, Fiber Channel and Gigabit Ethernet, Internet-transaction and gaming technologies. These technologies allowed following services categorized by Bretschneider et al. (2009, p. 1) [2] as screen-based, audio and communication.

Current IFE systems pay attention on seat-to-seat connectivity so today passenger can chat with another passenger or play in-flight computer games (e.g. chess) in multiplayer mode with his friend (Liu 2007, p.1) [3]. Today, passengers with credit cards can use them to pay for telephone calls, onboard shopping or pay-for-view movies (Anantha 2002, p. 7) [1]. Karlin (2001, p. 4) [4] described high quality surround audio systems like Dolby Digital virtual 5.1-channel already used in Singapore Airlines, Qantas Airways, Cathay Pacific Airways and Lufthansa and they are expected to become standard in all IFE systems soon.

Screen-based
<ul style="list-style-type: none"> • Video-on demand/TV • Aircraft display map • Computer games • Shopping
Audio
<ul style="list-style-type: none"> • Radio • Music on demand • Cabin-crew announcements
Communication
<ul style="list-style-type: none"> • Satellite phone • Satellite Internet • Fax

Fig 1. Some common services of current IFE systems

b. 'Coming soon' features

To improve passengers' satisfaction IFE manufacturers are introducing more and more technologies that were available all these years only on the ground. Watching direct broadcast satellite movies, having access to personal e-mail, using Internet (Kwan 2000, p. 4) [5] or charging laptop batteries (Anantha 2002, p. 7) [1] will be possible 35 000 feet high in the air in the near future.

In near future aircrafts are expected to communicate and exchange data with satellites, not only for purpose of Air Traffic Control (ATC) but for IFE systems also. (Bousquet et al. 2006, p. 1) [6]. This high speed communication will give birth to new generation of IFE systems which are going to provide services such as satellite Internet or satellite live TV channels. Surfing the Web or watching big events live like FIFA World Cup will be possible from the air soon (Kwan 2000, p. 4) [5]. Passengers will watch HD satellite TV for certain on High Definition in-seat screens (Lee 1999, p. 2) [7]. "The WAEA has created a working Group to identify applications, issues, and areas for standards development for satellite products in IFE" (Anantha 2002, p. 7) [1]. Anantha (2002) mention power outlets in seats from business jets are now becoming standard in commercial

aircrafts too, allowing passengers who need to recharge batteries of their laptop, mobile phone or PDA to do it during flight. This will especially benefit business travelers.

c. Passengers with disabilities

Every single passenger is important for airlines. Those with disabilities on board are treated with hospitality with satisfaction of their special needs in mind. To provide best services as they can airlines' require IFE systems to continue serving its purpose for this category of passengers also.

Captioning:

For those passengers who are deaf or with hearing loss so acute that they cannot fully understand audio portion of A/V content there is an option called captioning. Captioning is similar to subtitling but unlike subtitles which only show spoken dialogue as printed words on the screen, captions show additional things like on-screen and off-screen sound effects, music or laughter. Captions generally describe important parts of A/V content that can only be heard to know that they exist. Subtitles are made for translation and to help language understanding but captions are specifically designed for millions of viewers worldwide who are deaf and hard of hearing, especially elders. There are two types of captions; closed-captions and open captions. Closed-captions are not visible to all viewers, but only to those who activate them while open captions are always visible to all viewers and cannot be turned on and off. (WAEA 2007, p. 17) [8]

Narrations:

Another category of passengers with disabilities are those who are blind or have low vision. To satisfy their needs for entertainment, IFE systems offer descriptive narrations. For key visual elements that a viewer with this kind of disability would normally miss (e.g., action, settings, costumes, gestures or scene changes) script is written and voiced by professional narrator. These narrations are delivered between dialogs to avoid interference with audio or dialog of the content. How descriptive narrations will be delivered depends on the platform: "stereo television's secondary audio program for broadcast and cable distribution, selectable audio tracks for DVD distribution, and via infrared or frequency modulation systems in motion picture theaters". (WAEA 2007, p. 17) [8]

Accessible Navigation in IFE:

In-seat screen is core component and mostly the way passengers interact with IFE systems. These graphical user interfaces consisted of hierarchies of menus are not

usable for blind passengers. This barrier can be avoided in two ways or combination of these two:

Tactile Controls:

Keys on remote, used by passengers to navigate the menus, might have different shapes (square, triangle or round) (WAEA 2007, p. 17) [8] or use Braille system widely used by blind people to read and write.

Audible Feedback:

Second option that can be enabled for blind or passengers with impaired vision is audible feedback where IFE system “reads” to the passenger what’s on the screen. This technique is also called “talking menus”. Every function on the menu, button or key has its audio description which is played automatically when button is selected. System may read “descriptions of positioning within the menu structure, available choices, navigation instructions, audible prompts, and audible versions of other key information on the screen that is otherwise only available to sighted users” (WAEA 2007, p. 19) [8]

3. PROPOSED SYSTEM

For this project, as our main tool we are going to use Adobe Flash Builder 4 and Flex 4 run on ordinary laptop PC. “Developing on the Adobe Flash Platform is up to 90% faster compared to other environments... and then distributing to many operating systems and devices.” (Sun Sachs, AOL). Flex is free, open source framework, it enables “more creative, visual approach to building applications, and it shows in quality and interactivity of the end product.” (Emmanuel Laborde, SAP BusinessObjects). Many world leading GUI designers witnessed power of this technology. Jason Marsh from Acesis development team said “Adobe Flex enables me as a lead designer and lead GUI developer to quickly conceive, prototype, and develop functionality in response to customer needs.”

Once finished, our in-flight entertainment system will have high quality design, excellent performance and with help of Adobe AIR can integrate into any hardware platform or operating system.

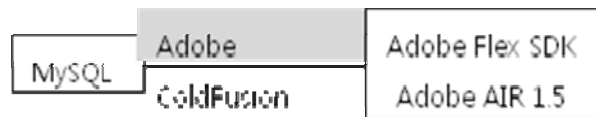
The ultimate strength of Flex is ActionScript 3 programming language that sits behind this platform. ActionScript is language recognized by Flashplayer and its developers are limited only by their imagination.

What the entire interface will be able to provide, in the main menu, will be categorized as a simple user activities, such as Watch, Listen, Play, Read, Eat and Shop. If the passenger wants to watch something on the screen, he will recognize his desire as user friendly option on the main menu which is button named Watch.

IFE system



Software technologies



Hardware technology



Fig 2. Three layers of IFE system architecture

After clicking on the Watch button, another menu will appear on the screen where he will be able to specify his wish, choosing from Movies, Music Videos, Documentaries, TV shows or Cartoons. Because we want to satisfy every user, on the screen there will be another menu for the user to specify movie Genre such as Horror, Comedy, Drama or Action, or to choose movie by country like Malay, Arabic, Chinese, Hindi or Hollywood. If a passenger wants to listen, button named Listen will be a logical choice for him and immediately after clicking on the Listen button he will be able to select what he wants to listen; Music, Audio books or Radio. Like movies, music also will be grouped into categories by genre such as Classic, Jazz or Rock or by country like Arabic, Malay or Hindi music. Like Watch and Listen buttons, other buttons will also do as their name says. Play will provide some in-flight computer games and satisfy passenger’s need for playing. Read is entirely dedicated to reading activities like reading news or reading e-books. Eat and Shop is for ordering food and for duty free shopping, respectively.



Fig 3. Screenshot of proposed system (Selecting desired movie)

4. FUTURE WORK AND CONCLUSION

This system is focused on end user and this is what it is primarily designed for. Administrators and content delivery staff will load new content in into IFE system database manually. To simply and speed up entire loading process separate interface will be designed for administrators and content delivery staff.

As all IFE systems feature navigations tools, this system in its final phase is expected to have one. Google Maps API will be incorporated and connected with airplanes GPS to show airplanes current location on the user screen. Those aircrafts which don't have Internet access in sky, or to save bandwidth maps will be preloaded from Google Maps onto airplanes storage in lower but satisfying resolution. This will make the maps independent from Internet maps source making them faster, reliable and resistant to connection failures. If aircraft have Internet access IFE system can provide full capabilities of Google Maps/Earth allowing them maximum zoom as they use it in their homes.

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