

Intelligent TV

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Abstract— As we are advancing into future with new products launched in market, it becomes difficult for users to cope up with these technologies. Recently, Smart TV's gained a lot of fame due to its abilities to do various tasks which compelled users to shift to these TV's. A device which we are proposing will be able to convert your normal LED TV into a Smart TV. A Raspberry pi with KODI installed in it will give your LED TV freedom to do more things than a Smart TV is destined to do. This device if implemented on a large scale can eliminate the need to buy a new Smart TV just for some new additions. This device will cost the same as that of the devices offered by other companies.

Key words: KODI, Raspberry Pi 3, Yatse, Screen Mirroring, IoT

I. INTRODUCTION

The central idea of Internet of Things is the ubiquitous presence of diverse things, such as smartphones, Radio-Frequency Identification tags, , etc., which are able to communicate with each other to achieve common goals. Internet of Things will have a high impact on several aspects of everyday life, particularly on domestic field. Key requirements for IOT devices include being uniquely addressable, sustainable and enhance able.

A smart TV, is also sometimes referred to as connected TV, hybrid TV, is a television set with integrated Internet and interactive "Web 2.0" features. [1]One of the first devices that became "smart," just after the mobile phones, was the television (TV).This traditional device had not changed much for many years suddenly expanded its capabilities to TV apps, Internet browsing, Skype calls, and many more. These devices have their own operating system and 4-core processors, much like a computer or a smart phone. Smart TV is a technological convergence between computers and flat screen TV sets and set-top boxes. Besides the traditional functions of TV sets and set-top boxes provided through traditional broadcasting media, these devices can also provide Internet TV, online interactive media, over-the-top content (OTT), and also on-demand streaming media, and home networking access. Smart TV is the next version of TV which allows you to do many things than what the "idiot box" used to do. Additionally, Smart TV's can stream movies online, allow you to watch your favourite TV series online, and also do all that stuff what its predecessor used to do.

Intelligent TV is one step towards future which lets you do functions what a Smart TV does but additionally, it gives you the freedom to transform your idiot box may it be CRT TV or a flat screen into a device that can perform all tasks of a smart TV and moreover perform tasks like video calls, presentations, hard-core gaming, screen mirroring, download movies, connect with friends, and surf the internet. An environment having input device may it be a wireless keyboard or a mouse, or simply a mobile phone

with required application installed and an output device can be a TV, or an image projector. Here, the mobile phone won't be communicating with the output device with sensors, which eliminates the need of traditional remotes and opens up the gates for smart phone to be used for another new application. Usage of smartphones as a remote for intelligent TV will not only pave way for simple screen casting instructions, but also video conferences or calls eliminating need of webcams as well.

Products available in market which transform your TV into a smart TV are still somewhat incomparable to the features provided by the intelligent TV. Giving user the freedom to configure the TV depending on the needs, as well as less complexity will not only help improve its user experience but also make user techno savvy which will lead into many developments in this field. Introducing this product in market will give a tough competition to other products in the market.

II. LITERATURE SURVEY

Indeed, most TVs currently sold are smart TVs—for example, in the defining market of China, 80% of TV sales in 2015 were smart TVs [2]. These devices have their own operating system and 4-core processors, much like a computer or a mobile phone. Samsung currently has a clear advantage on worldwide market share with 28.2% of devices followed by LG Electronics (15.2%), Sony (7.6%), Hisense (6.7%), and Skyworth (6.7%) [3]. A survey in Germany [4] indicates that only one out of four smart TV owners use their device to go online and browse the Internet, providing an explanation that "many responders find the use of the Internet with the smart TV very inconvenient." The main reasons behind this are that it is inconvenient to browse the Internet with the remote control (79.6%), and the browser has limited capabilities (63.1%). A 2013 study by Nielsen [5] in Australia found that ownership of smart TVs had increased significantly and that 33% of Australian homes owned TVs connected to the Internet. However, only 5% of them use this feature on a regular basis, a much lower percentage compared to all other devices in the same survey (38% for mobile phones, 68% for desktop, and 65% for laptops). According to the Australian Connected Consumer Report [6], the key barriers of users employing the Internet capabilities of their smart TV devices are: the lack of interest, lack of know-how, bad user experience (UX), a slow connection speed, and a lack of inter-testing content/Apps. With very few exceptions (e.g., YouTube and a few News and Sports Apps) most of the web, although accessible, is being ignored by smart TV users.

Another report by the NPD group in North America [7] highlights that the main smart TV feature that is employed is actually watching videos on a big screen (70%). Web browsing activity only captures the interest of 10% of the users; while other functionalities such as Social Media, Shopping, Maps, etc., have an even lower than 10% usage.

III. METHODOLOGY

The main objective is to establish connection between display and Raspberry Pi. Raspberry Pi 3 has many features which makes it the best fit for this application. YATSE application needs to be installed on mobile phone, for controlling TV via mobile phone. Wi-Fi connection needs to be setup and Bluetooth connection for keyboard and mouse if required. Screen Mirroring can be achieved by using the YATSE itself.

The algorithm to transform any display having a HDMI port can be achieved by following the below algorithm

- 1) Insert the micro SD card in to Raspberry Pi.
This states that, we need to insert the defined operating systems OS into the raspberry pi. The Raspberry Pi 3 model B is essential for this activity as it covers all the required specification.
- 2) Plug the USB keyboard into one of the USB ports.
For the initial setup, USB keyboard is needed. Bluetooth keyboard can be used later on and later on, a mobile phone can function as a keyboard as well.
- 3) Turn on your monitor or TV set and make sure it is set to the proper input (e.g. HDMI or Component)
- 4) Plug the HDMI or video component cable into the monitor TV set and connect the other end of the cable into the Raspberry Pi.

By connecting Raspberry Pi to display, the applications can be downloaded from which web surfing, and other tasks can be done. The KODI offers an interactive user interface, which can be controlled through mobile phone by using the YATSE application. The application needs some settings to be done before its application.

IV. RESULTS & DISCUSSION

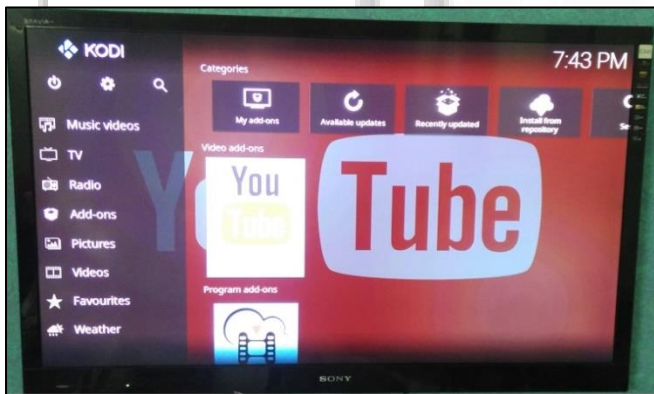


Fig. 1: A LED TV performing task of a Smart TV.

The functions which are supposed to be performed by an Intelligent TV device are well executed which are, on-demand video streaming, Screen mirroring, Video downloading, Web surfing, Surveillance, improved Resolution, Downloading applications, Gaming, etc. The device proved compatible to almost all smart phone devices supporting YATSE application. Interconnectivity between devices was well functioning as it was connected to Wi-Fi, Bluetooth speaker, Mobile Phone, TV at the same time. Screen Mirroring proved effective as it could handle video calls, as well as media slideshow.

During its application on an image projector the need of laptop, and audio jack was simply eliminated as the Bluetooth speaker replaced wired speakers.

Tables show the breakdown of parameters for Audio and video information respectively.

Audio information	Breakdown
aac	Audio codec
mp4a / 0x6134706D	Codec ID - Format profile ^[8]
48000 Hz	Sampling rate
5.1	Audio channels
s16	Sample size (s16 = signed 16-bit value)
fltp	float, planar
438 kb/s	Average audio bitrate (reported by demuxer)
aq:99%	Audio queue saturation
Kb/s:437.42	Current audio bitrate (reported by player)
att:0.0db	Attenuation / gain added by player

Video information	Breakdown
h264 (Main) (avc1 / 0x31637661)	Video codec
yuv420p	Color space / Chroma subsampling
1920x1080p	Resolution
SAR 1:1 DAR 16x9	Source Aspect Ratio - Display Aspect Ratio
9282 kb/s	Average audio bitrate (reported by demuxer)
fr:24.000	Source framerate
vq:88%	Video queue saturation
dc:ff-h264-dxva2	Video library performing decode
Mb/s:7.79	Current video bitrate (reported by player)
drop:12	Number of dropped frames
skip:13	Number of skipped frames
pc:1	Pullup correction pattern length

V. CONCLUSION

The device is able to communicate between its peripheral components, is able to accept input from numerous expected such as mobile phone, Bluetooth keyboard, Bluetooth mouse, etc. Output can be viewed on CRT TV, LED TV, Image projector, monitors, etc. The user interface proved to be more user friendly and the access to various functions gave the opportunity to do more with TV.

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REFERENCES

- [1] Emmanouil Perakakis, *Member, IEEE*, and Gheorghita Ghinea, *Member, IEEE Smart* “Smart Enough for the Web? A Responsive Web Design Approach to Enhancing the User Web Browsing Experience on Smart TVs.”
- [2] YuMe, “YuMe, Nielsen CCDATA and UPOTV Publish China connected TV market development white paper,” 2016.[Online].
Available:<http://www.yume.com/news/press-releases/yume-nielsen-ccd-data-and-upotv-publish-china-connected-tv-market-development>. Accessed on: Jun. 14, 2016.
- [3] BusinessKorea, “Samsung, LG Electronics took up 40% of global smart TV market last year,” 2015. [Online].
Available:
<http://www.businesskorea.co.kr/english/features/focus/10104-smart-segment-domination-samsung-lg-electronics-took-40-global-smart-tv-market>.
- [4] Tomorrow Focus Media, “Smart surfing has reached theTVmarket. Smart-TV Effects 2014-1,” BurdaForward GmbH, Munchen, Germany, 2014.
- [5] Nielsen, “Australian online landscape review,” 2013. [Online].
Available:<http://www.nielsen.com/content/dam/corporate/au/en/reports/2013/nielsen-online-landscape-review-january-2013.pdf>
- [6] Nielsen, “Australian connected consumers report,” Road Macquarie Park, N.S.W., Australia, 2013.
- [7] NPD Connected Intelligence, “Application & convergence report,” 2012.
- [8] <http://matroska.org/technical/specs/index.html#CodecID>