Framework comprising of adjustable display implemented using Raspberry Pi

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Abstract: The increasing need for technology has led to an increase in the use of gadgets. Gadgets such as computers, which are not portable, and laptops, which are portable but not always easy to carry. This research work attempts to lessen the burden of carrying such devices to a certain extent. It uses the latest Raspberry Pi 3 to provide the system with an operating system.

IndexTerms **– Raspberry pi, Battery, screen resolution**

I. INTRODUCTION

This system provides a suitable alternative to laptops and computers. This project aims at creating a system which can be easily constructed even by a layman. Here we are using a Raspberry Pi 3, any available display device, HDMI cable and a battery as the main components. Using the proposed system one can easily convert any display device into a computer. This project has life long impact on the upcoming technology as we proceed to the era to using portable and compact devices. The setup can be more efficient for the people who don't want the hassle to carry heavy laptops specially in rural area where people can not own a well efficient display to carry on work as desktops and other displays can be costly. The idea was inspired by reviewing a few IEEE papers based on smart mirror, giving the idea of making a compact smart device using raspberry Pi that's also portable.

The Raspberry Pi is a credit card sized computer that was developed in the laboratory of University of Cambridge and released by raspberry pi foundation in 2012. The Raspberry Pi 3 B+ is a version of the Raspberry Pi which was released in February 2016. It contains a 1.2 GHz ARM Cortex-A53 CPU and hence is the first version of the Raspberry Pi to support the arm64 architecture

Its specifications are:

- Broadcom BCM2837B0, Cortex-A53 (ARMv8) 64-bit SoC @ 1.4GHz
- 1GB LPDDR2 SDRAM
- 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2, BLE
- Gigabit Ethernet over USB 2.0 (maximum throughput 300 Mbps)
- Extended 40-pin GPIO header
- Full-size HDMI
- 4 USB 2.0 ports
- CSI camera port for connecting a Raspberry Pi camera
- DSI display port for connecting a Raspberry Pi touchscreen display
- 4-pole stereo output and composite video port
- Micro SD port for loading your operating system and storing data
- 5V/2.5A DC power input
- Power-over-Ethernet (PoE) support (requires separate PoE HAT)

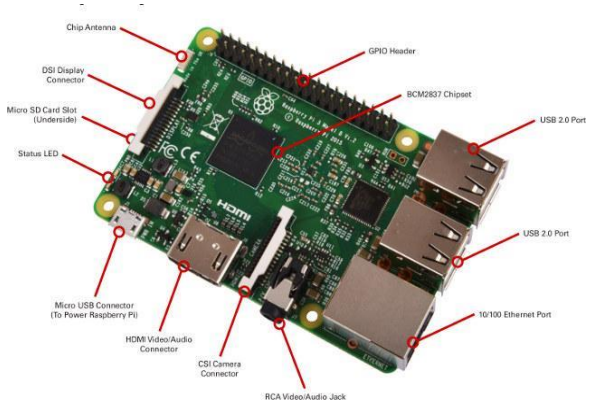

Fig 1: raspberry pi.

II. LITERATURE SURVEY

A) Design and development of daughter board for Raspberry Pi to support Bluetooth communication using UART. [ICCCA2015]
Reliable and secure communication between two or more devices require a wired connection. A wireless communication such as - Bluetooth, Wi-Fi, ZigBee etc. provides a flexible and inexpensive solution for remote applications. A large number of low-cost hardware platforms such as Raspberry Pi, Arduino, embed boards etc. are available that do not provide any inbuilt wireless module but are equipped with UART, I2C ports for design and development of the Internet of Things (IoT) and embedded applications. Raspberry Pi is a new hardware platform providing all the functionalities similar to personal computer or laptops. Bluetooth is a technology that operates in a master-slave mode, where master and slave together forms a Pico-net. It provides two modes of communication i.e., point-to-point (pairing is required) and broadcast. Raspberry Pi is a small sized computer board consists of RISC architecture based processor ARM 11, 700 MHz processor. It is equipped with SoC "BCM 2835" providing onboard 512 MB of SDRAM, an interface for output units such as VGA Monitor, touch screen and an input unit such as a keyboard, keypad, and mouse. Raspberry Pi is equipped with 2 SPI, 1 UART, and 1 I2C.

B) Raspberry Analysis in the Teaching of Computer Sciences: [*ISSN 0973-4562]*

Raspberry Pi 3 B According to [4] the Raspberry Pi 3 is the third generation of Raspberry Pi. Replaced the Raspberry Pi 2 B model in February 2016.
Compared to the Raspberry Pi 2 has:

Features	
CPU	ARMv8 quad-core 64-bit 64-bit and 1.2 GHz.
Network	802.11n wireless LAN
Bluetooth	Bluetooth 4.1 Bluetooth low energy (BLE).
RAM	1 GB de RAM
Port	Full HDMI port Ethernet port
USB	4 USB ports
GPIO	40 GPIO plugs
Conector	3.5 mm combined audio and composite video connector
Interface	Camera Interface (CSI) Display Interface (DSI)

Fig 2: General features of raspberry pi.

C) Constant-Size Image display Independent of Screen Resolution: [Patent No.: US 6,982,729 B1]

Today computer display devices have a wide range of available Screen resolutions. Some of the Standard resolutions are 640x480, 800x600, 1024x768, and 1152x768. Each of these resolutions gives the number of pixels that are displayed in the width and height of the display area. For example, the 640x480 resolution displays 640 pixels across the width of the display and 480 pixels across the height of the display. These Screen resolutions are typically independent of the actual size of the display area. For example, a 15-inch monitor can use a resolution of 1024x768 and a 21-inch monitor can use a resolution of 640x480.

The ratio of the width to the height of a web page. Displaying an image in a web page by Specifying the number of pixels for the image height and width allows the image to remain the same Size when the web browser is resized. But the Size of the image is different depending on the current resolution of the display driver. For example, an image that is 4x4 inches on a 17-inch monitor using a resolution of 1280x1024 would be 8x8 inches on the same monitor when using a resolution of 640x480. A potential difference of 2 to 1 in image sizes makes it difficult to create a page layout by Specifying the image Size using the number of pixels for the height and width.

III. PROPOSED SYSTEM:

In the proposed system, we are using a Raspberry Pi 3, an HDMI cable, Bluetooth connectivity and any display device as main components.

The device is a small network appliance that can deliver digital audio/video content streamed via the internet, to a smart television. The project aims to develop a system using these components to give user an independent display experience. Here, we are furnishing the raspbian new out of the box software(noobs). Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. the user will be able to use this system and connect any display regardless of the resolution of the display as it will arrange its resolution to the maximum setting it can support.

Most media streaming devices available in the current market mostly lets the user stream multimedia stuff such as, video streaming, audio streaming. what makes this system different is its ability of word processing. enables user to perform some light office work.

IV. METHODOLOGY:

The system will have Raspberry pi 3 B+ model as its core component in which a raspbian os will be installed. Making a portable setup in a way such that any external heavy device isn't needed. A working keyboard and mouse is sufficient for it. This devices aims for portability, accessibility, and eliminating the need of carrying heavy computing devices such as laptops in the first place, by being a cheaper and lightweight alternative to such devices.

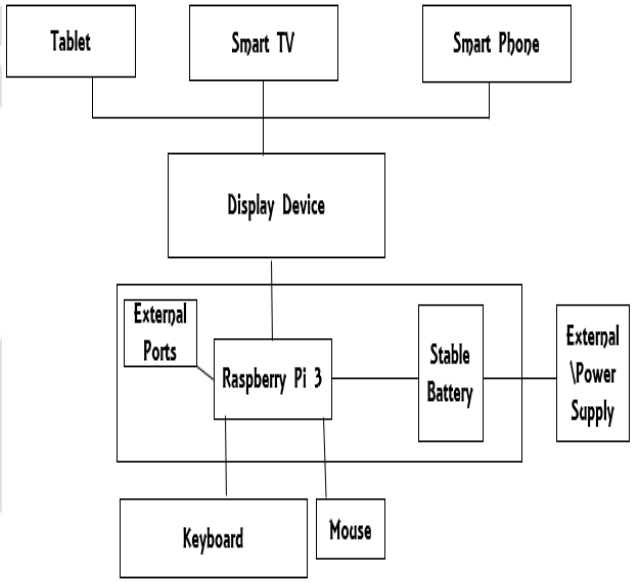

Fig 3: System design.

The system consists of a device, which can be a desktop or a television, a raspberry pi 3, external input devices such as keyboard and mouse, a stable battery and an external power supply. The use of stable battery is to provide required amount of power supply to the system.

Using this device we get access to not only the multi media support such as video streaming, listening to music or else looking out for pictures. This device helps the user to work from where ever he/she is just by accessing a screen or desktop to work on, which means it helps the user to not only stream videos, music and pictures but also having a hands on the word processing that is getting some office work.

Fig 4: Description of the components.

For building this multimedia device a 7inch Display is attached additionally if we desire for some higher resolution displays we can make use of LCDs or LEDs or even our own mobile phones by an additional HDMI or VGA cables attached to it.

Bluetooth connectivity is required to connect the raspberry pi embedded keyboard to the display device. As there is a built-in Bluetooth in Raspberry Pi 3. It is only essential if we want a complete wireless experience.

HDMI is a digital connection; HDMI cables are less prone to interference and signal noise than analog cables. Also, HDMI eliminates the digital-to-analog and analog-to-digital conversion other interfaces require. Therefore, HDMI typically produces the best quality picture and sound compared to other types of connections.

V. ABBREVIATIONS:

1) HDMI: High-Definition Multimedia Interface
2) Wi-Fi: Wireless-Fidelity
3) UART: Universal Asynchronous Receiver -Transmitter

VI. CONCLUSION:

As we can see in the present scenario we are able to just stream videos, music and pictures but with out framework it is almost possible that the user can do some word processing and multitasking on the go where ever he/she is just with some external display device having an HDMI connectivity.

VII. ACKNOWLEDGEMENT

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