Smart Mirror Using Rasberry Pi

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Abstract- *The Internet transformed our lives by connecting us more easily to information and other people in the virtual world. Mobile phones then became smart-phones and since then this concept has erupted and morphed into the Internet of Things, things which connect us to everyday objects. There is no end of objects that could be made "smarter", some being more suited to this than others. Mirrors, for example, provide a large surface ideal for displaying information and interacting with. Most people have mirrors at home so the concept of a smart mirror that we can interact with is attractive. The device was to go beyond an ordinary mirror. The device was to look like a regular mirror but would have a screen inside and you would be able to interact with it. The main features would be showing basic weather , location based time information , reminders etc.This project describes the designing and implementation of a mirror, called "Smart Mirror". It is a device that can function both as a mirror and an interactive display displaying multimedia content such as time, date, weather and news simultaneously. The user can interact with it using voice commands. The Magic Mirror consists of various functionalities like real time data and information updates, voice commands, face detection/recognition using LCD monitor, microphone and webcam.*

Keywords- Rasberry Pi,Internet of things,Python,Smart Mirror

I. INTRODUCTION

The world we live in today has become a place of the fiercest competition, whether it is in sports, entertainment, or the job market. Day after day we are moving towards a more automated and interconnected world because of various wirelessly connected embedded devices. These are responsible for changing and improving the standards and quality of living. Many devices are being developed which use concepts of multimedia communication, artificial intelligence, internet of things (IoT) to revolutionizing the way we perform our various day to day tasks in our home, offices or even industries. In order to be the best, one needs to allocate an extraordinary amount of time to their goals with little distraction.However, the advent of in-formation technology tends to act like a dual-edged sword when it comes to work productivity; sometimes one can use the ease of information to help them complete a task, but it can also provide significant distraction. Ultimately one strives to be their best, but the interruption of keeping up with the daily news, or preparing for incoming weather can hinder one's progress. Taking time throughout the day for these various activities can be extremely distracting and greatly cut into performance. Along with information, people greatly value their appearance, spending approximately an hour a day in front of the mirror during their morning and night routines. This is a significant amount of time where important things are taking place, but the mind is not working. It would be extremely useful to spend that time on the phone or computer completing any of the tasks mentioned above, but unfortunately it is difficult to do so while preparing for the day.

II. RELATED WORK

Some paper describes various issues and related work.The authors believe that the introduction of this digital information technology will have wide-ranging implications, which will for the most part be beneficial and valuable. The pa-per describes the design and development of a futuristic smart mirror that represents an un-obtrusive interface for the ambient home environment. (October 2007) the design and the development of an interactive multimedia futuristic Smart Mirror with artificial intelligence for the ambient home environment as well as for commercial uses in various industries. Pa-per: Ambient Intelligence Vole 5, No 4 (2004).Smart Reflect[7] is a similar work carried out by the students of MacEwan University. It basically aimed at providing a platform that can facilitate the development of smart mirror. It acts an alternative option than the sandbox environment. It is light in functioning as compared to already present platforms. Its major advantage is its multiple language and environment support so as to ease end user efforts. Another project named MagicMirror[10] as carried out by students of NUS, They created a magic mirror which can recommend you appropriate clothing in the morning while you get ready. The Magic mirror model will scan the user and then based on the particular occasion or event it will recommend most suitable attire and other styling options. The events can be retrieved from user's social media account or can be added to the calendar manually.

II. IMPLEMENTATION

The device is look like a regular mirror but would have a screen inside. A smart mirror is basically a mirror with a screen behind it. That screen can be an Android tablet or a computer monitor. The project which would collect real world machine data such as location based latest news and headlines, weather reports, and as well as show us the local time. The data would be transmitted from the machine and would be managed in a central database and would be managed by the Raspberry Pi. The Smart Mirror implemented as a personalised digital device equipped with peripherals such as Raspberry PI, microphone, speakers, LED Monitor covered with a sheet of reflective one way mirror provides one of the most basic common amenities such as weather of the city, latest updates of news and headlines and local time corresponding to the location. The mirror display is provided by a flat LED display monitor which displays all the necessary information which are useful for the user. The mirror also provides a picture-in-picture sub-display to facilitate the display.Smart mirror consist of:

RASPBERRY PI

Raspberry Pi 3 acts as the main control centre for this proposed model. The Raspberry Pi is equipped with a micro SD card which can be loaded with operating systems like Raspbian or Windows 10 IoT core. After the OS is running the Magic Mirror code will can be implemented on it to run the application. The Monitor will be getting input from RPi using HDMI cable.

LED Monitor

This screen was placed behind the mirror which was used to display the desired information to the user. An LED display is a flat panel,which uses an array of light emmiting diode. The required info. will be displayed on LED monitor.

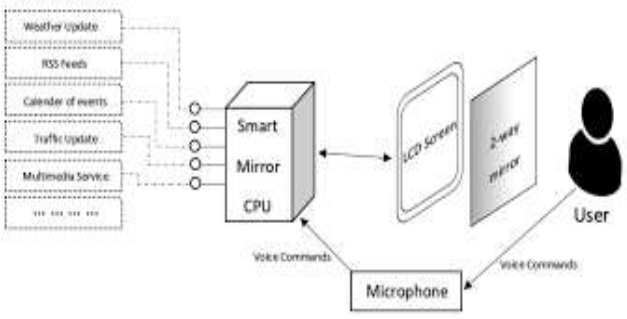

Fig.1 Implementation of smart mirror

Speaker

The audio output is taken from the audio jack of the raspberry pi. The audio output of the videos or any multimedia is amplified using an audio amplifier. The audio output is taken out from the speaker which is also interfaced with the raspberry pi controller.

Raspbian OS

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. Raspbian comes with over 35,000 packages, pre-complied software bundled in a nice format for easy installation on Raspberry Pi computer.

Raspbian is a Debian-based computeroperating system for Raspberry Pi. There are several versions of Raspbian including Raspbian Stretch and Raspbian Jessie. Since 2015 it has been officially provided by the Raspberry Pi Foundation as the primary operating system for the family of Raspberry Pi single-board computers. Raspbian was created by Mike Thompson and Peter Green as an independent project. The initial build was completed in June 2012. The operating system is still under active development. Raspbian is highly optimized for the Raspberry Pi line's low-performance ARM CPUs. Raspbian uses PIXEL, **P**i **I**mproved **X**-Window **E**nvironment, **L**ightweight as its main desktop environment as of the latest update. It is composed of a modified LXDE desktop environment and the Openbox stacking window manager with a new theme and few other changes. The distribution is shipped with a copy of computer algebra program Mathematica and a version of Minecraft called Minecraft Pi as well as a lightweight version of Chromium as of the latest version.

NodeJS

NodeJS is an open-source cross-platform JavaScript run-time environment for executing JavaScript code server-side. It comes included with Electron which is used to launch processes to control things that are not available in web API's such as the sensors and microphones for voice recognition.

VNC VIEWER

In computing, Virtual Network Computing (VNC) is a graphical desktop-sharing system that uses the Remote Frame Buffer protocol (RFB) to remotely control another computer. It transmits the keyboard and mouse events from one computer to another, relaying the graphical-screen updates back in the other direction, over a network.

IV. PROPOSED WORK

Various services like weather, calendar, traffic, news stock updates etc. can be accessed and controlled using voice commands. The Raspberry Pi 3 is connected to a Monitor via HDMI cable and a webcam is attached using a universal serial bus. Raspberry Pi is powered up using a 5V/2A DC supply.We plan to deliver a working model of Magic mirror by using raspberry pi 3 for smart homes of future as well as commercial uses. The device will look like a normal reflective mirror but would have a monitor attached on one side. A special LED monitor is used for this purpose as it can act as normal reflective mirror when the monitor is off and can also display various data as soon as the monitor is turned on. This will thus serve both the purposes. Proposed model can perform various functions described as given:Work as a normal reflective mirror so that the user can use it as a regular mirror. A two way mirror which can function both as reflective and see through mirror is attached to a LED display. This provides two major functionalities ie. Mimicking a normal mirror as well as working as a display for real time data updates. Personalized data and information services: Anyone using this mirror will be able to get real time updates of news and headlines, date, time, weather updates as well as other reports of our particular interests. The user interface will be show the data on the mirror and the empty space in between will accommodate the reflection of the user. A LCD was attached to display with the frame and connect the LCD display with the raspberry pi via HDMI cable. USB microphone and USB web were then connected with the raspberry pi. Finally, the power source for both the raspberry pi and LCD display was established. As the raspberry pi has its own operating system, the Raspbian operating system was booted for the project into the raspberry pi. It was updated and upgraded to increase the CPU speed. The default version of the operating system consisted of an older version of the Node which did not consist of NPM. So, the Node v5.1.1 was reinstalled which included the NPM v1.9. Next, pip was installed which was a package installer of python and it helped to install numerous packages. Now moving to the coding and designing part, HTML, CSS and JavaScript were used to display the information on the LCD display in such a way that only the information's would appear before the user. And for the AI and other modules, python programming language was used.

V. EXPERIMENTAL RESULT

A futuristic smart mirror system that provides information like time, date, accurate temperature and humidity, and latest news while looking and grooming in front of mirror.

Fig.2:Result

VI. CONCLUSION

We have designed an intelligent mirror keeping in mind the up-coming future advancement in the field of home automation environment. The prototype of the magic mirror is powered and controlled by the Raspberry Pi 3 and all the final output in form of real time data feeds are displayed on LED screen fixed with a two way mirror. We have built a working model to demonstrate various functionalities of the mirror using voice commands. It gives a layout that can be extended in future to accommodate even more functionalities. In our future work we will try to add advanced gesture controls, automated salutation using face recognition of the end user and also understand that how advanced artificial intelligence can be implemented to the mirror so that it can automatically take care of all the requirements of the end user.

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