Smart Mirror using Voice Interface

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Abstract - *A The future technology has paved its way into the world of Intelligence in the form of Intelligent mirrors which is an amalgamation of both the computer aided information services and mirror being provided to the user as a user interface. The credit is given to the microcontroller cards on board, that connects to the internet, access and processes the data and displays it effectively on a place prescribed in the mirror. The mirror is further being intellectualized with the addition of an input device the ALEXA. In the scope of study, the intelligent mirror system thus developed includes features such as weather reports, date and time information, current news updates and greeting messages. Additional commands are given to the system by the input voice commander the ALEXA that can perform various tasks from playing a video of your choice to showing maps of desired location.*

Key Words: **Smart mirror, Raspberry pi 3b+, Makers, IoT**

1.INTRODUCTION

INTERNET OF THINGS or known as IOT is an ecosystem that connects various physical components together that are accessible through the internet. The 'thing 'in IoT could be in reference to the automobiles with their built in sensors or the ultimate challenge the Humans with a heart monitor. A single line explanation would be any object that has been specified an IP address which has the ability to accumulate and transfer data across any or specified network without human intervention. The ability of the system to interact with the external environment or the internal states is due to its embedded technology that also plays a key role in decision making. The combination of IoT and Android is employed in this system.

2. OBJECTIVE

The objective wherein is to develop a mirror that does smart activities like showing weather, time , date and news etc. thus keeping the user away from time consuming activities. All of the above-mentioned tasks are to be performed with the help of the Raspberry pi 3b+.

3. PROBLEM STATEMENT

The major problem of any existing mirror is displaying just the object in front of it or just the human face without having to interact with them. This project is developed with the intention that people spend quality time in front of the mirror.

4. BRIEF DESCRIPTION OF THE PROJECT

The entire system can be precisely divided into three major sections being:

The LED monitor

The Raspberry Pi 3B+ and

Acrylic mirror

Brief description of this components is given below.

4.1 RASPBERRY PI 3B+

Fig 1: Raspberry Pi 3b+ model

This credit card sized Raspberry Pi 3b Plus is capable of doing a lot of things and anything when compared with desktop PC.

It has a quad core of 1.2 gigahertz,64 bit CPU,

Processor-Broadcom of BCM 2837

RAM-1GB RAM

Other Components-

BLE that is Bluetooth low energy with 30 pin extended GP IO,

4 pole stereo output,

Video port that is composite,

High-definition multimedia interfaces,

camera serial interfaces,

Display serial interfaces and

Upgraded switched micro USB power source that is used for storing data up to 2.5A.

Raspberry Pi capabilities are expansive which can be used for word processing, for playing mini craft or web surfing or even acting as a media player. Their extensive capabilities are just not ending here. They are also used for streaming blue Ray quality videos. These are the best options to incorporate to any of your next embedded designs project as they provide space for 40 pin GPIO header that in turn gives you access to 27 GPIO, 12c, UART as well as 3.3 volt and 5-volt power supply.

4.2 LED MONITOR

LED monitors are flat panel display which uses array of light emitting diodes in the form of pixels for video display.

There allowed to be used in the outsource because of the brightness where the can be visible to the sun store signs and billboards.

They have paved their way into the destination signs on public transport vehicle as well as variable messages signs on highways.

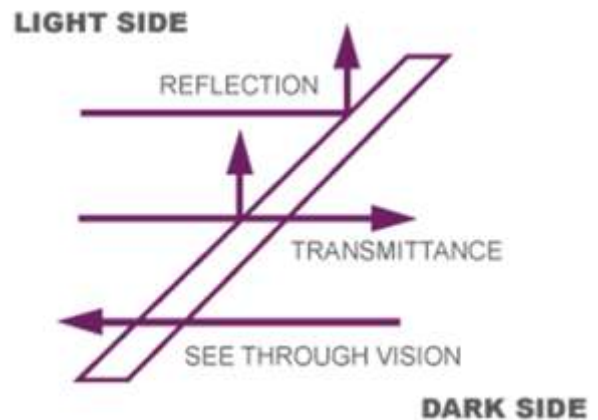*Fig 2: Dell LED Monitor*

4.3 MIRROR

Fig 3: Mirror Functionalities

The mirror is bidirectional initially it does not matter which side you are looking from. The light passes equally in both directions. However, to achieve the desired effect one side must be kept dark while the other is bright. The backside of the mirror will be coated in black to simulate the darker room. The monitor creates light on its own so its screen contents will be able to shine through from the dark side. By using a black and white interface only the white color will travel through the mirror. However, the mirror was designed to be highly modular allowing replacing most of the hardware. They exist in both acrylic and glass. Acrylic is potentially cheaper and easier to work with than glass. Alternatively, there also exists two-way film that can be used on ordinary windows to achieve the same effect.

5. HARDWARE REQUIREMENTS

5.1 ALEXA

Alexa is a virtual digital assistant developed by Amazon for its Amazon Echo and Echo Dot line of computing devices. Alexa's capabilities mimic those of other intelligent assistants such as Apple Siri, Microsoft Cortona, Google Assistant and Samsung Bixby.

Alexa responds to voice control by returning information on products music, news, weather, sports and more. The back-end engine for Amazon's Alexa running on Amazon Web Services in the cloud, enabling Alexa to learn an individual or family's preferences and expand its functionality over time. Alexa is only designed to send short query and request information following being triggered, but it always listening in the background for its trigger word.

Fig 3: ALEXA DOT

5.2 ETHERNET LAN CABLE

The ethernet port comes with 300 Mbit/s which is much faster than earlier version with 100 Mbit/s speed. It is known as gigabit ethernet based on USB 2.0 interface.

Fig 4: Ethernet LAN Cable

6. SOFTWARE REQUIREMENTS

6.1 RASPBIAN OPERATING SYSTEM

Raspbian Is the Best All Around Operating System. Raspbian is the official operating system of the Raspberry Pi and because of that, it's the one most people will want to start with. Raspbian is a version of Linux built specifically for the Raspberry Pi. 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.

There are few steps that may apply for installation this Smart Mirror by using Raspberry Pi.

➢ Firstly, install the Raspbian Jessie, then boot the Pi. Unmounts the SD card from your computer and insert it into your Pi. Connect your keyboard, mouse, HDMI cable and, lastly, the Pi's power cable.

➢ You will now see the Raspbian Pixel desktop (GUI). This Smart Mirror needs to be Wi Fi enabled so that it can connect to the internet and so that access is remotely done through VNC Viewer to set things up. In the top right of your screen, click on the network icon (two computers with an X).

➢ Select your network enters your WIFI password, and click OK. The Raspberry Pi 3b+ and Raspberry Pi Zero W have built in Wi Fi. After that, find the IP address so thus can be connect to it from any regular computer and complete the rest installation from there.

➢ Lastly, Smart Mirror is started on system boot with appearing of all features that include.
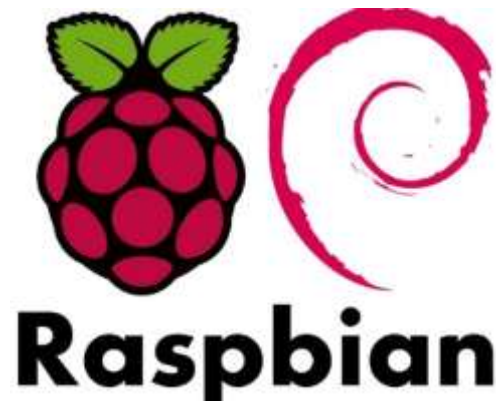

Fig 5: Raspbian OS Logo

6.2 ALEXA VOICE SERVICES

ALEXA Voice Services (AVS) is one of the products of Amazon services are built around AI voice controlled assistant for various things such as system requirements and system Smart Home Smart Mirror as Smart Mirror. AVS and ALEXA first introduced to Echo, intelligent speaker company, allowing two way voice interaction with multiple systems in the environment and online. ALEXA is available in the growing number of other devices, including smartphones, tablets and remote controls. ALEXA was chosen as the name for this voice service because ALEXA refers to the ancient Library of Alexandria known as the keeper of all knowledge.

6.3 VNC VIEWER

VNC Viewer VNC stands for Virtual Network Computing and has been developed by far flung console consoles for penetration and hacker testers. RFB protocol are used by VNC to send screen pixel data between device such as computer and laptop or smartphone through internet network and the used of the IP address that already available in the Raspberry Pi to monitor the Smart Mirror. It is an easy and powerful protocol created by Real VNC. VNC Server captures desktop computers in real time and sends them to VNC Viewer for display. VNC Viewer collects input (mouse,

keyboard, or touch) and sends it to VNC Server to inject and completely reach remote control. By utilizing this VNC Viewer facility, users can control the desktop remotely by using various electronic devices such as smartphones.

6.4 JSON

JSON or JavaScript Object Notation is a light weight text based open standard designed for human readable data interchange. Conventions used by JSON are known to programmers, which include C, C++, Java, Python, Perl, etc.

- JSON stands for JavaScript Object Notation.

- The format was specified by Douglas Crockford.

- It was designed for human readable data interchange.

- It has been extended from the JavaScript scripting language.

- The filename extension is. json.

- JSON Internet Media type is **application/json**.

- The Uniform Type Identifier is public. json.

- JSON is easy to read and write.

- It is a lightweight text-based interchange format.

- JSON is language independent.

6.5 OPEN CV

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD licensed product, OpenCV makes it easy for businesses to utilize and modify the code.

OpenCV is written in C++ and its primary interface is in C++, but it still retains a less comprehensive though extensive older C interface. There are bindings in Python, Java and MATLAB/OCTAVE. The API for these interfaces can be found in the online documentation. Wrappers in other languages such as C#, Perl, Ch, Haskell and Ruby have been developed to encourage adoption by a wider audience.

Since version 3.4, OpenCV.js is a JavaScript binding for selected subset of OpenCV functions for the web platform. All of the new developments and algorithms in OpenCV are now developed in the C++ interface.

6.6 ALEXA SKILLS

The Alexa Skills Kit (ASK) is a collection of self service APIs, tools, documentation, and code samples that makes it fast and easy for you to add skills to Alexa. ASK enables designers, developers, and brands to build engaging skills and reach customers through tens of millions of Alexa enabled devices. With ASK, you can leverage Amazon's knowledge and work in the field of voice design.

An Alexa skill includes a voice user interface, or VUI, to understand customer intents, and a back end cloud service to process intents and tell Alexa how to respond. You can use capabilities in the Alexa Skills Kit to deliver both.

Alexa converts spoken words to text using automatic speech recognition (ASR), deduces the speaker's meaning using natural language understanding (NLU), and provides the underlying customer intent your skill. With ASR, voice technology can detect spoken sounds and recognize them as words. ASR is the cornerstone of the entire voice experience, allowing computers to finally understand us through our most natural form of communication: speech.

Today's voice first technologies are built with NLU, which is artificial intelligence centred on recognizing patterns and meaning within human language. When a computer understands what you mean to say without you having to ask it in one specific way, using your voice starts to feel like having an actual conversation.

7. IMPLEMENTATION

STEP 1:

Turn on the supply of both raspberry and LED Monitor

STEP 2:

Turn any Hotspot and connect it with raspberry Pi

STEP 3:

Now to Monitor the raspberry pi connect your device to raspberry through VNC Viewer it requires an IP address so we have to enter the correct IP address of raspberry pi so it will be get connected

STEP 4:

After the proper connection, open terminal and type

 -nps start

STEP 5:

The smart mirror is displayed on the mirror through the LED Monitor.

It displays the Date, news, Weather, Schedules in your calendar.

Through Alexa we can even open browser and play all the videos and songs and read the document.

The scrolling down or up of the browser page can also be done by using certain commands to our Alexa.

8. RESULTS

Fig 6: Smart Mirror Output

8. CONCLUSIONS

The Smart Mirror that is used here makes our lives even easier by implementing the smart Alexa. Here the Alexa helps us to open the browser, which can open the documents or an article through the voice commands. The highlight of this smart mirror is, by using the Alexa skills we can simplify and use the mirror in a smart way and efficient way.

Alexa Skills can be altered in future for further implementation of making the smart mirror function efficiently and smartly.

The Alexa and the Raspbian component can be alone taken out and be fixed to any other devices to make it more interactive and smarter instead.

Example: we can use these components in car mirror, which makes the driver to interact with his/her mirror without using their phones on hand and get distracted while driving.

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