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SMART MIRROR

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ABSTRACT
People in the world today must be connected and ready for easy access to information. The Internet of Things means that computer devices that are integrated in everyday objects can be connected to send and receive data via the Internet. It is an interactive, futuristic multimedia Smart Mirror with artificial environmental intelligence and commercial applications in different industries. At present, 3D mirrors and hair salon smart mirrors are expensive, and are limited to use in public places. The user can interact with the mobile phone through the APP mirror, mirror through speech synthesis module make sounds, such as asking the mirror the weather, news, time, the mirror can automatically obtain the corresponding information network and broadcast.Through facial recognition and speech recognition model smart mirror can identify the user.The designed intelligent mirror has the advantages of small size, simple operation, and is suitable for families, and has broad application prospects.

Keywords: Smart mirror, Home automation, Raspberry pi, facial recognition.

INTRODUCTION
Everyone knows what a mirror is. It is an object found in most people's homes. In mirrors we see our reflections. But what happens when you combine the idea of a mirror with technology? What possibilities are there and how smart could a mirror be? These are some of the questions that inspired my choice of final year project, a project which aimed to develop a smart mirror and a small operating system to power it. The device was to go beyond an ordinary mirror, to have a screen inside that you would be able to interact with by using voice commands, and smartphones or other devices.

Presentation and punctuality are two of the most valued qualities in modern society. However, it can be difficult to effectively prepare for the day while remaining knowledgeable about current affairs and still maintain a timely schedule.

In the morning, it is imperative to prepare for the day in front of a mirror, which is often a slow process. Additionally, factors such as the current weather conditions can influence how a person prepares for the day. Finding an efficient way to check all the factors that can affect how a person prepares for the day while also not adversely affecting the tasks that are performed in front of a mirror can be a challenge.

The goal of our project was to create a product that will provide quick and easy access to the time, news, and weather while simultaneously allowing a person to go through their morning routine. Our product should enhance productivity while providing a functional and enjoyable user experience.

LITERATURE REVIEW

1) Piyush Maheshwari, Maninder Jeet Kaur, Sarthak Anand, "Smart Mirror: A Reflective Interface to Maximize Productivity", International Journal of Computer Applications (0975 – 8887), Year: May-2017.
2) This paper depicts the design and development of a smart mirror that represents an elegant interface for glancing information for multiple people in a home environment. Face-recognition based authentication is used to detect the user.
3) Govinda K., Saravanaguru R.A.K, "Review on IOT Technologies", International Journal of Applied Engineering Research ISSN 0973-4562 Volume 11, Number 4 (2016) pp 2848-2853, Year: 2016.
4) This paper explains all the concepts of IoT and the mechanism in brief. The important technologies which enable IoT are RFID systems, Sensor networks and intelligence technologies. The potential applications of these technologies are reviewed and the major research issues are described.
5) Shervin Emami, Valentin Petrut Suciu, "Facial Recognition using OpenCV", Journal of Mobile, Embedded and Distributed Systems, vol. IV, no. 1, 2012.
6) The growing interest in computer vision of the past decade. Fueled by the steady doubling rate of computing power every 13 months, face detection and recognition has transcended from an esoteric to a popular area of research in computer vision and one of the better and successful applications of image analysis and algorithm based understanding.
7) Mahindrakar, Smita, and Ravi K Biradar. "Internet Of Things: Smart Home Automation System Using Raspberry Pi". International Journal of Science and Research (IJSR) 6.1 (2015)

This report represents the application of IoT for Smart Home Automation system which includes a Raspberry Pi as a processing unit for data which is extracted from various sub-systems like, Temperature sensing system, Automatic light system, Cooling system, Gas detection system, Water level sensing system, Motion detection system and Lights on and off system. All these systems are monitored and controlled remotely by a webpage.

EXISTING SYSTEM

Currently, all products in the smart mirror market are either too expensive or limited to general hobbyists. For example, Samsung has produced a smart mirror, simply called Samsung Smart Mirror, which utilizes Intel's RealSense technology. This technology is bleeding edge and is not easily procurable or affordable for this implementation, at this time. Currently available designs offer informational widgets; however, they lack the multiple informational screens, gesture support, and multiple user configurations. The following are the various smart mirror implementations that were researched.

Magic Mirror: Informational display, no user interface.

Samsung smart mirror: 3D camera, gesture controls, voice commands and very costly according to survey.

TecH20 televisions: Display that also function as mirror, Only the mirror display component no UI is involved with the device.

In 2017, a company called the New Kinpo Group launched their take on the intelligent mirror called HiMirror. This intelligent mirror has a camera for monitoring the health of the skin.The mirror scans the skin and let's know what to improve. The mirror uses facial recognition to record the skin firmness, texture, clarity, luminosity and health of a user every day.

At the 2017 CES convention, Griffin Technologies unveiled their take and it serves as the smart home hub for a number of Griffin Technologies smart home appliances.

The mirror can display local time and weather, phone notifications their take on the smart mirror. The mirror does not use any user recognition, but the interface can be customized via a smartphone app to control any other Griffin smart home devices

Ramya et al. talked about a secure and energy - efficient wireless industrial automation system based on Raspberry Pi technology. It handles industrial equipment, manages power utilities, and supervises employee activities. All of these are done with the help of the PC server via Wi-Fi network. This server PC is protected by password and can be opened only by the authorized person. They focused primarily on reducing the consumption of electricity and informing people to critical industry situations. This system protects further accidents and provides greater security and privacy for organizations like industry, education, and hospitals

Smart mirrors can take user commands into consideration. Smart mirrors are mainly developed for the purpose of displaying time, date and weather forecasts. Some also contains news, weather forecast, etc. It can therefore be customized according to the requirements.

PROPOSED SYSTEM

The aim of designing this model is to create an interactive interface which can be conveniently used in home environment as well as commercial space. 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.

It is a smart and user friendly solution in the form of a mirror that also acts as a gateway to interactive services, especially information oriented services, such as multimedia and news feeds, among others. The mirror is ultimately a technologically increased device. The aim of the mirror design is to provide a natural interface for access to various services in

the home environment. The aim of this model is to create an interactive interface that can be conveniently used in the home and commercial space. Different services can be accessed, such as time, date, calendar, emails, news updates, temperature, etc., as well as access to YouTube videos, maps, etc. Many devices are now emerging on the basis of this technology and offer comfortable, secure and convenient personal services everywhere with this intelligence.

HARDWARE COMPONENTS

Raspberry Pi 3

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games. The Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red camera.

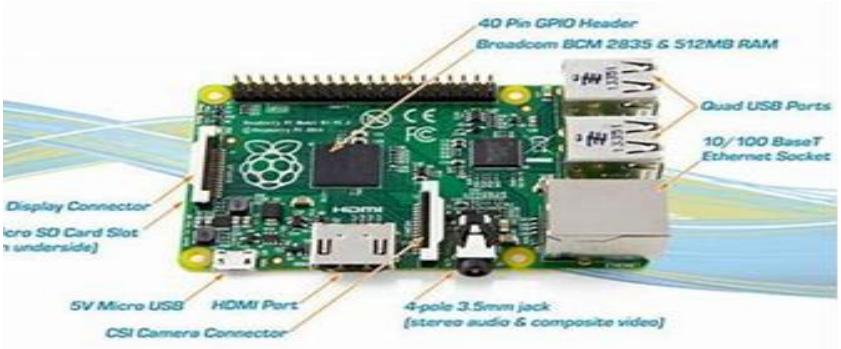


Figure 1: Raspberry pi

Dual Purpose Display

For the purpose of dual functionality, we are using a two-way mirror for the display. It will be attached on top of the monitor using a wooden frame to hold the whole system together. The wo way mirror can act as normal reflective mirror when the monitor is switched off and the data can be simultaneously displayed while the monitor is switched on. We plan to deliver a working model of Smart 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 two-way mirror 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.

Microphone

One mode of interaction with the smart mirror is through microphones. Two microphones were used to power the voice recognition capabilities of the device. USB microphones had to be used because the Raspberry Pi does not have a regular microphone input. The first microphone is a cheap simple one connected through a USB sound card to the Pi. The second microphone is actually a PS3 Eye camera that I had at home and that connects directly through the USB. However, only the microphone part of the PS3 Eye is being used. The voice recognition system works by listening for someone to clap with the first microphone and once that happens the second, higher quality microphone is triggered to listen for a voice command.

Camera

The Camera is input device for the mirror, it used for face recognition. Face Recognition based authentication is another use of the camera, it customizes the profile of different users on same mirror.

SOFTWARE COMPONENTS

Open CV

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. This software is mostly used for image processing and video analysis. With the help of this programming the computer processes and ultimately understands images and videos.

Python

Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax makes it an ideal language for scripting and rapid application development in many areas on most platforms

Raspbian OS

Raspbian is a free operating system optimized for the Raspberry Pi hardware. Raspbian comes with over 35,000 packages, pre-defined functions which helps in easy installation on a Raspberry Pi computer.

METHODOLOGY

A. Smart Mirror as A Mirror

We can use this mirror as natural mirror while looking we can see other information too using two-way mirror and monitor sceen.

B. Mirror as a information system or wall

In the smart Mirror features like Time, Date, weather details and news are fetched from online using predefined URL.

C. Mirror as a Google assistant

Alexa voice service is the best tool to interact with mirror. It helps you to make your time more informative as well as time saving.

D. Mirror as a Face recognition device

We have used 5 mp camera for face recognition. According to our face the mirror will identify and give the information.

RESULTS

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 monitor. 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 traffic, stocks, news and headlines, date, time, weather updates as well as other reports of our particular interests.

Voice Commands: User will be able to give voice commands to the mirror using a microphone connected to the Raspberry pi 3.

Our project mainly concentrates on the ease of the user's interaction with the mirror.
Thus, the mirror can be customizable at any moment according to the user's needs.
Allows touch free interaction so that the data displayed won't be interrupted.

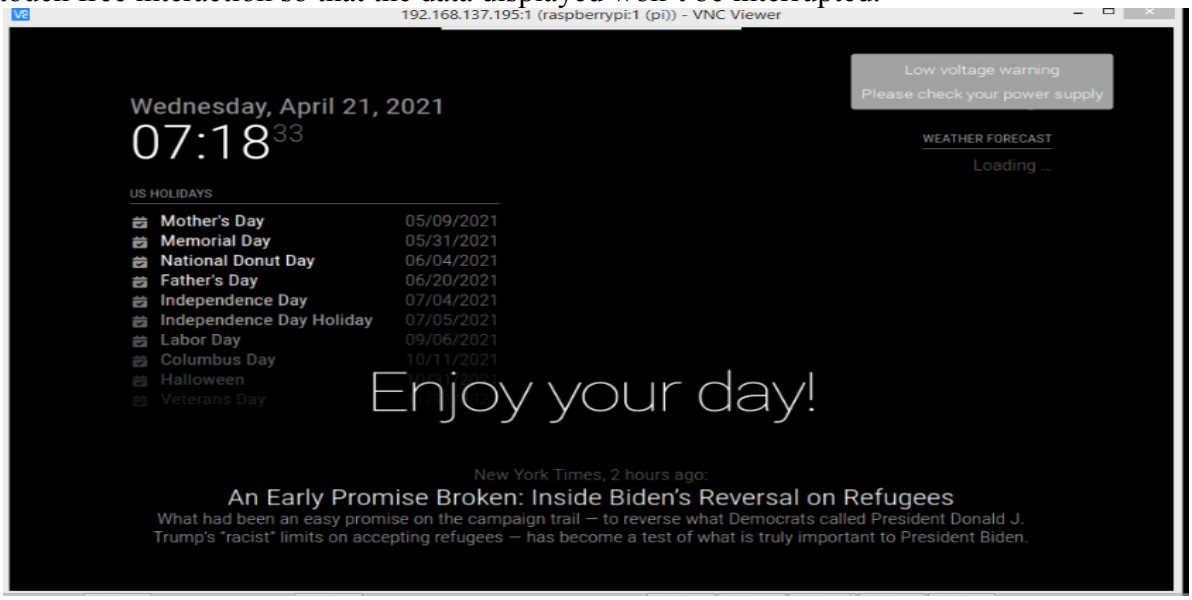
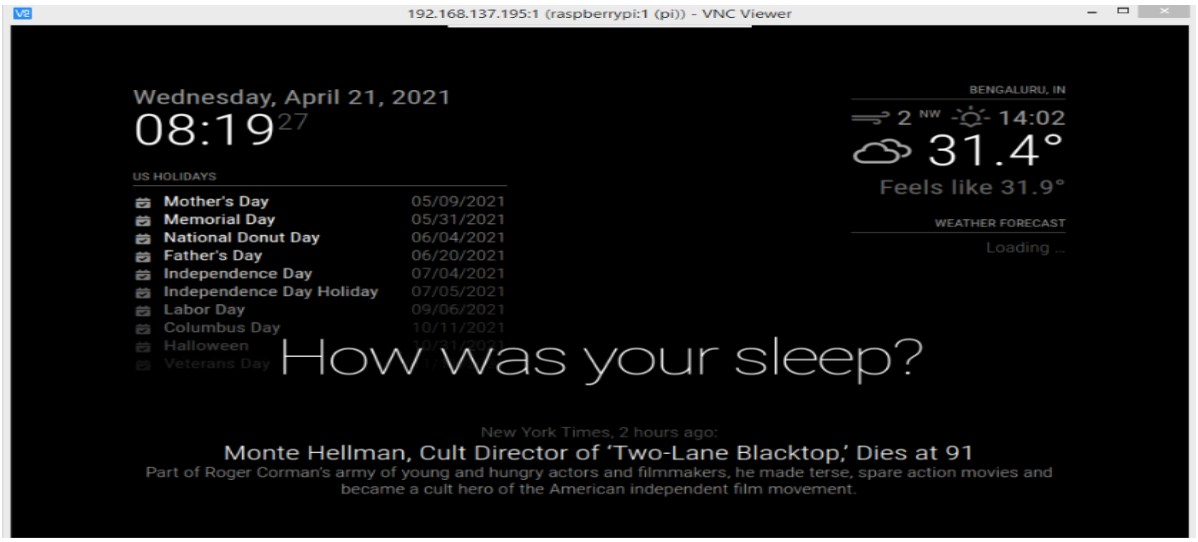


Figure 2: Output of smart mirror on the screen



APPLICATIONS AND ADVANTAGES

IN INDUSTRIES

The smart mirrors are majorly used in various industry verticals such as automotive, retail, residential, health care and others. Moreover, in the field of retail, smart mirrors are incorporated for suggesting customers with trending outfits.

IN HOME AUTOMATION

The functions of smart mirror can differ depending on their utility. In residential sector, it can be used to learn an individual's habits as a part of a smart home. And also helps to remind certain activities.

IN HOSPITALS

Medical mirror encourages people to track their vital signals on a daily basis.

ADVANTAGES

Smart Mirrors are designed to interactive with devices that helps you give updates easily with voice control.
You can do things at the same time in the morning like brushing your teeth while catching up on the latest stock updates, weather or traffic.
You can listen songs while preparing going to work. Many smart mirrors have true light for different purposes on and off sensor.
Smart mirrors can help you save time and just multitask

CONCLUSION

The Smart Mirror thus accomplishes this, by still being a mirror without all the technology inside it, making it very approachable to use and integrating seamlessly into our lives. The Smart Mirror has scope in the field of IoT and home automation. The Smart Mirror can be connected to the home appliances, mobile devices, etc. which can expand the functionality of the mirror. The facial recognition technology used can be future enhanced as a means of security. Adding security means that no one can try to access sensitive data that maybe displayed on your mirror via the use of APIs. We believe that the future of the home will be a brilliantly connected ecosystem of smart technology designed to make your life easier, more enjoyable, and efficient. Obviously there are a ton of opportunities in the home for technology integration but a mirror is one of the best places to start.
The main goal of the smart mirror was to reduce the time needed in a user's daily routine. In this project we have designed a smart mirror which provides a natural interaction between the user and the information like time, date, temperature (which are customized by the user).
The display of the mirror is provided by a flat led monitor.
This monitor will display all the necessary information which are used by the users.
The smart mirror did the thinking for the user with intelligent, commonly used applications such as clock, calendar, daily news, to-do list etc.

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