



Smart Mirror Using Raspberry Pi

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ABSTRACT: Every morning it is necessary to prepare in front of the mirror, which is quite a slow process. The factors like current weather condition can influence how a person prepares for the day. The purpose of these project is to increase the user's productivity by saving time. While looking towards the mirror you can see what the weather condition is and according to that you can schedule your day. Along with that you are able to watch various notification from social sites as well as news, calendar and much more things. The smart mirror is a idea to incorporate the technology seamlessly into people's lives where everyone's routine eventually collides. The device provides an effortless experience that allows the user to be greeted with information they would typically need another device. Also this information can be found on the user's devices. The mirror also provides real time interaction users. The Smart Mirror CPU is the Raspberry pi 3 computer and the framework that retrieves the data from the web through the Wi-Fi connectivity. Through facial recognition model, smart mirror can identify the user.

KEYWORDS: Rasberry Pi,Internet of things, Python, Smart mirror.

I. INTRODUCTION

In this world everyone needs a comfort life. Modern man has invented different technology for his purpose. In today's world, people need to be connected and they are willing to access the information easily. Whether it is through the television or internet, people need to be informed and in touch with the current affairs happening around the world. The Internet of Things means interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data. The Internet of Things with its enormous growth widens its applications to the living environment of the people by changing a home to smart home. Smart home is a connected home that connects all type of digital devices to communicate each other through the internet. Our lifestyle has evolved in such a way that optimizing time is the most important thing. Our work is based on the idea that we all look at the mirror when we go out, so why wouldn't the mirror become smart. A common approach for building a smart mirror is to use a high quality one-way glass, a LCD monitor, a frame to hold the glass and monitor, and a web browser with python to provide the software features and drive the display.

This project has been developed with the idea of making home smart to save time. The Internet transformed our lives by connecting us more easily to information and other people in the virtual world. The state of innovation currently is to provide more information with less interaction to get it. The device that has been researched and designed is called "Smart Mirror". It is a wall mounted mirror which displays relevant items to the user such as weather, time, date, temperature, humidity and news and other fields of interest. IoT emerged the idea of remotely monitoring objects through the Internet . When it comes to our home, security is crucial issue to the general public. For enhancing the security of home this framework is used by owner of the house. Assume you are not at home and a thief enters your home then this framework will give a caution through alert message. When thief enters the home, PIR sensor will detect the movement and gives the owner alert message. Wireless Home security and Home automation are the dual aspects of this project. The currently built prototype of the system sends alerts to the owner over message using the Internet if any sort of human movement is sensed near the mirror.

II. RELATED WORK

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. The project which would collect real world machine data and the data would be transmitted from the machine 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.

Smart Reflect 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.

The Aware Mirror is an augmented display that is placed in the bathroom for presenting personalized information to the user. It detects the position of a person in the bathroom using a proximity sensor and identifies her/him from the usage of a toothbrush. It provides useful information such as closest schedule, transportation information, and the weather forecast. The mirror is constructed by attaching an acrylic board in front of a monitor. A slider sensor on the mirror is used to navigate the information presented on the mirror. Although it attempts to provide an intuitive interface, it has some limitations that may restrict it from wider usage. For example, the state-of-use of a toothbrush for identifying a person might not provide accurate states to personalize information. Also, the use of magic mirror restricts dark colors from going through it; and hence, requires special attention to the color of the contents to be displayed. In our case there is no such issues as we use a touch screen to mimic a mirror-like interface through the use of touchscreen and video technology.

Another project named MagicMirror 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.

Philips HomeLab acts as testing platform for interactive and automated home environment. The Philips Hue is one such example of smart lighting which can be controlled using mobile application. Another example is of an Interactive Mirror which can installed in room or washroom to get personalized services depending on the end user. Children can customize it view cartoons, adults can get live news feeds and updates on weather, traffic etc.

An earlier work presents i-mirror that attempts to include information services within the mirror interface as a natural way of providing interactive experiences to people. The i-mirror uses dedicated optical system including a video camera, magic mirrors, and a video projector to imitate a mirror. Its use of magic mirror to superimpose an image to the mirror is similar to the one in AwareMirror. Three potential uses of the i-mirror have been explored such as the one with ability to show images in the dark; one with the capability of providing younger/older looks; and the one with memory.

III. IMPLIMENTATION & METHODOLOGY

A. SYSTEM OVERVIEW

The major problem is with existing mirror is it shows only any object kept in front of that or face of human. People wastes their lot of time standing in front of time then after of they read news so all this is time consuming. So we are developing a project which overcomes to time wastage. Staying connected with new information is both important for entertainment and daily life. With such a variety of options, there is difficulty in following all of your data streams. Often, during your day, you may end up in a position where it is inconvenient, or even impossible, to take out your phone or computer and check the newest update. You cannot commit to a slower interaction. You need a display to glance at, with the information you need ready to go. However, aesthetics are just as important as displaying information. Keeping an extra computer in your bathroom or hall would be inconvenient, and would not fit well with the look of a modern room. A sleek, simple display, easy for an average consumer, is a necessity in todays world.

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, news stock updates etc. can be accessed and controlled. 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 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 TFT touch screen 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.



Figure 1. Hardware Architecture of Smart Mirror

Hardware Requirement:

A. Raspberry Pi

The Raspberry Pi 3 Model A+ is the latest product in the Raspberry Pi 3 range. It boasts a 64-bit quad core processor running at 1.4 GHz, dual-band 2.4 GHz and 5 GHz wireless LAN, and Bluetooth 4.2/BLE. It acts as the main control centre for this proposed model. The design relying on an microSD card for booting and long-term storage which can be loaded with operating systems like Raspbian. After the OS is running the Smart Mirror code will can be implemented on it to run the application.

B. PI Camera

The Raspberry Pi Camera v2 was used for facial recognition. It was used to take input either an image or video to recognize the user.

C. TFT Touch Screen

A 7 Inch Touch Screen HDMI HD LCD TFT was used to display the information to the user.

D. PIR Sensor

A passive infrared sensor was used to detect human movement in a certain range.

Software Requirement:

A. Raspbian OS

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

B. NodeJS

NodeJS is an open-source, cross-platform, JavaScript run-time environment for developing server-side and networking applications. 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.

C. Python

Python is a widely used high-level programming language for general-purpose programming, created by Guido van Rossum and first released in 1991. It has lots of support and libraries which makes it very popular among raspberry pi community. Most of the codes of this project were written in python.

B. METHODOLOGY

Smart Mirror As A Mirror

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 with high concentration of aluminum content. That screen can be an Android tablet or a computer monitor.



Smart Mirror As An Information System

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 personalized digital device equipped with peripherals such as Raspberry Pi, speakers, LCD 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 of services.

Smart Mirror As Security System

When there is nobody in home it can be switched into security system by using VNC viewer to detect human presence. When someone enters into room ,PIR sensor will detect the movement of the person when he passes by the mirror and capture the image and stores it in the drop box .Also informs the owner by updating captured image in the drop box ,by this way smart mirror system can also be used as a security system.

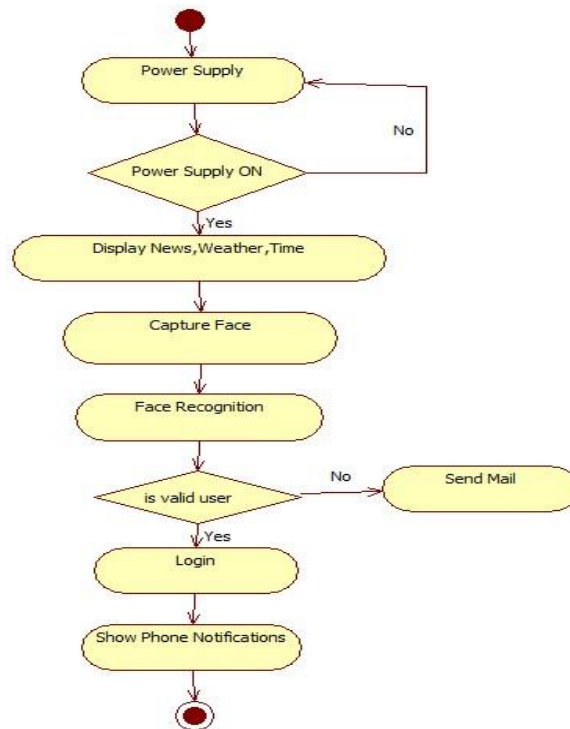


Figure 2. Activity Diagram of Smart Mirror System

IV. RESULTS

While looking and grooming in front of mirror the user log in to its account and the mirror provides specified real time data like current weather, temperature, humidity, date, time, phone notifications and latest newsfeed and when there is no known user in front of mirror it acts like security system that is if unknown person stands in front of mirror it will be notified to the owner through an alert mail.

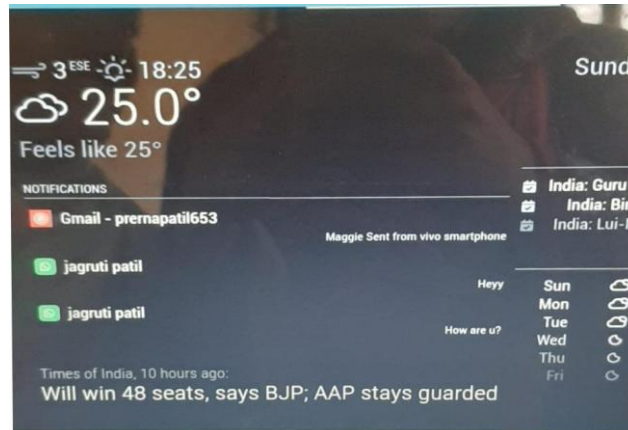


Figure 3. Result

V. CONCLUSION AND FUTURE WORK

The smart mirror designed will provide the user with an enhanced mirror experience. The device has been designed keeping in mind the advancement in the field of home automation. The mirror is powered and controlled by the Raspberry Pi 3 to give output in the form of real time data feeds like news, weather, calendar, etc are displayed on LCD screen. The PIR sensor ensures that the mirror will always turn on when a person steps up to use it. Also the mirror works as a Security System, when there is nobody in home it can be switched into security system by using PIR to detect human presence. When someone enters the room, it will capture an image and send an alert message to the owner using the face recognition module. There are many future possibilities for this project and hopefully will be continued. A layout can be extended to accommodate more functionalities by controlling the mirror using voice commands. In future 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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BIOGRAPHY

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