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Smart Mirror

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Abstract: Smart mirror, which continues to grow vastly, plays an important role in the future technology, providing both the functionalities of a mirror and the smart mirror and the smart feature that's come with the users. The impact of such emerging technology would completely change the lives of the people on day-to-day basis. In recent years everything is turning smart, such as smart home and smart cities. The smart mirror is one such device where a normal mirror acts as a smart device.
Keywords: Smart Mirror, Raspberry Pi, Voice recognition, face detection, Weather, Time, Google News, IoT (Internet of things)

I. INTRODUCTION

The purpose of mirror in day to day lives is to observe and interact with ourselves. The interactive mirror is a development effort to augment the mirror with proper fixed information for offering better features that provide personalized data such as date, weather, and regional time corresponding to the location, Google headlines, music and our daily schedule. According to survey, we waste 30 minutes on washing, makeup, and wearing after getting up, and these 30 minutes are also the time for us to observe in the mirror. In order to require full use of this time, in the mirror at same time, can completely access the relative information of the day, this project indicates a kind of Intelligence mirror can be used in the home. The mirror will resolve the problems that many people experience every day, getting information without distraction. Before going to bed, the user may want to know whether it will rain the next morning so that they can plan their exchange.

II. LITERATURE SURVEY

The smart mirrors proposed and implemented so far are having variety in terms of hardware and mode of operation. Mirrors capable of accepting voice command via the microphone are built with Raspberry Pi microcontroller, LCD or LED monitor and acrylic two way mirror. It displays the weather, time, and location information on the screen [1]. Some Smart mirrors are having MCU (Multi Control Unit) units, built with Raspberry Pi and can display weather and latest news updates on the screen. Sensors like Humidity and Temperature sensors used [2]. Multimedia enabled Smart Mirrors are designed which accept voice commands make use of concepts of Artificial Intelligence. The designed System alerts about weather and capable of suggesting the user based on weather. The suggestions are displayed on the mirrors [3]. Webpage page based mirror are designed and are customizable. These accept voice commands and use ready APIs of website. Google Assistant is used here and details of user are stored in the database [4]. Some mirrors designed for health monitoring devices. These can be used to track weight and fitness of human being. Notable features of the system are Face Recognition, GPS navigation, Bluetooth Connectivity and wireless communication. For improved communication SONUS technology is used [5]. Hermoine 1.0 is used for designing some mirrors. It is an extension of domestic mirror like a Magic Mirror. The voice controlled system is used as a Home Assistant [6]. Some systems are developed using Python and Javascript programming and tool such as Node.js. System is voice command based smart mirror [7]. [8]Novel Approach of a Smart Medical Mirror System for Medical by utilizing the unique features of smart mirror Humans always face problems when it comes to medical check-up due to lack of time or laziness [9] Home Appliances Controlling through Smart TV Settop Box with Screen-Mirroring Remote Controller. The legacy TV is now being replaced by IP-connected Smart TV which offers more advanced computing ability and connectivity. Smart TV also allows the user to install and run more advanced applications based on a specific platform ,[10] The Smart mirror can be used as a security system against the Intrusion in home[11] A person's well-being status is reflected by their face through a combination of facial expressions and physical signs. The SEMEOTICONS project translates the semeiotic code of the human face into measurements and computational descriptors that are automatically extracted from images, videos and 3D scans of the face.

III. PROPOSED SMART MIRROR

Block Diagram of Smart Mirror Smart mirror is a Raspberry Pi (low powered minicomputer) based display when connected to the internet it picks and displays the necessary information in the presence of the user. In the proposed system, Raspberry Pi 3 B+ is used which contains 1 GB SDRAM, runs on Linux platform and needs 700mA. A single sided mirror is placed on the LCD screen which acts as a regular mirror when there is no light behind it or act as a glass window where information is displayed.

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Only when the user stands in front of the mirror the customized informationwill be displayed. In order to retrieve updated data from the web sources various data feeds can be used such as RSS feed.We plan to designate and exhibit such kind of futuristic smart mirror which provides a whole modern experience to the user. Our proposed smart mirror consists of a Raspberry Pi, two-way mirror, acrylic glass, monitor (LED), and motion Sensor. Raspberry Pi 3 B+ is a minicomputer. It uses Raspbian operating system. A wooden frame will be prepared with LED attached behind the glass with all the sensors, and the raspberry pi. The power supply is attached to the raspberry pi which will power the LED monitor and the sensors. The block diagram depicts that it would collect personalized data like date, weather of the metropolitan, the latest updates of news and headlines and local time corresponding to the location. For this process internet access will require which will be provided by Wi-Fi module on the raspberry pi.

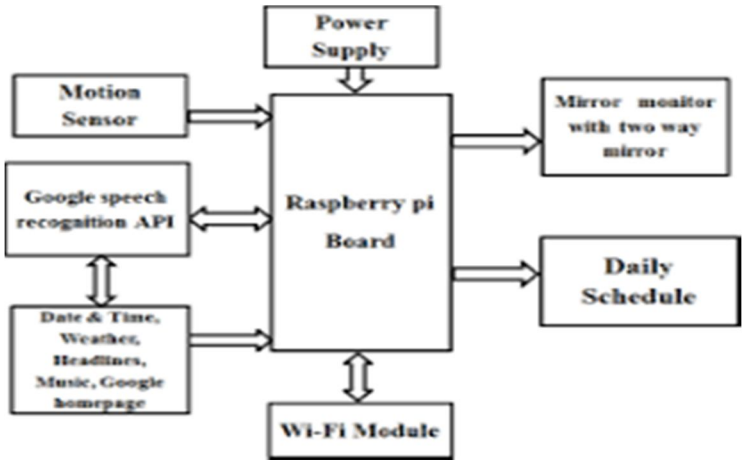


Fig 1.1: Basic block diagram of smart mirror Application

Once the person appears in front of mirror the motion sensor is activated and mirror will display the welcome message to the user. The audio information will give to the microphone through voice command by user. It can communicate with mirror in real time and search the information on internet. All the information is displayed on the LCD screen connected with the raspberry pi. The mirror will also show the personalized daily schedule of that person and for security purpose we used face unlock for that particular person. The virtual layout that will be prepared using will display on the mirror when it is turned on and will show date, time, weather, and news headlines. And we also play some songs through google voice assistances. Fallowing Components are used in Smart Mirror.

1) *Raspberry Pi:* The Raspberry Pi is the brain for your smart mirror. While you can use an Android device to run your smart mirror, the most popular option is to use a Raspberry Pi. These devices are cheap and more than powerful enough to run most smart mirrors.
2) *HDMI Cable:* If your monitor doesn't have an HDMI input, you'll need an HDMI to DVI or D-SUB adapter. The monitor I used for my smart mirror didn't have an HDMI input, so I bought a cheap adapter that works perfectly fine.
3) *Monitor:* If you don't have an old monitor, you can use or you don't want to buy a second-hand one, there are plenty of inexpensive monitors available that will do a perfectly fine job. I decided to buy a new monitor for my PC and used my old one for my smart mirror. Even the best monitors don't look very good in smart mirrors. The point of the monitor isn't to display fantastic photos or videos – you're more likely to only display text and simple graphics.
4) *Glass / Two-Way Mirrors:* This is an important part for your smart mirror. You have a few choices for materials here and the right choice for you depends on the size of your mirror and the quality you want it to have.
5) *Stand-off Clips for Frameless Mirrors:* The most common way of building a smart mirror is to mount the mirror in a frame. Framed mirrors can look fantastic, but they're not the only option. I chose to build a frameless smart mirror as frameless mirrors tend to look great in bathrooms.
6) *Motion Sensor:* The best smart mirrors don't need you to manually turn them on and off. To truly be a 'smart' mirror, the mirror should only turn on when there's somebody in the room, then turn off when there's nobody around.
7) *Microphone:* While a lot of people like the idea of having a touch screen smart mirror, I personally feel that voice commands are far more practical and useful.

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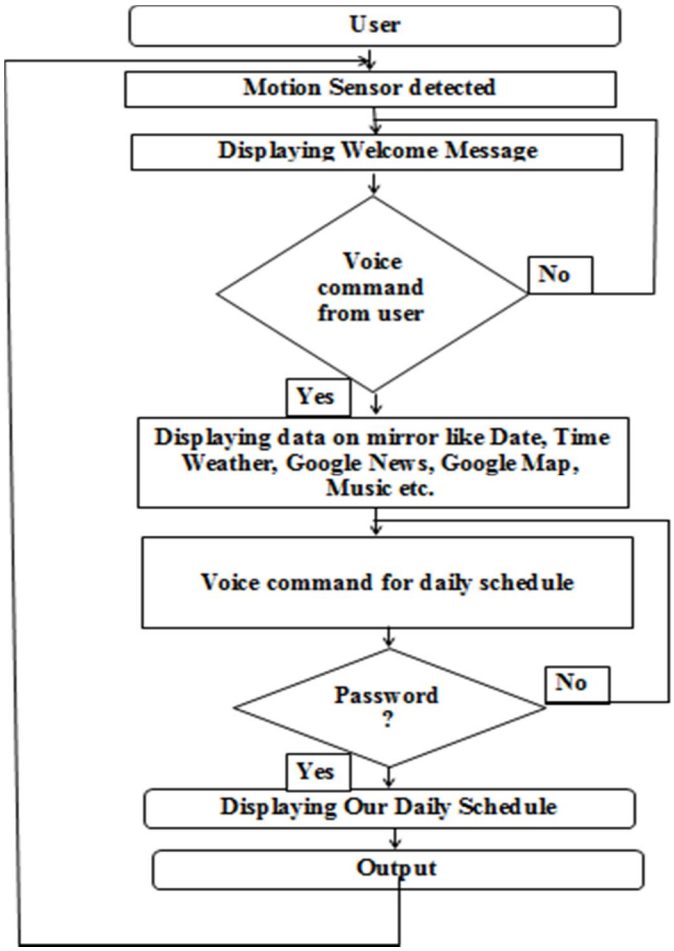


Fig 1.1: Data flow diagram of smart mirror application

When the person appears in front of mirror is activated and will show the welcome message to the user. After activating the mirror will display date, time, weather and news headlines the mirror will also play music and show our daily schedule. Smart mirror can communicate with verbal commands, functions and listen user questions and respond them adequately. The mirror will automatically sleep if a person disappears from mirror with help of sensor. We plan to design and develop such kind of futuristic smart mirror which provides a whole new experience to the user with the flavor of AmI. Our proposed smart mirror consists of a two-way mirror, acrylic glass, monitor (LED), Raspberry Pi, Raspberry Modules, sensors. A wooden frame will be prepared with LED attached behind the glass with all the sensors and the raspberry pi. The power supply is attached to the raspberry pi which will power the LED monitor and the sensors. Once the mirror is activated, it will connect to the docker which contains all API and software needed to run the mirror. This will require internet access which will be provided by the Wi-Fi module (LAN can be also used) on the raspberry pi. The virtual layout that will be prepared using HTML and CSS will be displayed on the mirror when it is turned on and will show calendar, weather and news headlines. The docker will contain the API of Alexa or google voice assistance (virtual voice assistant from Amazon or google) that will respond to the user's voice. The mirror will perform facial recognition which will be helpful for real time image zoom in and out. This will be one with help of OpenCV and some python programming. The software will be programmed on java and python and Node.js will be used as a server-side language. The proposed smart mirror will perform some advanced features that are discussed in the section of this report.

The proposed smart mirror will perform these tasks:

a) A normal two-way mirror and acrylic glass will display realtime image.
b) After activation the mirror will display weather, time andnews.
c) The mirror will automatically sleep if a person disappearsfrom the front with the help of sensors.

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IV. RESULT

Smart mirror requires 24 hours internet access. When a person gets detected by motion sensor then mirror is turn on in fraction of seconds then we are able to access following data through voice commands. The welcome message is display to the user. According to time it will also show casual greeting like Good Morning, Good Afternoon, Good Evening, Good Night.

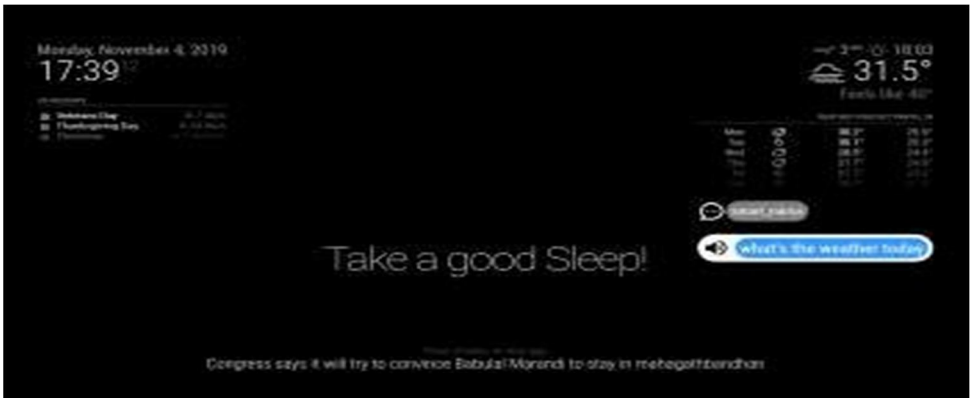


Fig -4.1: Smart Mirror Accepting Voice Input

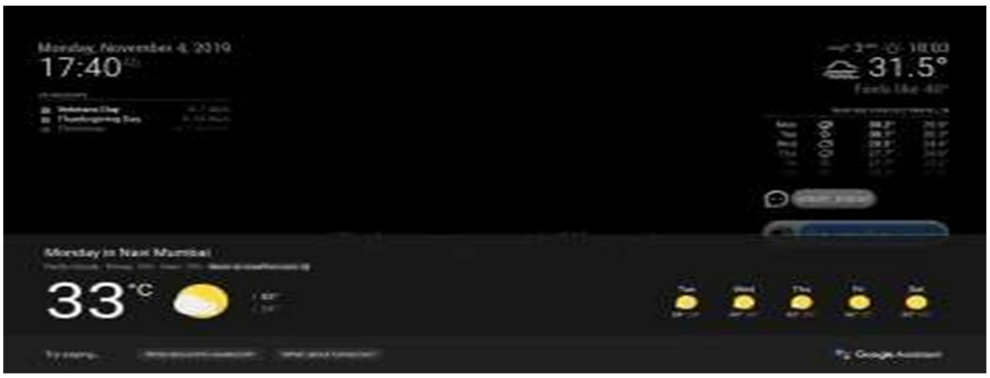


Fig -4.2: Smart Mirror act according to Input

A. Application of Smart Mirror

A smart mirror is a device that functions as a mirror with additional capability of displaying multimedia data, such as text, images, and videos. This device allows users to access and interact with contextual information, such as weather data, seamlessly as part of their daily routine. Virtual mirrors usually computer vision, face detection and face tracking technologies to analyse visual patterns and represent digital information.

V. CONCLUSION

We have shown interactive mirror that provide date, and regional time corresponding to the location, weather of the metropolitan, the latest updates of news and headlines. The mirror will also play music and show our daily schedule. For security purpose we use password of that particular user for daily schedule. It can communicate with voice commands, functions and listen user questions and respond them adequately. We use PIR sensor instead of Ultrasonic and IR sensor because PIR required direct line of sight between sensor and user in a space. Ultrasonic sensor work using sound waves as a result they can detect people behind obstacles and IR is proximity sensor, it does not work in darker environment.

VI. FUTURE SCOPE

In future this mirror can be used to build smart mirror many new plugin opportunities are now available with the ability to access external hardware. It would be nice to explore various plugin ideas using motion detectors, temperature and light sensors, gesture recognition, voice commands, and some form of proximity detection, such as detecting the closest phone in range.

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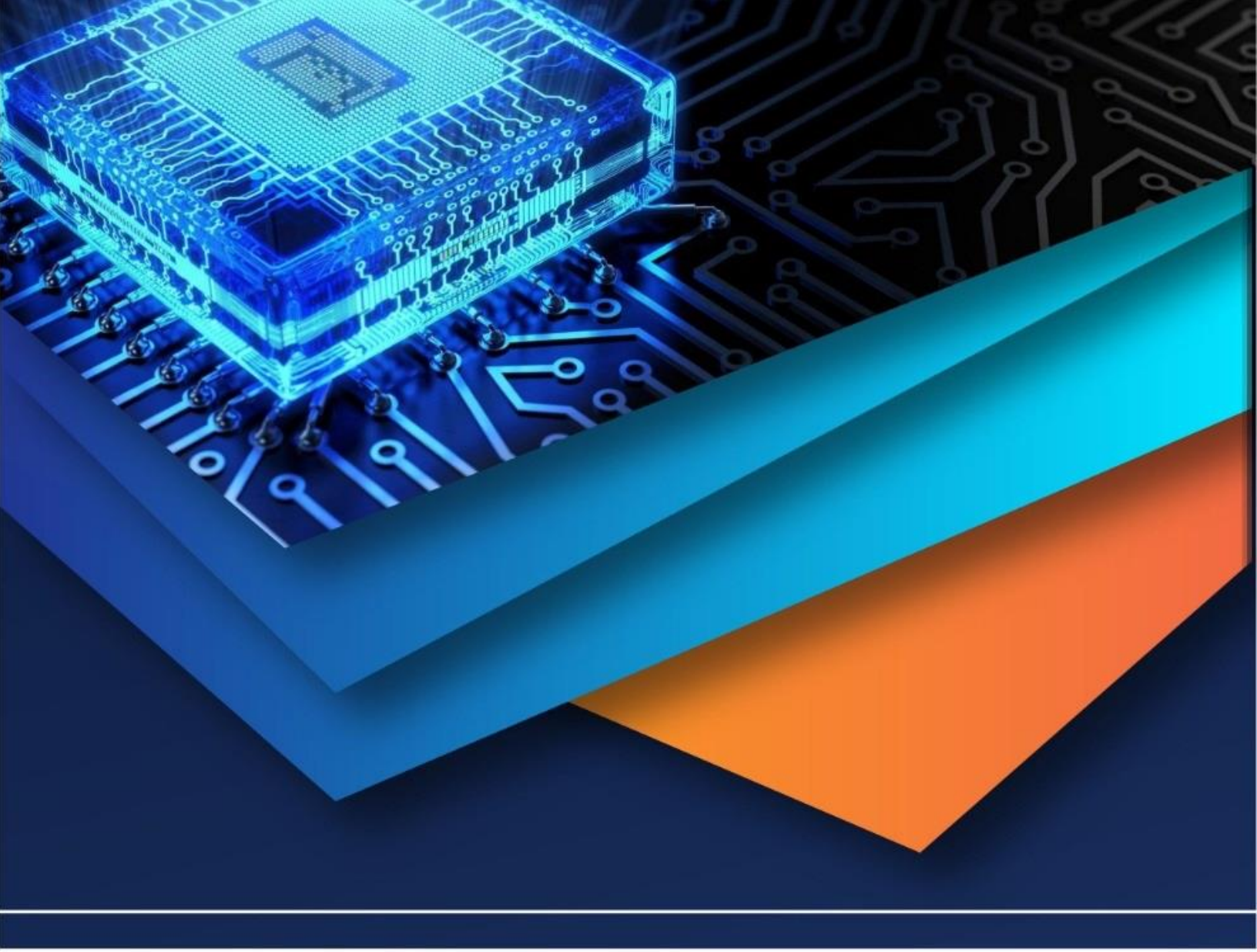
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