Smart Mirror Using Raspberry PI

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Abstract— People's lives are clearly being transformed by the impact of emerging technologies. Everything around us has become smart in the last few years. Smart phones, smart cars, and smart watches have become ubiquitous in today's culture. A smart mirror, for example, is a technology that turns an ordinary mirror into a smart gadget. The mirror depicts a beautiful interface for seeing information and one's own reflection. It has two modes of operation: standard and smart. The mirror functions as an ordinary reflecting device in standard mode, while smart mode accepts external commands and displays relevant results. This mirror may be made with a Raspberry Pi, facial recognition software, and voice commands. The standard of living and the quality of life can be improved by employing this smart mirror.

Keywords— Internet of Things (IoT), Raspberry pi, Smart mirror, voice commands, Face recognition.

I. INTRODUCTION

The internet of things (iot) is a collection of interconnected, web-connected gadgets that can gather and transmit data over a network without the need for human intervention. The rapid growth of web-connected devices has been a prominent iot trend recently. The internet of things (iot) creates greater opportunities for more uncomplicated integration of the real world into computer-based frameworks, resulting in increased efficiency, financial benefits, and less human effort. The internet of things (iot) is defined as a global framework for the digital society that enables advanced benefits by linking (virtual and physical) things based on current and developing (new) interoperable data and communication breakthroughs. Regular entities become "smart" as a result of the internet of things, which allows them to send information and automate tasks without the need for human intervention. An iot device could be as simple as a health-tracking watch or as complicated as a smart city with sensors installed across its territory.

With its rapid growth, the internet of things has transformed people's environments by transforming their homes into smart homes. A smart house is one that is connected to smart devices and communicates with them over the internet. Our style of life has progressed to the point where the most important thing is to save time. Because of the rapid advancement of technology, the use of smart gadgets is growing every day. Every day, we examine ourselves in the mirror to assess our appearance and outfit. We are psychologically connecting with the mirror in this way. So, everyone can be excited by the prospect of a mirror that can answer to any of your commands. The normal mirror is transformed into an arrogant mirror, which is then employed as an information system to collect data. On a single user interface, several tasks can be completed. In a matter of seconds, the smart mirror device may check regular activities, critical meetings, and worksheets on a pc, tab, cell phone, or other device. The smart mirror is an internet of things (iot)-based intelligent technology that can be used to facilitate and improve the user's awareness of numerous functions. With the help of interactive computing systems and embedded systems, the level of living and quality is changing dramatically by using this smart mirror. A smart mirror can be utilized as a commonplace item to alter a person's perception of themselves in the mirror

Figure 1:components of smart mirror display

II. LITERATURE SURVEY

A. *Design of Smart Mirror on Raspberry Pi*

Authors: Kun Jin, Xibo Deng, Zhi Huang, Shaochang Chen (School of Electronic Engineering, Naval University of Engineering).2018 International Conference on Intelligent Transportation, Big Data & Smart City[ICIT]

In this paper, an intelligent mirror based on Raspberry pi is designed for home using the internet of things. The intelligent mirror is made of Raspberry Pi as a host controller, and STM32F030C8T6 microcontroller as the core control chip. In

working conditions, a smart mirror is connected through WIFI to obtain information such as weather forecasts, news feeds, date and time from the API network interface to display information on the mirror.

B. Smart Mirror using Raspberry Pi

Authors: S. Sahana, Shraddha M., Phalguni M. P., Shashank R. K., Aditya C. R. , Lavanya M. C.(Dept. of Computer Science and Engineering Vidyavardhaka College of Engineering Mysuru, India) 2021 5th International Conference on Computing Methodologies and Communication [ICCMC]

The impact of emerging technology would completely change the lives of the people on a 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.

C. IoT Based Voice Controlled Raspberry PI Smart Mirror

Authors : Sophia Jasmine G, Magdalin Mary D, Jaya Ghaanndth S V, Dhanush Kumar J (Electrical and Electronics Engineering, Sri Krishna College of Technology Coimbatore,Tamilnadu,India).2021,7th International Conference on Advanced Computing & Communication Systems

In general, the Alexa mirror looks like a regular mirror; but, it has a screen inside it and the user immediately senses the sensor inside the mirror. In the case of a college guide ,coding is done so that the locations are detailed by a surveillance camera and classrooms, different blocks, laboratories, cleanrooms etc. can be indicated.

D. Smart Mirror for Home and Work Environment

Authors : Muhammad Hamza, Sajjad Ahmed Lohar, Sumbul Ghulamani, Asadullah Shah (Dept. of Computer Science, SZABIST Hyderabad, Pakistan) 2019 6th IEEE International Conference on Engineering Technologies and Applied Sciences

The motive of this paper is to provide more information to user without making more effort to get it, Here the idea of Smart Mirror originated, Modern appliances require input through keyboard or touch screen interface which require little effort to access information but this interactive mirror allows user to access data quickly and comfortably through voice and other devices. The smart mirror consists of peripheral such as LED monitor, camera, LED lights, speakers, and microphone, covered with one-way mirror.

E. Smart Mirror for Smart Life

Authors: Muhammad Mu'izzudeen Yusri, Shahreen Kasim, Rohayanti Hassan, Zubaile Abdullah Husni Ruslai, Kamaruzzaman Jahidin, Mohammad Syafwan Arshad.2017 6th ICT International Student Project Conference (ICT-ISPC).

IoT is known for its advantage that can help simplify people's everyday routines. Hence, the researcher comes with a proposed system called Smart Mirror. It is a concept of smart home-based Internet of Things (IoT). This system allows users to access information and also controls the lights in the house. Relevant information can be traced such as time and date, weather, warning, traffic, and location map.

III. METHODOLOGY

We suggest a smart mirror that is both an interactive system and a tool for receiving notifications. It's an attempt to add to the design of a real mirror system so that the interface may be utilized for virtual applications. Everyone is busy today, but he will glance in the mirror for a bit when he goes out. What if you could see something other than yourself when you looked in the mirror? It makes me happy. What if your mirror could recognize you and alert you to an important business meeting at 4 p.m. today? What if your mirror could warn you it's cold outside and that you should put on a sweater? We use an interactive mirror for this purpose. We do not place the same value on efficiency at home as we do in the workplace. The technology can also be used with glass tables. This data can be retrieved and entered into the table. We may access and receive notifications from social media sites such as Facebook, Google Plus, Gmail, and others at the same time, assuming the table is large enough. Smart Mirror was created for usage in a personnel area and includes features such as user detection and display manner. Smart houses have been produced by merging monitor and mirror systems in various interactive system studies. The pyro-electric infrared sensor is used to detect changes in infrared radiation in the environment, and it has a human-like sensitivity. Home automation will provide sociability, entertainment, and other services. The method used to complete this project is discussed in this section. We also searched for various types of references linked to smart mirrors, then filters the results to find references that are both relevant and relevant to the objective of this paper. The search is carried out by looking for relevant keywords, and the filtration is carried out by looking at the conversation topics from each reference and deciding which can be used in the Smart Mirror

learning process. After filtration, authors use smart mirrors to generate thoughts and designs that can aid the learning process. Smart mirrors are made by collecting concepts from several sources and applying them to the objectives of this paper.

The strategy of The Evolutionary Prototyping process, which captures feedback from users so it may be readily adjusted, is one of the methodologies utilized in the smartest mirror project. After researching the problem, the viewpoint that is frequently focused on is the issue-related explanation for the existing situation. In this scenario, the goal is to improve learning. Aside from that, items and equipment for the smart mirror were studied to ensure that they could be used effectively in the design and development. By incorporating smart mirror advancements, various assignments can be completed more quickly. The mirror is built in such a manner that residents may access some information while improving their user profile and experience, thanks to advancements in Internet of Things and its applications. Face recognition can be used to determine who is accessing it and will display the necessary information. The display will not turn on if the user is not listed in the machine's database. It is thought that by doing so, the smart mirror's security will be ensured, as only authorized users will have access to it. The smart mirror offers a voice recognition feature in addition to face recognition. Voice recognition will aid in the operation of the smart mirror and make life easier for the user. This may occur as a result of the user's ability to can use his or her voice to activate any feature in this smart mirror. The smart mirror will check the database after receiving the audio. If the command matches the database, the smart mirror will execute the command that the user has asked. It will not run unless the user enters the correct command. In the market, there are a variety of smart mirrors to choose from. The following are a few of them:

The proposed Smart Mirror will be able to accomplish the following:
- A regular two-way mirror with acrylic glass to provide a real-time reflection.
- When the mirror first turns on, it will show the current weather, time, and news.
- Music and videos will be played by the mirror.
- In real time, the mirror would be able to zoom in and out of images.
- If a human passes in front of the mirror, the mirror will go to sleep automatically.
- The mirror can be linked to our email account to send us updates and reminders.
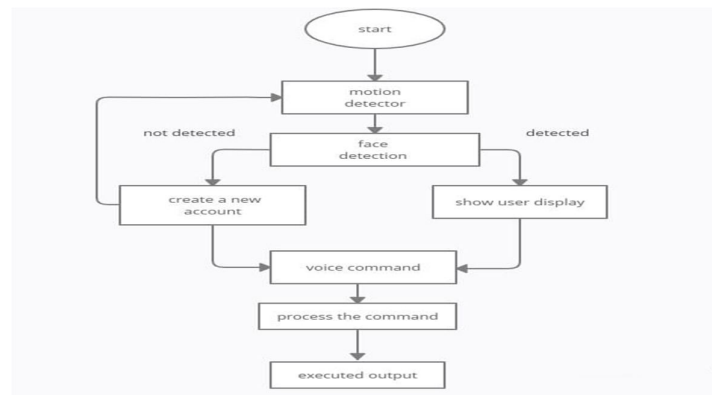- Multiple user profiles will be supported by the mirror.

Figure2: flow chart

IV. SYSTEM DESIGN

The architecture is modular, and it is built on function-specific modules that can be combined on a single platform. Many functions, such as the clock, calendar, current weather, and news feed, and many more third-party functionalities, can be grouped in this way. The server module is in charge of all processes, including user contact via sensors and the mirror user interface (UI), information visualization via the mirror UI, and so on.

A. Notice
This module displays a random notice regarding any upcoming academic activities at the college. The notification property has four arrays:, 'afternoon', 'evening', and 'anytime.'

B. Newsfeed
Based on a relatively simple syndication (RSS) feed, this module displays news headlines. Scrolling through news headlines is time-based (update Interval), but it can also be regulated by sending the module particular news feed notifications. As a source, an array of feed URLs is used. For headlines, the feed's URL is used.

C. Update Notification

When a new version of the Magic Mirror application is released, this will display a message.

D. Clock

The current date and time are displayed in this module. The data will be updated in real-time. It shows the time in 24-hour format. The time is displayed in the Asia/Kolkata time zone.

E. Current Weather

This module shows the current weather, as well as the time of sunset or sunrise, the temperature, as well as the wind speed, and a symbol to show the current conditions. Bangalore, Karnataka, India is the location feed for weather data. Open Weather Map was used to get the weather data. It's an internet service that delivers weather information, such as current conditions and forecasts.

F. Weather Forecast

This module shows the weather forecast for the next week, as well as an icon that shows the present weather conditions, as well as the minimum and maximum temperatures. This module's URL is the same as the current weather module's.

G. Weekly Schedule

It shows today's schedule from a weekly recurring schedule of a certain class's schedule. It's designed to fit into regular weekly schedules. They have a low update frequency and can therefore be manually maintained.

H. Slide Changer

This is an add-on module for the aforementioned modules that allows them to be presented in a rotating carousel rather than all at once.

I. Alarm

This creates an array in which all of the alarms are considered as objects. The attributes of these items include time, 24-hour format, days, and so on. The alarm has a sound, and if the sound is not defined, the alarm will be set to the default alarm sound.

J. Voice commands

Since we're creating a voice assistant app, one of the most critical features is that your assistant knows your voice (and hence understands what you want to say/ask). As a third-party module, we use Google Assistant.
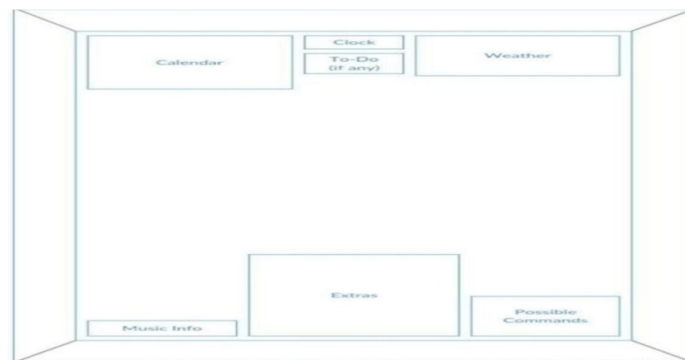

Figure 3: Default smart mirror display layout

V. APPLICATION

Several relevant works have already been completed in this area. The smart mirror model is equipped with a variety of software and hardware technologies, as well as a design, features, applications, and operation mode. The Raspberry Pi microprocessor, LCD or LED monitor, and acrylic two-way mirror are used to create the smart mirror. It gathers data such as weather, time, date, and location and displays it on an LED monitor. The microphone, which can be set up using the Raspberry Pi microcontroller, can be used to send voice commands. DHT22 sensors can be used to create humidity and temperature sensors. Various input modalities, such as remote controllers and virtual keyboards, can be used with the smart mirror. Some smart mirrors employ a website technique to fetch data, which leverages several APIs. Some smart mirrors also function as home assistants and can be

controlled via input. Some devices have two modes of operation: normal mode and smart mode. In normal mode, the smart mirror functions like a standard mirror, however in smart mode, all of the mirror's features are engaged. The smart mirror also shows tailored information on the LED panel, allowing users to handle their needs more efficiently and precisely. Smart mirrors are commonly used for showing time, date, and weather, as well as for information systems, face recognition, and voice recognition. More advanced applications have yet to be discovered.

VI.   FUTURE SCOPE

Nothing is flawless or complete, and there is always room for development in any product. To keep up with modern technology, everything must be updated or improved on a regular basis. Apart from upgrades, there might be a slew of other additions that enhance our smart mirror's functionality and capabilities. This study has a lot of potential in the future, and hopefully it will be of the most use in the field of artificial intelligence. The most basic functionality may be smart mirror-based home automation, which would give a natural way of interaction for controlling domestic equipment such as turning on/off lights and fans using simple voice requests. This paper's next step is to do research in order to put the smart mirror notion into practice in order to improve learning In the future, research will be conducted with the goal of determining the optimal way for developing this smart mirror. This smart mirror is expected to aid and facilitate human existence.

VII.   CONCLUSION

To summarize, this application is a new technology for living a smart life. We created a futuristic smart mirror that allows customers to connect naturally with their home's ambient services. A flat LED display monitor provides the mirror display, which displays all of the relevant information for the user. The Smart Mirror has a lot of potential in the field of IoT and home automation. To improve its functionality, the Smart Mirror may be connected to household appliances, mobile devices, and other gadgets. With the help of this smart mirror, users may better arrange their activities. As enabling technologies advance, smart mirror applications will become increasingly sophisticated. Clearly, there are many options for electronic integration in the home. However, a mirror is one of the best places to start. We created an intelligent mirror with future advancements in the field of home automation environment in mind.

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