SMARTMIRROR USING RASPBERRY PI4

[1]Prof. Vishal R. Shinde, [2]Mr. Sagar Rajesh Ghate, [3]Mr. Atharva Madhukar Hulavane, [4]Miss. Deepika Dilip More.

[1]Asst.Prof,[2,3,4]UG Student,[1,2,3,4]Computer Engg. Dept. Shivajirao S. Jondhle College of Engineering & Technology, Asangaon, Maharashtra, India.

[1]mailme.vishalshinde@gmail.com, [2]sghate25@gmail.com, [3]atharvahulavane786@gmail.com, [4]deepikamore868@gmail.com

Abstract: The Internet changed our lives by making it easier for us to access information and other people in the online community. Then, mobile phones evolved into smart phones, and this idea blossomed and changed into the Internet of Things, which connects us to commonplace items. There are no end of objects that could be made "smarter", some being more suited to this than others. Mirrors, for instance, offer a roomy surface perfect for information display and interaction. Considering that most households have mirrors and since it has been romanticised in several futuristic films, the a smart mirror's concept with which you can communicate with is appealing.People in the maker community have recently started to create smart mirrors with varied levels of interactivity, such Magic Mirror and Home Mirror. This mirror is a really elegant interface for skimming the data and can be utilised for intrusion detection in a cosy setting. It has two alternative operating modes: standard mode, in which the mirror behaves normally; and smart mode, in which the mirror responds to external commands and shows pertinent information. The Raspberry Pi-3 model, together with touch screen capabilities and voice commands, can be used to create the smart mirror[1].

Keywords- MagicMirror, Linux , Internet of Things, RasbianO.S .

I. INTRODUCTION

The increasing popularity of smart homes and the Internet of Things (IoT) has led to the development of innovative devices that can make our lives easier and more convenient. One such device is the smart mirror, which can reflect information and present, such as the weather forecast, news headlines, and calendar events, as well as allow for voice control and interaction.Smart mirrors are a new and exciting technology that has gained significant popularity in recent years [2]. A smart mirror is essentially a mirror with an embedded display that can provide a range of features beyond traditional mirrors, such as displaying the time, weather, news updates, and personal notifications. The use of smart mirrors has expanded to areas such as health and fitness tracking, home automation, and entertainment.In this paper, A smart mirror design that utilizes the Raspberry Pi platform [1]. Smart mirrors can be created using the Raspberry Pi, a small, inexpensive computer the size of a credit card.A wide spectrum of users should be able to afford and access design. Time, weather, news updates, and personal notifications are just a few of the things that a smart mirror can display. Additionally equipped with voice recognition technology, the mirror enables users to communicate with it verbally. The system recognises faces and displays personalised information for each user using a Raspberry Pi camera module.Overall, smart mirror design is a cost-effective and accessible option that addresses privacy and security concerns while also offering a variety of practical benefits. The use of Raspberry Pi makes flexible and customizable, allowing users to modify the mirror to meet their specific needs.

II. AIMS AND OBJECTIVE

a) Aim

The major objective of paper was to create a smart mirror device and an operating system for use with related hardware. The device was created to seem like a typical mirror, however, It would feature voice controls and a touchscreen that was controllable by mobile devices. The operating system would support running apps and would provide a simple API for thirdparty developers to create their own apps for the Smart Mirror. The Smart Mirror's primary functions would be to display the time and basic weather information.

b) Objective

- Home automation is not new for a long time and it is all about turning the house into an intelligent unit with the goal of increasing comfort and efficiency at home.
- Less computational power or resources like RAM, CPU, GPU or TPU, etc.
- In less quantity of data, we can achieve more accuracy.

III. LITERATURE SURVEY

Paper 1: SmartMirror Using Raspberry Pi4:

 DOI : 10.5281/zenodo.7856216

In this paper, Firebase Cloud services are used. Firebase consists of Real time DB, Cloud Hosted DB. Cloud services are used to facilitate safe file transfers and also for storing images and videos. This mirror interacts with user with WhatsApp message which is time consuming & very inefficient in terms of user interface. In their smart mirror, Home automation was added by Mr. P. Mathivanan, Sakhtivel A, Anbarasan G, and Selvam G. They were able to control lights, fans, the room's temperature, and other things with the mirror they made. They developed a module that made it possible for them to monitor the status of all of their household appliances on WhatsApp, which was incredibly useful. In their mirror, they also added facial and biometric recognition. developed a intelligent mirror that acts as an appealing yet straightforward interface for showing data. Its main goal was to simply communicate with people by presenting their basic data, such as the date, time, weather, and so on.

Paper 2: SmartMirror With Voice Commands:

An approach for facial recognition in an open environment is presented in this research. The initial step is to identify face windows and their bounding box regression vector. There are numerous alternatives for the second combines. The positions of the five facial landmarks and the locations of the face regions are the network's final outputs after the face recognition and alignment stage. Studies demonstrate that the method of face alignment and detection is superior to earlier methods.It achieves great performance on angle of faces in image and obtains accuracy of 96.1% on AFW and 98.9% on FDDB. Secondly, faces are sent to convolutional neural network for training. With very limited training data, retraining the entire network seems impossible. The result shows that the method exceeds the traditional algorithms and general CNN in small dataset.

Paper 3: IoT based Design of Intelligent Mirror using Raspberry Pi:

This study proposes a training sample expansion technique based on convolutional neural networks and a parallel neural network for detecting illumination, occlusion, and facial features, as well as a face identification system employing the Relu activation function and Dropout random regularisation approach. Network training not only speeds up the convergence of the network, but also improves the generalization ability. On this basis, the software according to facial detection and feature point location is designed to realize the automatic loading of images and the face recognition function, to achieve accurate positioning of the face points, and to locate experiments on the LWF face database. The findings demonstrate that the method is significantly more accurate and reliable, and that it can produce reliable and precise estimation of crucial points.

IV. EXISTING SYSTEM

The paper "Design of Smart Mirror Based on Raspberry Pi" by Y. Sun et al. proposes a smart mirror system that displays various information such as time, weather, news, and social media feeds using a Raspberry Pi. The authors provide a detailed description of the hardware components used, including the Raspberry Pi, camera module, and LCD display, as well as the software components used, including OpenCV for facial recognition and various APIs for data retrieval.The paper also includes a demonstration of the system's functionality and a discussion of future work, such as integrating voice control and improving the user interface [2]. The paper "IoT based Design of Intelligent Mirror using Raspberry Pi" by J. Kawale and P. Chaudhari proposes an intelligent mirror system that uses Raspberry Pi as the core component. The system is designed to display various types of information such as weather, news, and calendar events, as well as provide voice-based control for home automation and entertainment devices [3]. This paper proposes a smart mirror system based on Raspberry Pi that displays various types of information such as time, weather, calendar events, and news headlines. The paper also provides a detailed description of the hardware and software components used, as well as a demonstration of the system's functionality[5].

V. COMPARATIVE STUDY

Sr. No	Paper Name	Author/ Publication	Advantages
1.	Smart Mirror using Raspberry Pi: A Survey	S. Sahana, Shradha M., Falguni M., Sashank R. K.	Smart mirror include displaying of Time, Date and Weather, Information System, Face recognition and Voice recognition.
2	IoT Based Voice Controlled Raspberry PI Smart Mirror	G. Sophia Jasmine, D. Magdalin Mary, S. V. Jaya Ghaanndth and J. Dhanush Kumar	Better speech precision is achieved by the most refined NLP and TTS algorithms
3.	IoT based Design of Intelligent Mirror using Raspberry Pi	J. Kawale and P. Chaudhari	When user is not in-front of mirror, it acts as a traditional mirror. This also known as Power Saving Mode as in this mode all electronics circuits are in OFF state
4.	Augmented Rendering of Makeup Features in a Smart Interactive Mirror System for Decision Support in Cosmetic Products Selection	A. S. M. M. Rahman, T. T. Tran, S. A. Hossain and A. El Saddik	By using the material property the shininess (specular exponent of the material) of the face geometry was adjusted as needed.

Table No.1 : Comparative Analysis

 DOI : 10.5281/zenodo.7856216

VI. PROBLEM STATEMENT

Hardware: The first challenge is to identify and obtain the necessary hardware components for the smart mirror, including a computer screen, a two-way mirror, a Raspberry Pi or similar single-board computer, and any necessary cables and accessories.

Software: The next challenge is to identify and configure the necessary software components for the smart mirror, including an operating system, a web server, and any necessary modules and plugins for displaying information such as weather, news, and calendar events.

User Interface: The smart mirror should have a simple and intuitive user interface that allows users to customize the information displayed on the screen and interact with the device using voice commands or touch inputs.

Voice Recognition: A voice recognition system that can accurately understand and execute user instructions must be installed if voice commands are to be utilised to operate the device.

By addressing each of these challenges, the goal is to create a smart mirror that is easy to use, visually appealing, and capable of providing a wide range of useful information to users.

VII. PROPOSED SYSTEM

The Raspberry Pi, a small Linux-running PC that serves as the brain of the Smart Mirror, also features a number of GPIO (broadly useful information/yield) pins that let you control electronic components for real-world registering and IoT research. One of the reputable operating systems that can be downloaded and used without charge is Raspbian OS. The framework depends on Debian Linux and is advanced to work proficiently with the Raspberry Pi PC. It is likewise fitting for the vast nearly all ARM clients and engineers. A level board display called an LED Monitor uses a variety of light-emitting diodes as its pixels to display video. They can be used outside thanks to their beauty [7]. More complex displays are built on the restricted supply mechanism. Smart Mirror can offer an open source forum for programmers, hackers, and users. Developers' main objective in this scenario would be to add new features to the extensive and extended framework. Such capabilities addition would improve the performance of developers and attackers. The Raspberry Pi gains the screen using the HDMI connections. [2]. Information can be shown on an LED screen such as news, the current weather, the time, and the date. Acrylic Mirror is made from thermoplastic sheets that reflect light which is lightweight and used to upgrade the look and wellbeing of showcases, signage, POP and an assortment of manufactured parts. Acrylic reflect is ideal for food, retail and security applications. It simply needs to debug the position after connecting the infrared frame, which is less expensive. The capacitive resistor is less favourable than the touch panel. The touch module of an infrared frame may recognise objects that capacitive resistors are unable to detect [1].

VIII. ALGORITHM

Step 1: Start
Step 2: Speech Recognition
pip install SpeechRecognition.
r = sr.Recognize()
Microphone()
Step 3: Importing Modules
import speech_recognition as sr
import pytsx3
Step 4: listener = sr.Recognize()
engine = pyttsx3.init()
voice = engine.getProperty('voice')
engine.setProperty('voice', voice.id)
Step 5:def talk(text):
engine.say(text)
engine.runAndWait().
Step 6:def take_command():
try: with sr.Microphone() as source:
print('listening...')
voice = listener.listen(source)
command = listener.recognize_google(voice)
print(command)
except: pass
return command
Step 7:while True: run_alexa().
Step 8: End.

IX. SYSTEM ARCHITECTURE

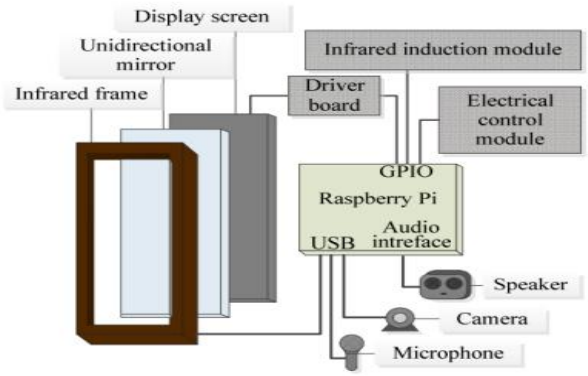

Fig.1: Components Of SmartMirror

 DOI : 10.5281/zenodo.7856216

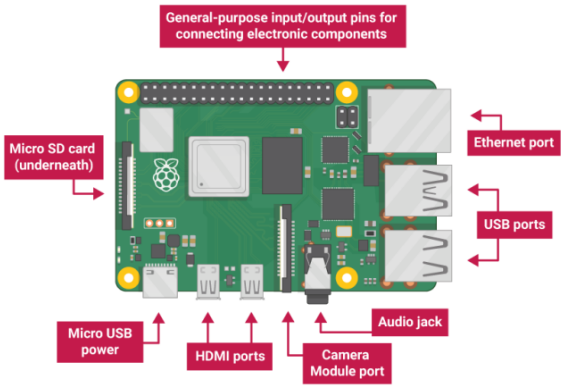

Fig.2: System Architecture

Description:

Raspberry pi4: The Raspberry Pi Foundation created the single-board computer known as the Raspberry Pi 4. It is the most recent Raspberry Pi model and was introduced in June 2019.

X. ADVANTAGES

- You have total control over the hardware and software used to build a smart mirror with a Raspberry Pi.
- You don't need to take out your phone or turn on another device to check the clock, weather, and news headlines as you're getting ready in the morning.
- Some input-controlled smart mirrors function as house assistants as well.[1]

XI. DESIGN DETAILS

Fig 3: Result

Description: This is the final output of smart mirror which shows all basic information like Weather forecast, Time, holidays, compliments & calendar. Which all information are used in daily routine.

XII. CONCLUSION

Thus we have tried to implement the paper S. Sahana, Shradha M., Falguni M., Sashank R. K., "Smart Mirror using Raspberry Pi: A Survey," IEEE 2021 and according to implementation, we have successfully proposed to use permissions, receivers and services of Amazon AWS on Raspbian OS. for constructing sophisticated smart homes. This paper's primary goal is to create a mirror using machine learning methods that will function flawlessly and continually update itself. Future updates to Alexa's skills can keep the smart screen up-to-date and productive. For instance, you could modify your car's mirror to enable communication between the driver and the mirror while you're driving hands-free.

REFERENCE

[1] S. Sahana, Shradha M., Falguni M., Sashank R. K., "Smart Mirror using Raspberry Pi: A Survey," 2021 *(ICCMC)*, Erode, India, 2021, pp. 634-637, (doi: 10.1109/ICCMC51019.2021.9418408.)

[2] G. Sophia Jasmine, D. Magdalin Mary, S. V. Jaya Ghaanndth and J. Dhanush Kumar, "IoT Based Voice Controlled Raspberry PI Smart Mirror," 2021 *(ICACCS)*, India, 2021, pp. 1170-1173, (doi: 10.1109/ICACCS51430.2021.9441945.)

[3] P. Karthik, U. G. Keerthiv Sanjay, S. Abhiram and V. Dinesh Kumar, "Implementation of Home Automation using Smart Mirror," *2021*,pp. 1-6, (doi: 10.1109/ICAECA52838.2021.9675660

[4] J. Kawale and P. Chaudhari, "IoT based Design of Intelligent Mirror using Raspberry Pi," 2019, pp. 1-4, doi: (10.1109/I2CT45611.2019.9033738).

[5] M. Wani and P. Ahire, "Real Time Smart Mirror System Using Internet on Things," *2019*,pp. 1-4, (doi: 10.1109/ICCUBEA47591.2019.9129315.)

[6] K. Jin, X. Deng, Z. Huang and S. Chen, "Design of the Smart Mirror Based on Raspberry PI," 2018, pp. 1919-1923, doi: (10.1109/IMCEC.2018.8469570).

[7] F. Ok, M. Can, H. Üçgün and U. Yüzgeç, "Smart mirror applications with raspberry Pi," 2017, pp. 94-98, doi: (10.1109/UBMK.2017.8093566).

[8] Design and Implementation of Smart Mirror System Based on Raspberry Pi" by W. Hu, L. Liu, and Q. Sun:2014.

[9] A. S. M. M. Rahman, T. T. Tran, S. A. Hossain and A. El Saddik, "Augmented Rendering of Makeup Features in a Smart Interactive Mirror System for Decision Support in Cosmetic Products Selection," *2010 IEEE* (doi: 10.1109/DS-RT.2010.30.)

 DOI : 10.5281/zenodo.7856216