

Personalized Smart Mirror

Yashoda Ghag, Shubham Pandit, Diksha Upadhyay, Sharvil Gadkari, Sunil Rathod

Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Savitribai Phule Pune
University, Pune, Maharashtra, India

ABSTRACT

The smart mirror discussed in this paper is mainly for home environment. The paper idea highlights some of the smart mirrors from different companies. These smart mirrors are not widely used due to cost or high requirements of hardware. The proposed smart mirror which addresses the problem of earlier smart mirrors will be operated by Linux OS and will be connected to real world through internet.

The smart mirror will consist of Linux OS, LED monitor, speakers, camera, microphone with two-way mirror and acrylic glass. With the help of voice recognition API, the mirror will communicate with the user through voice commands and responds them accordingly. The mirror could also support human movements. The mirror will highlight some basic amenities like time, local news, and weather. The mirror will also perform some advance functions such as playing music, face recognition, etc. This mirror with artificial intelligence can provide an extraordinary experience to the user which is kept as future development of the proposed work.

Keywords : Linux OS, Web-cam, Smart Mirror, Voice assistance

I. INTRODUCTION

The Future of Mirrors is here Smart mirror which is based on innovation of technology. Smart Mirror consist of a simple LED display which sits behind the mirror and hidden with a Two-Way Mirror and displays white UI elements with a black background. When the Smart Mirror is on, we can see both our reflection and the white elements, allowing software to present relevant information while you get ready for the day. Effective time management is an essential factor in increasing the production of day-to-day life. Integration of technology into people's daily lives has made that time management possible. The use of products such as tablets, PCs, and smartphones have given people access to the tools needed to be productive.

Such a device is expected to have a beneficial effect on society. It will streamline the lives of the users by allowing them to view information important to them and provide easy access to important services they may require. Furthermore, being able to control various household electronic systems from a single device will remove the need for a separate control for each device.

In this paper, we present a personalized mirror that is meant to serve as both decoration and information source. With just one look at the mirror, one will have the basic information on what's going on like news, weather forecast for that day.

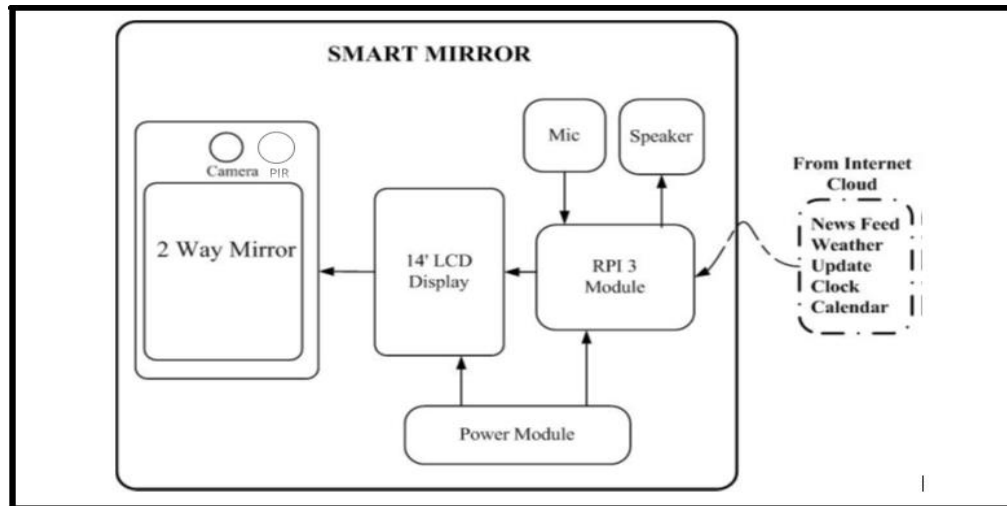


Figure 1: System Architecture

II. LITERATURE REVIEW

Here we discuss the literature review of existing Systems

TABLE-1: TAXONOMY CHART

	Live Streaming	Alert Generation	Network	Music Player	Security
Smart Mirror	NO	NO	YES	YES	NO
Smart Mirror with Voice Assistance	NO	NO	YES	YES	YES
Smart Mirror Virtual Assistance	YES	YES	YES	YES	NO

TABLE-2: LITERATURE SURVEY CHART

Sr. No.	Paper Name	Author	Method Proposed	Limitations
1.	A Comparative Study and New Model for Smart Mirror	Mittal, V. Verma, R. Rastogi	Voice Assistance	Energy Consumption No Authentication.

2.	Smart Mirror Integrated with Smart Assistant	Prof. Sheetal Patil, Prathamesh More, Ritoli Rajput.	Sending Notifications via Email Net Streaming	Internet Connection Database to store photos
3.	Smart Mirror using Virtual Voice Assistant	Amit Dhavle, Saurabh Chavan,	Music Player Pocket Friendly	Security Power Supply
4.	Design of Smart Mirror Based on Raspberry Pi	S. L. Herman and C. G. Garrard	Big Data	Security Issues
5.	Smart Mirror for ambient home environment	A. Korkin and F. Rosei	Home Automation System	Not Reliable Data Transfer

III. PROPOSED APPROACH

A. Problem Statement

The goal of the smart mirror is to provide an access point for a person to receive all the information that could affect how they plan for the day. For getting weather updates, a person will always have to switch on the television which is time consuming.

B. Proposed System Overview

For this System we are planning to design and develop kind of mirror which provides a whole new experience to the user hence called Smart. Our proposed smart mirror consists a two-way mirror, acrylic glass, monitor (LED), Linux OS, Node js Modules, Webcam. A wooden frame will be prepared with LED attached behind the glass with all the sensors and the Processor. The power supply is attached to the LED.

Once the mirror is activated, it will connect to the Server 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 laptop. 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 script will contain the api of Google (virtual voice assistant from Google) that will respond to the user's voice.

In this system architecture we have following modules:

1) Weather

This module works on openweather api which gives all the information about weather for any location along with date and time module alongside.

2) News

This module specifically designed to extract all the latest updates about current affairs which uses free

news api to access the news and then passes it to the server.

3) Face Detection Module

This module is to be executed at the start of the system which initiates the mirror based on presence of the person in front of the mirror.

4) Date and Time

This module is used for getting date and time on the user display.

5) Entertainment

This field contains various modules which will provide content like Jokes, which can comment on your attire etc.

6) Reminders

This modules is used to store the reminders on calendar for specific date or time which will give user a reminder on that time or when user asks for the data.

C. Algorithm

S = Face Recognition.

Σ = set of input symbols = {Video File, image, character information}

F = set of output symbol = {Match Found then notification to user, Not Found}

δ = 1. Start

2. Read training set of images

3. Resize image dimensions to

4. Select training set of Dimensions,

M: number of sample images

5. Find average face, subtract from the faces in the training set, create matrix A

Where,

Ψ = average image,

M = number of images, and

Γ_i = image vector.

$G_i = \Gamma_i - \Psi$

Where, $i = 1, 2, 3, \dots, M$.

$A = [\Phi_1, \Phi_2, \Phi_3 \dots \Phi_M]$

6. Calculate covariance matrix: AA'

7. Calculate eigenvectors of the c covariance matrix.

8. Calculate eigenfaces = No. of training images – no. of classes (total number of people) of eigenvectors.

9. Create reduced eigenface space the selected set of eigenvectors are multiplied by the A matrix to create a reduced eigenface

10. Calculate eigenface of image in question.

11. Calculate Euclidian distances between the image and the eigenfaces.

12. Find the minimum Euclidian distance.

Output: image with the minimum Euclidian distance or image unrecognizable

$C = \{\text{the system will not process the audio data, Eigenfaces will generate the grayscale images, the algorithm will run only on key frames.}\}$

IV. RESULT

As per the prototype of the model the hardware is built around the LED screen of the laptop which are mirror and frame, webcam etc. the hardware setup of the system looks like the figure below.



Figure 1: Hardware Architecture

when the instance is launched the following results are given by the system.

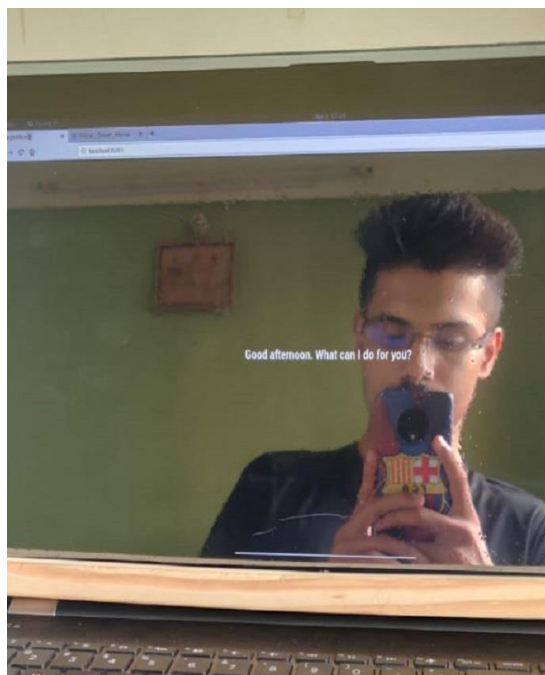


Figure 2: initial interface of mirror

When webcam at the top detects the presence it initiates the mirror and one of many gui pops on screen as shown in fig.1. and when you say “okay mirror” it starts taking commands from the user.



Figure 3: Mirror Showing a Joke

In fig.2 when user asks mirror “tell me a joke” mirror prompts joke on to the screen and read it for the user that's why the speakers are attached to system.



Figure 4: Weather Updates

In fig 3 the weather module is executed when user asks about any specific place, weather for that specific place is shown onto the mirror. Weather is shown along with the wind speed and temperature.

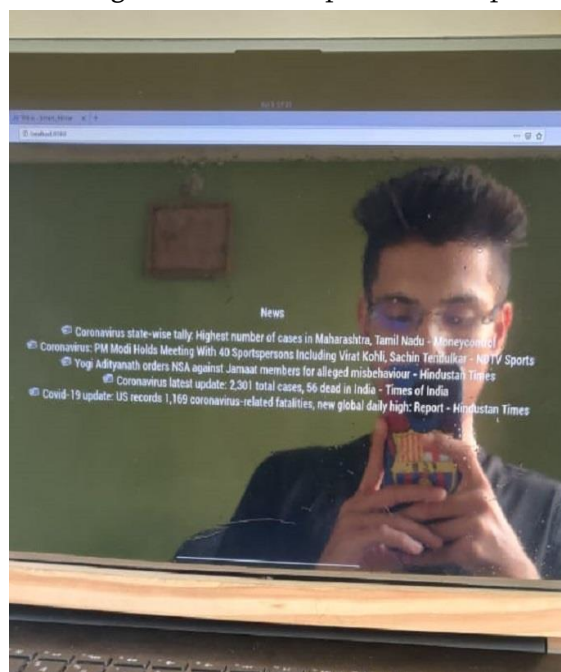


Figure 5: News feed

In the above figure the mirror is showing news feed. On asking the mirror “what's latest” it shows all the latest news feed on to the screen. Mirror can also perform tasks like giving complement showing calendar etc.

V. ADVANTAGES

1. User Friendly interfaces.
2. Home automation.
3. Raises standard of living.

VI. LIMITATIONS

1. More Power Consumption.
2. Strong Network Connection.

VII. CONCLUSION AND FUTURE SCOPE

The main goals of the smart mirror were to aim to reduce time needed in a user's daily routine and provide a merger of user and technology that becomes an enhancement, not a new burden. Apps like their calendar, music, news, to-do lists and weather will be available. The user didn't even have to worry about turning on and off the system because the mirror will detect motion and do the work for them. This will help us reduce power consumption.

VIII. ACKNOWLEDGEMENT

It gives us a great pleasure in presenting the paper on “**PERSONALIZED SMART MIRROR**” and we would like to take this opportunity to thank Dr. Pankaj Agarkar, Head of Computer Engineering Department, DYPSOE, Pune for giving us all the help and support we need during course of the Paper writing work. We would also like to thank our Principal Dr Ashok Kasnale for creating a motivating environment and encouraging us towards achieving greater excellence. We are really grateful to him. We also thank all the staff members of our college for their support and guidance.

IX. REFERENCES

- [1]. Smart mirror using Virtual Voice Assistance, Datta Meghe College of Engineering, Navi Mumbai, Maharashtra, India, April 2019
- [2]. Smart Mirror Integrated with Smart Assistance, Bharati Vidyapeeth, College of Engineering, Pune, Maharashtra, May 2018
- [3]. A Comparative Study and New Model for Smart Mirror, Department of CSE, Gelgotias University, Greater Noida, India, December 2017
- [4]. C. Lampton, Internet of Things Global Standards Initiative, ITU Retrieved 26 April 2016.
- [5]. J. W. Smither, Maker Culture (chapter in Innovating Pedagogy 2013) (PDF). The Open University. Retrieved 20 April 2016.
- [6]. S. L. Herman and C. G. Garrard, How Can I Get Started with Home Automation? (2013) Retrieved 20 April 2016.
- [7]. A. Korkin and F. Rosei, Magic Mirror (2014) Retrieved 20 April 2016. <https://www.raspberrypi.org/blog/magicmirror>
- [8]. L. J. Slater, GitHub//MichMich/MagicMirror (2016) Retrieved 20 April 2016.
- [9]. E. Strickland, H. Hatrie, GitHub/HannahMitt/HomeMirror (2016) Retrieved 20 April 2016, <https://github.com/HannahMitt/HomeMirror> Smart Mirror Retrieved 20 April 2016. <http://smartmirror.io>