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AI based Smart Mirror

Gaurav Anbhore[1], Aniket Natkar[2], Deepak Bhoad[3], Amol Mhatre[4]

[1,2,3,4]*Student, Department of E&TC, KOKAN GYANPEETH College of Engineering, Karjat, Maharashtra, India*

Abstract - *The Smart Mirror introduce the design and the development of a futuristic Smart Mirror with an artificial intelligence for the home environment as well as for industrial use. The smart mirror would collect real world machine data and the data would be transmitted from the machine and would be managed by the Raspberry Pi 4. The Smart Mirror is developed as a personalized device which includes Raspberry Pi 4, microphone, speakers, LCD screen covered with a reflective one way mirror. This provides the real time weather forecast, latest news updates, local time corresponding to the location. And using Amazon Alexa we can therefore interact with the mirror and get the required output. The advantages of this Smart Mirror are that is compact, cost-effective and user-friendly. In addition, its vast application promise, people of all ages can make use of this system.*

Key Words: **Smart Mirror, Artificial Intelligence, Raspberry Pi4, Alexa with voice response, Real time weather forecast, Real time & Calendar, News RSS feeds.**

1. INTRODUCTION

Smart mirror is basically a mirror, which provides the information which we need in our day-to-day life, as weather report, real time news, time, etc. The mirror has a LCD screen at the back which will be showing all the information, as this was an existing system by reference[1] and to this we have implemented a personal assistant so that can interact with the mirror and the user.

Based on this interactive computing and communication technologies, many devices/products are now emerging and it is providing comfortable, secure and convenient personal services everywhere whether it is home or various industries. We look at the mirror daily and interact with it psychologically to find out how we look. The interactive mirror is a development effort by adding the mirror with proper embedded intelligence for offering enhanced features such as weather of the city, latest updates of news and headlines and local time corresponding to the location which was previously developed by the references. The Smart Mirror would help in developing smart houses with embedded artificial intelligence, as well as finding its applications in industries, smart office, and other applications.

It can do all the work which we command it to, as it has a personal assistant which will listen to your commands and will response according to it. The smart mirror has microphone through which it will listen to the commands, and there is speaker from which it will give its response. Smart mirror have the some capabilities like showing date and time which was done before when it was developed, but objective of this project is as follows: It must be capable of showing all the real time data, the Smart Mirror must be capable of showing the information on the screen correctly, the screen should not affect the reflection of a person, the Smart Mirror must take the voice command as the input and give the required response to the user, and the Alexa should provide proper response.

2. PROPOSED SYSTEM

The Smart Mirror is basically a Personal Assistant for Human Interaction between the Mirror and user. The Smart Mirror is proposed in such a way that it provides day to day life information simultaneously while getting ready. It provides information such as Real Time, Calendar, Indian Holidays, Current Weather Forecast and also upcoming day's weather forecasting according to the Smart Mirror's Geo-Location, RSS News Feeds and compliments, while getting ready. The Raspberry PI 4 module is used which includes the Raspbian Operating System based on Debian. We are developing design using Raspberry Pi4 Module which is used to retrieve the data by using wifi connectivity. The Alexa is used for interaction between Mirror and User to gain Information.

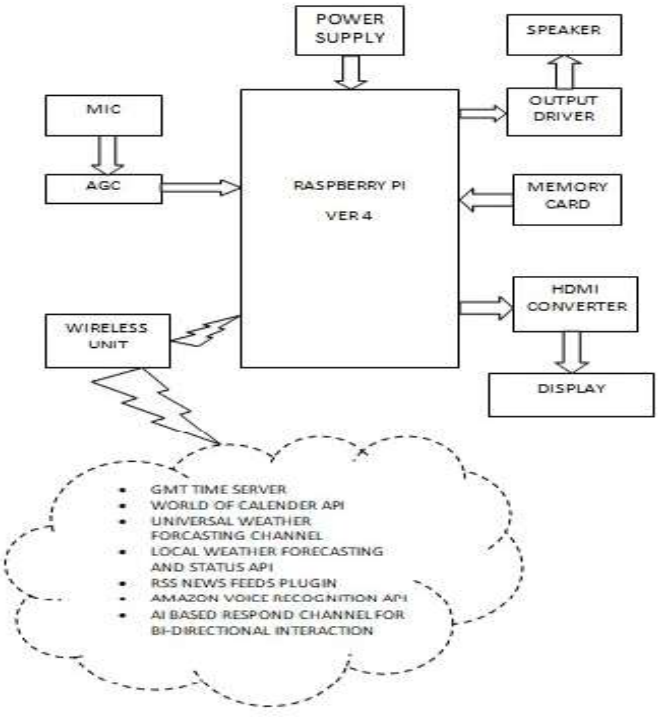

Fig -1: **Proposed Design**

The Smart Mirror is a personal Assistant built using Raspberry Pi4 Module. A LCD display by Sony Corp. of 14-inches is used to build a mirror. A unidirectional microphone with 5V input supply is used to give commands to mirror. Alexa is a voice response model which is used to respond asked queries which makes the Smart Mirror Artificially Intelligent.

2.1. HARDWARE SECTION

2.1.1 Raspberry Pi

Fig -2: Raspberry Pi 4 Model B

The Raspberry Pi is a Single-Board Computer. It is heart of the Smart Mirror. It is used to make the system interactive and all the processing takes place in this chip-set. It provides the OS required running the Smart Mirror efficiently.

The Raspberry Pi 4 Model B is the newest Raspberry Pi computer made, and the Pi Foundation knows you can always make a good thing better! And what could make the Pi 4 better than the 3? How about a faster processor, USB 3.0 ports, and updated Gigabit Ethernet chip with PoE capability? Good guess - that's exactly what they did!

The Raspberry Pi 4 is the latest product in the Raspberry Pi range, boasting an updated 64-bit quad core processor running at 1.4GHz with built-in metal heat sink, USB 3 ports, dual-band 2.4GHz and 5GHz wireless LAN, faster (300 mbps) Ethernet, and PoE capability via a separate PoE HAT.

You can still use all your favorite Raspbian or PIXEL software with this update. You MUST make sure to upgrade your Raspbian operating system install to the latest version so that the firmware can support the new chips. Old SD cards from previous releases will not work without a upgrade.
The dual-band wireless LAN comes with modular compliance certification, that's the metal tin in the corner of the Pi, with the logo stamped on it. This allows the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market.

2.1.2 Two-way Mirror

Fig -3: Two-Way Mirror

A two-way mirror, also called one-way mirror (or one-way glass, half-silvered mirror, and semi-transparent mirror), is a reciprocal mirror that is reflective on one side and transparent at the other. The perception of one-way transmission is achieved when one side of the mirror is brightly lit and the other side is dark. This allows viewing from the darkened side but not vice versa.

The glass is coated with a thin and almost-transparent layer of metal (window film usually containing aluminum). The result is a mirrored surface that reflects some light. Light always passes equally in both directions. However, when one side is brightly lit and the other is kept dark, the darker side becomes difficult to see from the brightly lit side because it is masked by the much brighter reflection of the lit side.

2.1.3 LCD Screen

Fig-4: LCD Screen

The LCD Screen is used to provide an output to the Raspberry Pi. All the information such as, time, weather, news is displayed on this screen. It provides the base of the Smart Mirror. It is connected to the using the HDMI Cable.

2.1.4 VGA to Micro HDMI Cable

Fig-5: HDMI cable

Micro HDMI is connected to the raspberry pi and the VGA cable is used to connect the with the LCD screen. It helps in displaying the output on the LCD screen.

2.1.5 Microphone

Fig-6: Microphone

The Microphone is connected to the using the USB cable. It provides as a speech input to the Raspberry pi. It is used to provide speech recognition to the system and makes the model more interactive.

2.2. SOFTWARE SECTION

2.2.1 Raspbian OS

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

2.2.2 NodeJS

NodeJS is an open-source cross-platform JavaScript run-time environment for executing JavaScript code server-side. 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.

2.2.3 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.

3. SETUP OF PROJECT

Fig -7: Setup of project

The above Fig-6 shows the setup of the project which consists of a wooden frame, Reflective mirror, An LCD display of 14-inches is mounted behind the Reflective Mirror. There is a VGA-to-HDMI USB convertor that connects LCD screen to Raspberry Pi 4 module. A USB auto gain microphone is used for voice command and A Speaker of 5V 1A is used for voice response. The Raspberry Pi4 module requires a 5V 3A Power supply and the LCD display requires a 12V 1A Power supply.

Fig -8: Final look of project

4. CONCLUSIONS

The main objective is to design a Smart Mirror that will be helpful for the residential as well as commercial purposes. A good project can't be produced without proper research first. Similar projects and products were analyzed for similarities, improvements, and flaws in them. The programming and interfacing of raspberry pi has been helpful during the implementation. It is one kind of a Personal Assistant for the Smart Mirror's user. The Smart Mirror will help to reduce the time needed by the user in a daily routine. After overcoming the problems we face during the project, we have successfully designed a Smart Mirror. The Smart Mirror gives the functionality like Real Time, Indian Calendar, Weather Forecast, and Upcoming Days weather situation, RSS News Feeds, and Alexa for the human Interaction with the Mirror and to get the required correct information.

5. FUTURE SCOPE

We aim at designing a smart mirror that provides an ambient environment between users and the internet. It will help the users in their daily activities. The smart mirror can also be implemented in various industrial and home applications. Hence IoT proves out to be an important technology for making household appliances smart. The facial recognition technology used in the smart mirror proves out to be an important means of security. Smart mirrors can be connected to home appliances and smart phones. The mirrors can detect face and provide access to personalized services. The mirror can also be implemented to recognize emotions. With the help of emerging technologies, smart mirrors can be advanced to touch screen modes. The mirrors can be better enhanced to be deployed in beauty parlors, cloth shops, hotels, etc. with better advancements in technology; mirrors can be used in many other fields.

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BIOGRAPHIES

Prof. Sanjay V. Sonar
ME in Electronics and Telecommunication Engineering.

Gaurav K. Anbhore
Pursuing BE in Electronics and Telecommunication Engineering, Konkan Gyanpeeth College of Engineering, Karjat.

Aniket S. Natkar
Pursuing BE in Electronics and Telecommunication Engineering, Konkan Gyanpeeth College of Engineering, Karjat.

Deepak P. Bhovad
Pursuing BE in Electronics and Telecommunication Engineering, Konkan Gyanpeeth College of Engineering, Karjat

Amol N. Mhatre
Pursuing BE in Electronics and Telecommunication Engineering, Konkan Gyanpeeth College of Engineering, Karjat.