



Smart Mirror: A Modern-Day Mirror

Ganesh Rajapaka¹, Akash Rana², Sarim Shaikh³, Rajesh Tatkare⁴, Prajakta Pawar⁵

¹Atharva College of Engineering, Mumbai, Indiaganeshrajapaka@gmail.com

²Atharva College of Engineering, Mumbai, India, akashrana@gmail.com

³Atharva College of Engineering, Mumbai, India, tamkinsarim@gmail.com

⁴Atharva College of Engineering, Mumbai, India, rajeshtatkare@gmail.com

⁵Assistant Professor, Atharva College of Engineering, Mumbai, India, prajaktapawar@gmail.com

ABSTRACT—

With technological advancements, almost all things are becoming a better version of their past. With the advancement in IoT, IoT-based devices have made life much easier for everyone. In the smart mirror, raspberry pi 3b is used as the main circuit along with a display, and a dark acrylic sheet is applied to it to give it a touch of reflection of the mirror. Multiple peripherals like camera, mike, speakers, etc. are added. The ability of this mirror to provide live data to the user in front of it which gives audio output and takes input by providing a custom profile to each user just by authenticating them through their face which saves a lot of user time, also the user can ask mirror to play music or show any live data through the internet.

Index Terms—Internet of Things, IoT, Smart mirrors

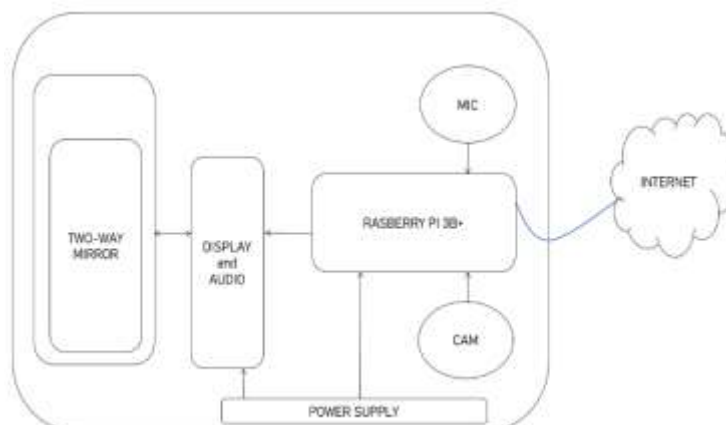
INTRODUCTION

There is a step increase in demand for IoT-based smart home devices. With the advancement in many different sectors of life, people are now wanting to have a more advanced version of everyday things like a watch, Heart rate counter, locks, etc. This technology makes life easier and simple also the ability to use Wi-Fi through which the user can do much of the automation of the house lead to more demand for advanced devices. One such device is the smart mirror. It's a mirror but with a touch of smartness. It has a reflective surface with makes it looks like a mirror but behind it, there's a machine working and proving information and feedback to the user. The ability of the mirror to interact with its user and provide them custom tailored data daily which saves precious time for the user makes it a smart mirror by helping them solve everyday problems in a more efficient way.

Advancements in smart devices make them more economical and compact for the everyday user. More and more people are making use of smart devices. When running around the clock on a busy schedule simple news watching would cost a lot of time loss for that person. The problem can be solved by using of smart mirror. Having a widget that shows all the news necessary for that person while getting freshened up in the morning would make it a time-saving gadget for that person. There can be multiple widgets like weather, songs, news, articles, daily slogans, daily task chart, Etc. Having all these things in front of the eye without unlocking your device in the morning would be beneficial in both ways i.e. healthy and timesaving. The user just needs to touch for interacting with the mirror. The device is better when installed as a display item in the respective space for its user.

BLOCK DIAGRAM

The main circuit used in the project is raspberry pi 3b+ along with other peripherals that include Raspberry Cam, USB mic, Display, and Speaker.



Raspberry Pi 3b+

Raspberry Pi 3B+ is the brain of a "Magic Mirror" - that displays information such as news, weather, and calendar events. The Raspberry Pi 3B+ can handle running the necessary software to display this information and drive the display. It is powered by a 64-bit quad-core ARM Cortex-A53 CPU clocked at 1.4 GHz. This processor is much faster than its predecessor, making it more capable of handling demanding tasks.

Display & Audio

The display consists of a screen with a built-in audio system. This has reduced the load on the main circuit for giving power to the audio device. The HDMI cable is able to transfer both video and audio signals to the display. The display used here is of a 32-inch display, which is adequate for showing all the modules and at the same time giving enough blank space for the user's face to be seen on the device. The modules are arranged in such order that the middle section of the display is meant to be blank for the user to see themselves. The audio being built-in along with the display allows a good sound system to be made through a single device.

Mic

A simple USB mic whose power supply needs are low compared to other mics is used. The sensitivity of the mic is just enough for the user to interact with the device easily and clearly.

Cam

The camera used here is Raspberry Pi cam v1.3. This camera is specially made to work with the Raspberry Pi circuits and hence there is no compatibility issue between the hardware. It is a 5-megapixel camera. This camera is adequate for work in the project for face detection purposes. The Raspberry Pi Camera Module V1.3 is a versatile and affordable camera module that can be used for a wide range of applications.

Two-Way Mirror

For the screen to work like a mirror. A dark Acrylic sheet is used which when put on the screen shows the reflection of the user while also showing the GUI of the screen behind the sheet. It is not costly and the maintenance of this sheet is very low. An extra clear sheet of dark acrylic is used here to give HD vision experience to users of the GUI.

Power Supply

The Raspberry Pi 3B+ requires a 5V DC power supply with a minimum of 2.5A. This is because the 3B+ model consumes more power than its predecessors due to the additional processing power consumed and features. An adequate power supply is important because the Raspberry is connected to other peripherals and needs the power to do the tasks assigned

MODULES

There are many modules used in this project. Each module serves its independent aim to the user. Modules servers are an essential part of this project. An Internet connection is needed for the modules to work properly.

Clock

This module is used to display the current time to the user. It is available in both analog and digital clock formats.

Event Calendar

This module is more toward the upcoming event. Hence, it is said an Event calendar module.

News

The news modules show the headline of the news that is displayed on the news pages. The news module is actual showing headlines that can be seen by the user for a couple of seconds before it transitioned to the next headline.

Spotify

The module's aim is to show the music played by the user on their device. The song's album cover along with the video bar is shown to the user on the mirror.

YouTube

The module is used to display the GUI of the YouTube app on the mirror's screen to the user. The user needs to have their mobile device connected to the same network as the mirror for the module to work. The module does the work of casting the YouTube video onto the mirror.

Face Detection

The module is used to create custom profiles of multiple users and show custom module profiles made for each respective user. When the user comes in front of the camera the mirror switches from the general profile to the user's profile and shows the requested module by the user. The user can select which modules to be shown in the config file of the mirror.

Google Assistant

The module is used to bring a digital assistant to serve the user on the mirror. The user can give a task for the assistant to perform and if it is present within the capability of the assistant the task shall be executed. Sometimes some tasks shall not be executed due to hardware and software complexity issues. The module is connected to the google cloud platform from where it fetches the information needed to be served to the user.

Weather

The weather module shows the weather along with the upcoming weather status to the user. A mini logo representing the sun, cloud, etc is used to bring more liveliness to the interface.

Greetings

The module is used to greet the user and show different positive messages to the user.

WORKING



Here, the raspberry pi 3b+ is used which is given an adequate power supply. A USB mic is connected to the raspberry pi circuit. The aim of this mic is to take voice input from the user and feed it to the circuit. This mic is used for google assistant interaction with the user. The use of voice input given by the user is a function that makes -the project more advanced and interactive. The camera used here is the raspberry pi cam v1.3, which is a 5-megapixel camera and is adequate to recognize users in front of it. When a known user came in front of the camera the system changes to the custom user's profile, which can be designed in the config file of the project. The display here used is a television display that has audio built-in. An HDMI cable is able to transfer both voice and video data through itself. A dark acrylic sheet is applied to the display to give the touch of a mirror finish while still allowing the GUI to be seen by the user on the other side of the display. The modules are aligned in such a way that the user can clearly see themselves in the middle of the screen while able to see and interact with the modules at the same time. The user can see the time of their local location easily on the mirror through the clock module. The event calendar module's aim is to show upcoming events to the user. The music that is played on the user's device can be seen in the mirror. The YouTube module allows the user to play music in the mirror. For this, the user is needed to be in the same network as the mirror and do a screencast while in the YouTube app to cast their screen and the video in the mirror. The user can experience both the audio and video of the YouTube video in the mirror. The weather module shows the weather along with the upcoming weather status to the user. A mini logo representing the sun, cloud, etc is used to bring more liveliness to the interface. The weather of upcoming days is shown to the user to keep the user aware of their local climate. The greetings module is a short and simple module whose work is to greet the user with a positive message on the screen of the mirror. When the user needs to use the Google Assistant the user can simply use the command "Jarvis" to wake the assistant, give a command through the USB mic connected to the Raspberry, and see the commands executed and shown on the screen. The user can hear the assistant's voice through the speakers.

CONCLUSION

With an increase in technology, devices are becoming smarter day by day which is increasing the productivity of humans in one way or another. Here, the smart mirror can do multiple tasks successfully to help its user in the day-to-day task. Which would make it just a more time-saving device. In addition, the days the mirror would become more advance, and useful to the industry, and individuals. Having multiple modules of software at a glance allows users to be more productive in everyday life with a little lesser effort.

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