

Smart A.I Mirror

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Abstract: Smart AI Mirrors are a relatively new addition to the family of smart products that has gained a lot of attention from commercial and amateur manufacturers in recent years [1]. This thesis looks towards incorporating intelligence into such mirrors. The Smart A.I Mirror encompasses smart display devices which looks like actual mirror. The objective is to design an innovative mirror prototype that is able to listen to instructions as well as communicate with humans while dressing up in front of the mirror before getting ready to work. To construct this smart mirror, the approach must involve an analysis of the smart mirror, the design of hardware and software, the development of a prototype, the implementation, and finally the assessment stages. Weather, time and date, forecast, news, holiday calendar, and complement as inspiration will be displayed on the mirror. Furthermore, our framework includes a LED light displays that can be used as decorations. The Raspberry Pi 3 board Model B (RPI) will be used as the smart mirror's embedded computational unit. Moreover, Voice Assistants (VAs) are computer programmes that answer questions and performs activities for users, such as Amazon's Alexa, Google Assistant, Apple's Siri, and Microsoft's Cortana. VAs, also known as virtual assistants, digital assistants, or intelligent personal assistants, represent a change in the way people engage with technology[2]. Users of the Smart Mirror system may easily manage their daily activities as well as solve a variety of difficulties related to household duties.

Keywords: Smart Mirror, Raspberry Pi, Google Assistant, Iot

1. Introduction

Living in the sophistication of science and technology makes our lives smart. Every device nowadays appears to have a 'smart' version. Smartwatches, smart TVs, smart fridges are available [3]. So, this is a time to look at a unique smart device which is the smart mirror. Everyone has seen a mirror, but smart mirrors are a little bit different. All of the smart appliances used daily are based on intelligent Internet of Things (IoT) devices. A Smart Mirror is a two-way mirror with a display integrated into the

glass. The smart mirror will display some of what users want, including times, weather reports, news feeds, appointments and more [4]. This project is to add a unique element of innovation to conventional mirrors, which are widely used in every home. The project wants to incorporate the Internet of Things aspect into a standard mirror. So, a smart mirror prototype may be created using this concept. The main focus of this research is to provide convenience to users when using the mirror in the room while getting ready or relaxing without having to open a smartphone or other device and speed up daily activities.

Every day, an individual will spend time getting ready in front of the mirror and of course, it takes a long time. However, other than spending time getting ready in front of the mirror, users can access or receive any important information without missing it. Therefore, Artificial Intelligence or also known as A.I are used to conveying important information such as date, weather conditions, time and so on [5]. The objective of this project is to build an innovative mirror prototype that can listen to instructions as well as communicate with humans so that instructions can be given. It can also give cheerfulness, beauty and elegance of colored lighting to the room using LED lighting. The project will also add mirror functionality in a more interesting and useful direction by using Google Assistant, users can interact directly with the mirror for any instructions to be given.

2. Materials and Methods

This section will describe all the necessary information that is required to obtain the results of the study.

2.1 Hardware Development

For development of the final working hardware, it will discuss in this sub topic. The main hardware components are shown in Table 1.

Table 1: List of Hardware Component

No.	Materials	Function
1.	Raspberry Pi 3 board Model B	We used Raspberry Pi to access the internet, to embed the coding at the terminal in Raspberry Pi OS and connect all the output and input such as monitor, speaker and microphone.
2.	Monitor	We utilized monitors instead of television since they are lighter and less expensive. It is used to display the information on the screen.
3.	Microphone	A microphone is necessary to receive input or commands from the user to the system, and we picked the microphone USB port since it is simpler to detect or receive sound.
4.	L.E.D light	We used LED light to add lighting to the back of the mirror. User can change the color of it. This LED light enhances the beauty of our smart mirror.
5.	Speaker	Speakers are a transducer that transform electromagnetic waves to sound waves. The speakers receive an audio signal from a device such as a laptop or another audio receiver. The speaker will connect to the Raspberry Pi as a sound system to the mirror.
6	Wood frame	Wood frame is required to hold the transparent glass. We will also screw the monitor to the frame and glue the LED light to the outside edge of the frame.
7..	Transparent glass	Glass is completely transparent to visible light. We use transparent glass instead of a real face mirror to allow the monitor to display output.
8.	One-way film	By using this film, we will not be able to see the other hardware inside the frame and we will see it as a normal face mirror while the monitor will display output.

2.2 Software Development

For development of the final working software development, it will discuss in this sub topic. The main software that we used are are shown in Table 2

Table 2: List of Software Development

No.	Materials	Function
1.	Raspberry Pi OS	It is a powerful small gadget that allows individuals to experiment with programming. When we use Raspberry Pi 3 board Model B, we need to run the coding using Raspberry Pi OS.
2.	Google Assistant	Google Assistant is a virtual assistant powered by artificial intelligence that is primarily available on mobile and smart home devices. It can provide a response when we interact with it.

2.3 Method

2.3.1 Operation of Raspberry Pi 3 board Model B

The Raspberry Pi 3 board Model B is made up of five parts which are a top, a bottom, two sides, and a testing or inspection port. It has four 2 USB 2.0 ports, a stereo output jack, a full-sized HDMI port, a CSI and DSI port for camera and display, a 40 pin GPIO header block and a beefy 2.5A power source limit. It has 1 gigabyte (GB) of RAM and a 1.2 gigahertz (GHz) quad-core processor [6] that makes it suitable for this Smart A.I Mirror project. The main advantages are its tiny size, low cost, and high computing power. The operation of Raspberry Pi 3 board Model B is shown in Figure 1.

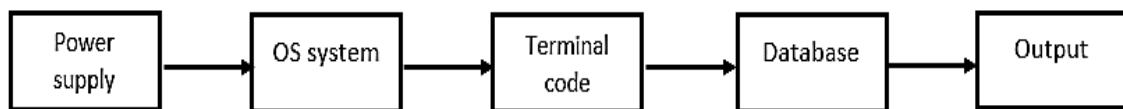


Figure 1: Block Operation of Google Assistant

2.3.2 Operation of Google Assistant

When the user asks Google Assistant a question or tells it to do something, it will react most helpfully, whether the user wants fast answers, local knowledge, or even a variety of other things. It provides a voice command, speech searches, and voice-activated device control that allowing users to accomplish a variety of activities. It is intended to provide you with conversational encounters [7]. So, when the user interacts with it, it may give a response. The operation of Google Assistant in our Smart Mirror is shown in Figure 2.

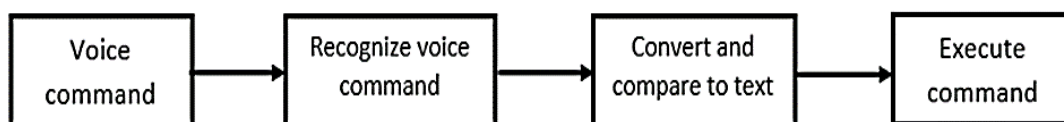


Figure 2: Block Operation of Google Assistant

2.3.3 Circuit Schematic

A circuit schematic representations the circuit's elements and connections. It is used to trace the circuit and its operations. The circuit schematic is the most effective of all diagrams for studying the overall system performance. The connection method of each component hardware is shown as in Figure 3.

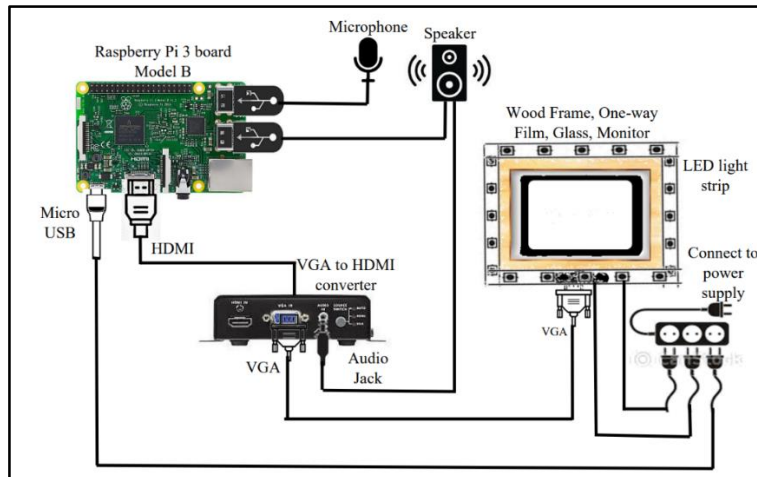


Figure 3: Circuit Schematic

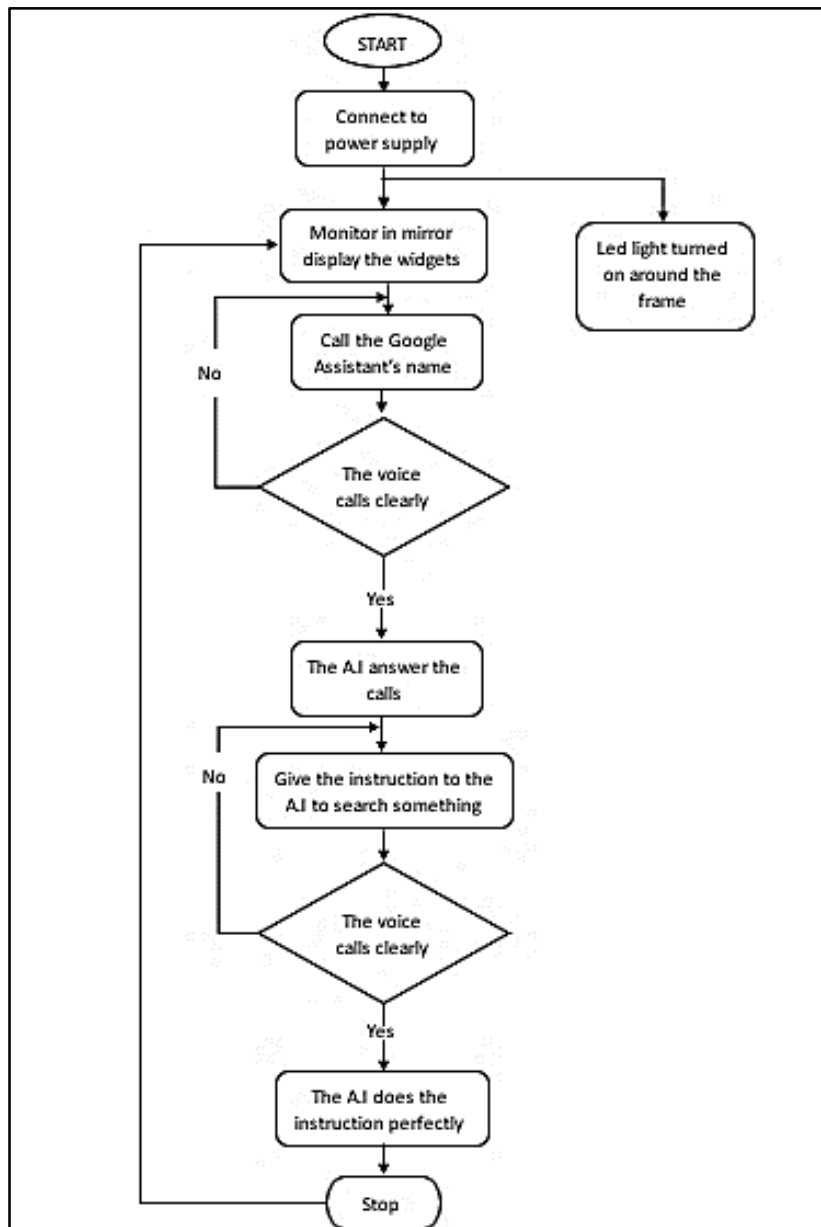


Figure 4: Working Principle of Smart A.I Mirror

2.3.4 Working Principle of Smart Mirror

The steps on how to operate the Smart A.I Mirror is stated in the flowchart shown in Figure 4.

3. Results and Discussion

The front display of Smart A.I Mirror have shown in Figure 5.



Figure 5: The display of Smart A.I Mirror

The creation of this prototype operates on glass installed on a solid wooden frame and plastered with a one-way film intended to make the glass look like an impenetrable mirror from the front and a standard-sized electronic monitor mounted on the back of the mirror. Once connected to the power supply, a Raspberry Pi operated with raspbian operating system embedded with hardcode connected to monitor will show several panels with information on which information will be streamed from the internet as the project is based on the Internet of Things (IoT) and a strip colorful led light will turn on by turning it on using an IR remote control.

Next, the display of several information panels on the monitor is divided into six segments. These divisions are made to make it easier for the user to see each segments without feeling messed. At the top left of the display has time and date for the user to always know the current time and be alert if having any appointment. From the top right has the current temperature and weather for a particular time and the speed of the wind blowing. Below it, have a compliment for the user to feel more energetic and productive when waking up from sleep looking towards the mirror to do his daily work.

In the middle left segment, has a holiday calendar that includes Malaysia and foreign countries that user can use to plan their rest or vacation dates to interesting places regardless of race and religion. Middle right segment has a weather forecast base on place will be set for the next seven days from the latest date for user alert and makes preparation if anything with the weather. The last segment is bottom bar, has useful world news for user to know what is going on outside without missing out on current information.

Moreover, an interesting feature available on the mirror is the mirror is able to find information that the user does not know by calling the name “Jarvis” in front of the mirror clearly. Mirror uses the Google Assistant system to provide help and assistance on questions after the system name is mentioned. The mirror will also emit colorful light by led strip light from the sides of the frame to color and enliven the space.

4. Conclusion

Our final year project work has been developed, implemented, and tested successfully. Smart A.I Mirror is a future smart mirror that allows users and home services to connect naturally. The primary goal of this Smart Mirror is to design an innovative mirror prototype that is able to listen to instructions as well as communicate with humans. Furthermore, it is also to automate the house, and it does so by showing information such as the time, date, weather, holiday calendar, forecast and news feed to the user. It's simple to set up, and it shows the user the material on a monitor disguised behind a two-way mirror to distinguish between the system's users. The content will be gathered from the internet, and the Raspberry Pi will be used to power it.

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