Iot Based Smart Mirror using Raspberry Pi

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Abstract

A simple basic mirror is one of the most used object in a household, people tend to spend a lot of time in front of it. But the only functionality it provides is that, it shows the reflection of the person and people use it mostly for checking their appearance. Since, the mirror is used so often, why not add more functionalities to it and make it more efficient and useful. Though IOT has extensive and diverse set of applications. This system uses IOT along with raspberry pi to make the basic mirror more efficient. Nowadays, most of the devices are becoming smart, so this system here enhances the utility of mirror and makes it smart mirror. This system not only provides the basic functionalities of the smart mirror, but it also offers additional features like a voice-controlled assistant. The objective of smart mirror is to optimize user's efficiency by saving their time. The smart mirror displays widgets like date, time, weather and latest news and headlines. It also displays the user's notifications when connected to the mobile device. So, this mirror could be used as a normal mirror and at the same time be used as a smart mirror with all the additional functionalities, which makes it a perfect device for a smart home with modern utilities.

1. INTRODUCTION

Nowadays, most of the devices are becoming smart and the usage of smart devices has increased a lot. Modern house designers are using more smart devices such as smart lights. So, converting the basic mirror into smart mirror by adding more functionalities sounds perfect as the mirror is one of the most used object out of all the household objects.

The Internet of things (IoT) is a system of interrelated computing devices, mechanical and digital machines provided with unique identifiers (UIDs) and the ability to move data over a network without requiring human-to-human or human-to-computer interaction. [1]

So, this system uses applications of IOT and uses Raspberry pi to convert the basic mirror into smart mirror.

Over the years people have been using basic mirror for getting ready, this served the basic function for which it was built, but now with advance in technology, traditional devices/equipment's have been made efficient by adding smart functionalities. Some example of basic devices with smart functionalities are smart speakers, room cleaning devices, lights, TV's and so on. Here we plan to add smart functionalities to a basic mirror which will increase its usability and productivity. For adding smart functionalities to a basic mirror, we require a micro controller like Raspberry Pi which can be connected to IoT components to provide multiple features for use. Raspberry Pi is connected to a display which can present to the user a variety of information such as weather, time, date, and news updates through widgets.[3]

The developed device consists of a two-way mirror along with a LED display enclosed in a wooden box. It also

Figure 1:.[2] IOT applications

Figure 2: [4] Raspberry pi

contains other components like Raspberry pi, speakers, microphone to perform various functions like showing date, time, weather, news and notifications to the user. It helps the user in saving time by getting all the necessary updates while performing other tasks.

2. REVIEW OF LITERATURE

2.1. "IoT based Smart Mirror using Raspberry Pi"

Authors: Lakshmi N M, Chandana M S, Ishwarya P, Nagarur Meena. [5]

Their proposed system provides information like time, date, accurate temperature and humidity, and latest news and the main additional feature of this proposed system is thief detection. It also proposes plans of designing the smart mirror that receives online news and displays it using IOT.

2.2. "Smart Mirror Using Raspberry PI"

Authors: Prof. P Y Kumbhar, Allauddin Mulla, Prasad Kanagi, and Ritesh Shah. [6]

Their proposed system will show Time and Date, Weather conditions, status, News and Indian Upcoming Holydays. Their proposed system has basic features and will be used to display information to the users.

2.3. "Raspbian Magic Mirror-A Smart Mirror to Monitor Children by Using Raspberry Pi Technology"

Authors: R.M.B.N. Siripala, M. Nirosha, P.A.D.A. Jayaweera, N.D.A.S. Dananjaya, Ms. S.G.S. Fernando. [7]

In this paper, the system proposed for smart mirror is used to display date, time, weather and News and the main feature of the system proposed is to help parents to monitor their kids and also to help them keep a track of their work or daily chores. The system connects with various applications and communicates through smart phone notifications.

2.4. "Design and Implementation of smart mirror as a personal assistant using Raspberry pi"

Authors: Divyashree K J, Dr. P.A. Vijaya, Nitin Awasthi [8]

In this paper, the proposed system will be acting as a Personal Digital Assistant providing day-today schedule and appointments pulling the information from the users google account. It will help the user in efficient and proper time management of the user using a interactive smart mirror.

2.5. "A Comparative Study and New Model for Smart Mirror" [9]

Authors: D.K. Mittal, V. Verma, R. Rastogi

In this paper, they have analyzed various previously implemented smart mirror projects. The various technologies and functionalities implemented by these projects have been compared and analyzed for their different approach towards developing smart mirror systems. A general methodology which is followed for developing smart mirror systems if given. They have proposed a design of a futuristic smart mirror which could be a great device for ambient home services and also it is mentioned how the proposed system can be extended for other frameworks.

2.6. "Design and Development of Smart Mirror using raspberry pi"

Authors: Vaibhav Khanna, Yash Vardhan, Dhruv Nair, Preeti Pannu [10]

Here, the concept of Ambient Artificial Intelligence (AAI) is mentioned for its impact on the industries involved in smart environment development. They have indicated the utility of smart mirror in environments such as home and industries. For the development of smart mirror, raspberry pi is used. Aim of this proposed system is to provide an interface for accessing various services such as weather, time and date, Youtube, maps etc.

2.7. "Smart Mirror"

Authors: Khurd Aishwarya, Shweta S. Kakade, Prof. R. M. Dalvi [11]

In this research paper, various components which are needed to build a smart mirror have been mentioned such as microphone, speaker, LCD screen, webcam etc. Two important examples of algorithm needed for recognition of face and speech to text conversion are given, for this purpose, Sonus technology is used. For future work on this project, functionalities such as iris detection and thumb impression can be used for added security for accessing mails and personal data.

3. PROPOSED METHOD

We propose to build this smart piece of hardware by keeping in mind all the requirements and drawbacks of existing system. Along with time, date, and weather forecast related information, we also aim at implementing module which can feed news headlines from various sources. More importantly we aim at implementing voice control and gesture control modules. It will further add to the features and the ease of using the device. We also aim at integrating voice assistant into the device to further increase the functionalities of the device.

Final system will have the following functionalities-
- Capability of showing room temperature and weather updates
- Displaying notifications and Time
- Integrated voice assistant
- Voice Control
- Gesture control

4. RESULT AND ANALYSIS

The final system contains a two-way mirror placed in front of the display to efficiently make the device function both as a mirror as well as a smart device. A two-way 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. So, using this functionality of the two-way mirror, the final system is built. The figure 4.1 shows the transparent side of the mirror and figure 4.2 shows the reflective side of the mirror. [12]

The developed system can benefit the user in many ways, like in getting ready, latest news, notification, weather forecast as shown in figure 4.6. The possibility of adding new features at later stage makes smart mirror a useful device. It has the capability of effectively reducing the users time consumed in carrying out basic task, this is done by giving all the information he/she needs while getting ready in front of the mirror. There are multiple uses of the developed product such as a smart assistant, home intrusion system and so on. Smart Mirror has built in google assistant which is a smart assistant, it helps the user in carrying

out tasks by giving voice commands to the system. It can be used as a home intrusion system by adding a motion sensor and programming it in a way such that it can alert on occurrence of an unexpected activity. Its wide range of application and demand of the current consumers will make smart mirror a popular device in future.

In the final system, the display and all the other components used are enclosed in a box. The figure 4.3 shows the display used in the system. Figure 4.4 shows the box used to contain the components such as the display, speakers, microphone, raspberry pi.
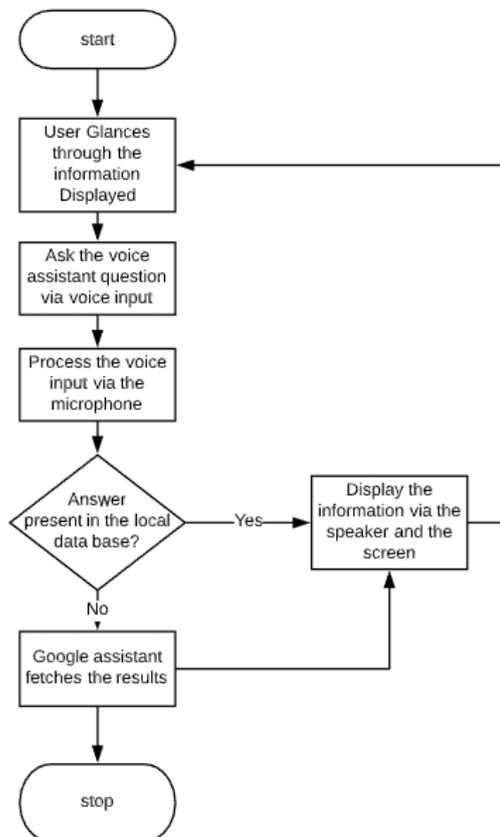

Figure 4.1: Two-way mirror with display on.

Figure 4.2: Two-way mirror with display off.

Figure 3: Control flow Diagram

Fig 4.3: Component used (Display)

Fig 4.4: Box used to contain the components.

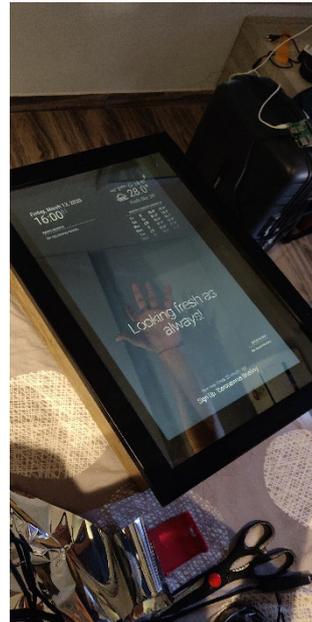**Figure 4.5:** Interface of smart mirror

Figure 4.6: Final structure of the Smart Mirror.

5. CONCLUSION

Here we have developed a smart system in which multiple smart functionalities are added to a basic mirror. Smart Mirror helps users to get their basic tasks done effortlessly such as reading latest news, notifications and weather forecast. Along with these utilities, in recent time smart assistants have proved to be of great use. This system comes along with Google assistant to enable the user to carry out much more tasks efficiently. The primary reason to develop this system is to reduce the time consumed by people in carrying out basic tasks, this is achieved by integrating IOT components with mirror, this enables the user to carry out basic tasks while getting ready. There is scope to add video playing capabilities too as per requirement. This system also has capability of being used for multiple other uses as well, with few additions a smart mirror can be used as a intrusion detection system, enhance small scale business experience and so on.

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International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181

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