



Open access Journal

International Journal of Emerging Trends in Science and TechnologyIC Value: 76.89 (Index Copernicus) Impact Factor: 4.849 DOI: <https://dx.doi.org/10.18535/ijetst/v5i5.01>

Using Raspberry Pi to Design Smart Mirror Applications

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Abstract

Smart mirrors, which proceed with the works today and will have its spot later on innovation, give both mirror and PC supported data administrations to its clients. Because of the microcontroller cards locally available, these frameworks, which can associate with the web and take information from the web, can demonstrate this data on the spots situated on the mirror. In the extent of the investigation, the created canny mirror framework incorporates the climate data, time and area data, current occasion data, client data, and camera picture taken from web administrations utilizing Raspberry Pi 3 microcontroller card. Some gear can be controlled by voice charges through the receiver on the brilliant mirror.

Keywords: *Raspberry Pi; Node.js; Python; Javascript.*

Introduction

With the help of technological advances, many products used today can be connected to the internet and made more streamlined. Smart technologies generally have an operating system in them. However, microprocessor /microcontroller, memory and peripheral interfaces are included. In the last years, mirror technology has also appeared at this point in the category of products. It is expected that in the next few years, many of the fields will be used, not only in the fashion world, but also in the mirror industry, which is closely followed by fashion companies. Image processing etc. methods can be used to improve the reflection mirror technology^[1].

Looking at the workshops related to the smart mirrors, it can be seen that there are many different usage areas. For example, when; all kinds of detailed information about the body (height, weight, etc.) can be given by extracting the 3D model of the

body with the help of the sensors that the fish is housed in the mirror. Situations related to the health status can be monitored through the ray mirrors. The user can add daily exercise information by adding the necessary exercise movements. In these studies, image processing techniques are mainly used.

Smart mirrors offer a variety of user-friendly possibilities as far as they can be improved. There is an intelligent mirror that also provides the current traffic situation feature with added location information.

Intelligent Mirror Operations

Smart mirror work has been done in the internet (IOT) field of fast-paced objects in the direction of technological advances over the last decade, which long years people have dreamed to make. The mirrored mirrors that we introduce with science-fiction films are now among the smartest home

technologies. Mirrors combined with the Android or IOS programming subfolder show that the developer does not have a sore point. Figure 1 shows a sample mirror mirror application. Activation of the touch screen feature on the mirror can increase application diversity. Multimedia systems can be added to contribute to the development of smart mirrors.



Figure 1 Example of a mirror mirror operation

The astronomical mirrors developed by many large companies have begun to be seen on the technology market. The mirrors of the smart mirrors are created and shared for different programming languages with open source code via the platform Github. Developed technology companies include Apple, Microsoft, Samsung and Google.

Smart mirrors used in the bathrooms serve both as information and as an image. An example of a mirror mirror work, which allows electronic information to pass through the eye, is shown in Figure 2. There are two modes in the designed mirrors. In power off mode, the mirror mirror acts as a standard mirror mirror. When the power is on, the mirror becomes a mirror image.

The mirror may contain a touch screen at the top to serve the user interaction. It allows the user to observe electronic news, information and programs while performing operations such as brushing, hair styling, make-up, etc. in front of the mirror. They can read news headlines, respond to their mails, review and arrange appointment schedules^[1].



Figure 2 An example of a smart bathroom mirror

Smart Mirror Software

Python and Javascript (Node.js) programming tool has been used in the scope of the study. JavaScript is a scripting language developed by Netscape. JavaScript provides the possibility to refresh web pages with dynamic and dynamic. Java Script, and HTML code are sent to the scanner. The browsers interpret these codes and perform operations such as changing the location of the HTML objects on the screen, changing the properties. Node.js is basically a JavaScript library. The most obvious difference from JavaScript is that JavaScript code can also be run on the server side^[3]. Real-time applications can also be used. It is also used in embedded systems since it is not connected to the platform.

The reason why Node.js is preferred in this study is that it is based on a modular architecture. Modules designed for all kinds of needs can be used in projects. The most important module of modularity is package manager

This packet manager, called Npm (Node Packaged Modules), allows the process to manage the connections between the connections and their connections, allowing each project to behave in a specific way without a fault. Npm Node.js for various scripts to automatically load, list, delete, update, such as the process provides; a console-based application

The Python programming language is also an important part of this work, which is based on Raspberry Pi. Python is an objective, interpretable, modular and interactive programming language. Python supports the ssh system and any data entry. Work is both object-oriented and web-oriented. The tools used in this project in Python are Qt4 Designer

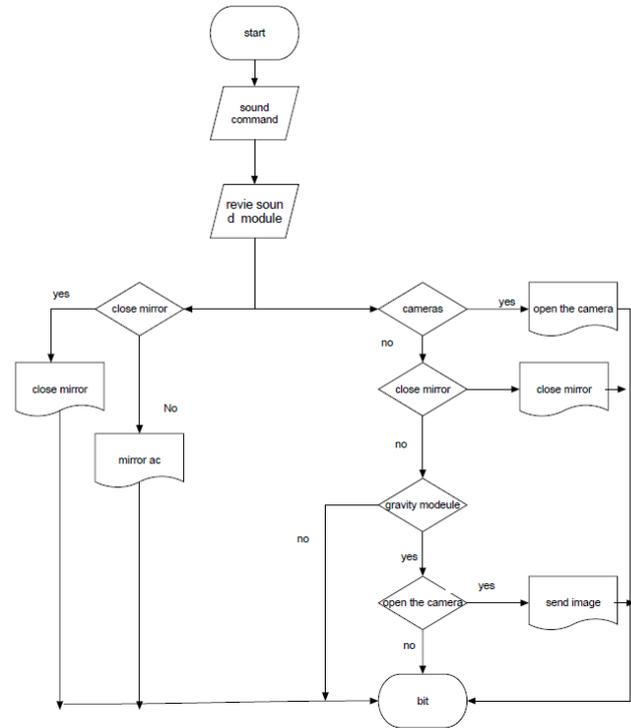
tool for object oriented and Django tool for web programming. I am writing an interface design with Qt4 Designer toolkit. Django is a web development platform^[4].

The bright mirror project YEOJU Smart mirror shown in Fig. Node.js has been developed with the programming language. YEOJU's smart mirror allows users to visualize useful information they have customized with their own widgets from other smart devices, such as information about solar panels, security or the heating system of a feature that differs from other cloud mirrors^[5].



Figure 3 A sample mirror project with Node.js support

The flow diagram of the system monitored by the system is shown in Figure 4. The acuity diagram starts with voice commands. The project is fundamentally based on two modes of operation. Mirror control and camera control. The controls operate thanks to the modules. These controls, which are 5 steps, depend on the power mode of the mirror and the capture of the camera^[6].



Smart Mirror Design

One Raspberry Pi3, one LCD monitor, one Reflex glass for the mirror, one microphone for voice commands, and one camera for gravity are used for the mirror kit designed for this workout. Figure 5 shows the views of the front and back faces of the mirror.



Figure 5. The front face (a) and rear face (b) of the mirror

The mirror program developed via the Node.js programming tool operates in two types of instructions. One of the commands operates the mirror and the other the camera. When voice signals of user's voice are detected, the microcontroller converts the text in the microcontroller and manipulates the necessary functions to direct the commands. Raspberry Pi3 reads the voice commands with the help of the embedded code, and

executes the read command by running the modules according to the command read from the back. The built-in code is based on the modules. Each feature on the mirror reflects a separate module. Modules are written in a common line, each of which is divided according to its characteristics. The sound mirror, which is operated by voice command, introduces sound signals on the platform of snowboarding.kitt.ai and the .pmdl extension is converted into a file. This .pmdl extension file is added to the file modules and the handling of the commands is provided. The rough code for the embedded software that has been developed is given below.

```

Connected to a computer
Read sound signals from microphones
Switch sound signals to command switch (read command)
case 'Open Mirror': Run Mirror Open module.
case 'close mirror': Mirror closes the module.
case 'open camera': Operates the camera hungry module.
case 'gravity': The gravity module is running.
Break case 'close camera': Camera close module is running.
default: operation
end switch
Open Mirror module
Start Mirror when the mirror is closed
Start Mirror
close mirror module
the mirror is turned on
The saved screen protector is running
finish it
Turn on the camera module
gravity module
the camera is turned on
Make a grab at the end of 3 seconds
Send to official user's email address
finish it
turn off the camera, turn off the module, turn on the camera
    
```

Implementation Results

In this study, the application of Raspberry Pi and the mirror is shown in Fig. 6 of the general block diagram. As can be seen from the above, the necessary commands are detected from the received voice signals and the module of the command that is found is running.

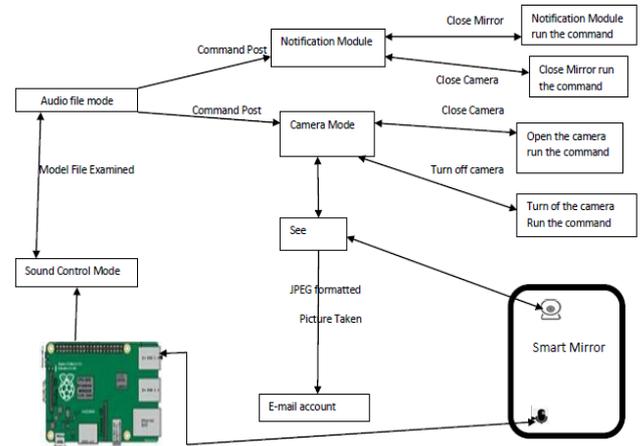


Figure 6. Block diagram of the mirror application

The Raspberry Pi3 module displays the information of the phone calls to the web services defined by the local network, using the weather information^[7], the latest news information, event calendar information, push bullet information displayed on the mirror in the specified locations.

Firstly, weather information and activity calendar information is given in the upper area on the mirror. On the other hand, voice commands, push bullet information, news information, and day message ("Today is very nice!") are shown in the lower part of the mirror.



Figure 7 Applying the mirror software 1

As a result of the operation of the mirror application, the reflected mirror image and the microfarad aliasing signals are sent to the Raspberry Pi3 module. Sound signals that are recorded according to the module function, which is designed in the Raspberry Pi3 module, are converted to text and interpreted as commands. Depending on the commands, the sub-modules that have been implemented implement the function of the relevant part of the project.

Result

Smart mirrors, one of the applications in the IOT area, can be used in many areas such as home technology, fashion sector, hairdresser. Raspberry Pi3 controlled mirrored mirror application software designed and developed by means of software to display the data (weather, news, etc.) from the internet on the designed mirror design with the audio signal commands and the camera application is tried to be realized.

The voice commands specified by the enhanced acoustics mirror software have been synchronized by sending the instantly taken photos in .jpg format by adjusting the power mode and shooting with the camera.

In subsequent workshops, it is aimed to control the beam mirror from a distance by hand movements, to apply applications such as multi-window applications and transition between multiple windows, face detection. Again, the reflector is planned on a mirror in which the sensor information used in home automation can be displayed instantaneously.

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