12th International Conference on Recent Innovations in Science, Engineering and Management
Sri Venkateswara College of Engineering & Technology,Etcherla, Srikakulam (ICRISEM'18)
17th February 2018 www.conferenceworld.in ISBN: 978-93-87793-01-9

Development of Smart Mirror using Raspberry-Pi 3 for Interactive Multimedia

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ABSTRACT

Smart mirror is two-way mirror with superior transparency allowing the content to be displayed through mirror for interactive multimedia. The process is carried out using credit size computer by Raspberry-Pi 3 model B. It provide up-to date information on weather, news, device status, time and date operated with voice module. It provides a webpage based interface to access data feeds and other services. The data feeds use web service based communication to extract data packets available through various APIs offered by websites. The voice control interface that controls the gadget and present data from developing the administration. In this undertaking, we created Smart Mirror a product stage for creating brilliant mirror applications and its usage with regard to the new capabilities that our platform provides.

Keywords: API, Raspberry-Pi 3, Smart mirror.

I.INTRODUCTION

Smart mirror is a device which display the information in a personalized manner through mirror for intuitive media. The design of course of action shows different insightful in a display. The embellishment of the project is projected on a mirror and the notion of creating smart mirror is enhanced using Raspberry-Pi 3. The Smart Mirror is equipped with peripherals enveloped with the reflective mirror through which information get display on the monitor. This gadget enables clients to get to and collaborate with relevant data, for example, climate information, news headlines, device status, time and date flawlessly as a feature of their every day schedule. The mirror is therefore interface by verbal commands and respond the respective commands by Google Assistant. The advanced features increases the standards of individual fulfilments. Rationally the design is provide with the physical attire and interfacing gadget by creating profile. The principle highlights of Smart Mirror enables to evade the sandboxed condition made by web programs. Sandbox is an isolated area where a programmer can be executed with a restricted portion of the available resources. Running a program in a sandbox can prevent it from doing any damage to the system and for privacy concern only authenticated person can make use of the device. The main aim of this project is to explore the impeding shift in how people receive information. The interactive mirror is a development effort to augment the mirror with proper embedded intelligence for offering

enhanced features. The complete function is demonstrated with differentsections as follows [2] Description of the Smart mirror that enumerates the Essential qualities, [3] Architecture and Overview of the component,[4]Output of planned endeavourdesign, [5] Conclusion with the discussion on Future scope.

II. DESCRIPTION OF SMART MIRROR

The design and prototype of the device acts as a Smart Mirror by displaying the user data and providing customized information on the display with touch free user interaction. User are able to create a profile and customize the visual interface to display the choice of data needed. The advancement of Smart Mirror projects up-to-date information for intuitive sight and sound. The mirror use an electronic display along with two-way film which blocks 95% of light and delivers highest level of privacy. During daytime, sunlight creates a glare on the surface of the mirror making it impossible to see inside. From inside, the user can still be able to see outside. During night time, the privacy offered by sunlight is gone and thus an installation of light is needed outside the window to create glare. Using the combination of mirror and display, the widgets created through various APIs. A web application for customizable interface is hosted on the embedded computer which is necessary to display the content requested by the user. It is customized by the user since not all users will have the same preferences. Some information display contains data aggregated from third party API's, such as social media feeds, news feeds and weather updates. The mobile application is linked to the full web application.To begin using the Smart Mirror, it is necessary to create an account via mobile application associated with the main application because the user must upload the details in the login process. Through this, the user may choose some APIs they want to interact with. A database is used to store user account and preferences. Thus the device provide voice recognition to process search requests for the user without physically interacting with the device.

III.PROPOSED SMART MIRROR

The aim of the mirror is to provide an easy way for one to access information services such as news feeds, weather, time and date. The Smart Mirror CPU is the Raspberry Pi 3 computer. This is where all the software components would lie in. The personalized information is obtain by minute updates of latest reports that introduce and manage the device according to the user input, once logged into the interfacing unit.

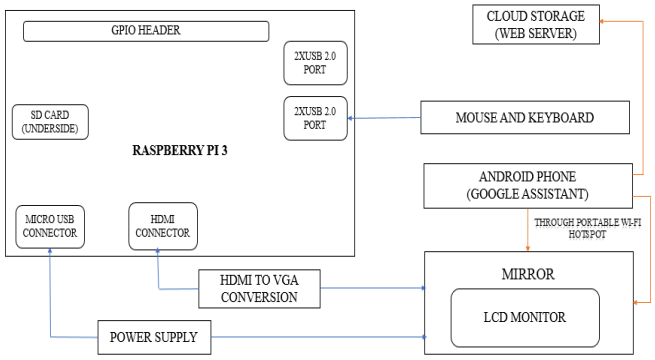

Figure 1: Smart Mirror component design and architecture

The mobile and web applications are synced and operated by users voice commands without the need of mouse and keyboard. The only time a keyboard is used is, when system maintenance is required. The file is enhanced with APIs interface. A web application allows the interfacing, hosted on the embedded computer. Finally, the CPU projects the information on to the connected monitor screen. The mirror known as two-way mirror display the information with high proficiency. The benefit of the Smart Mirror gesture recognition is that the user does not have to touch the screen, therefore eliminating smudges.

3.1 HARDWARE COMPONENT OVERVIEW

3.1.1 RASPBERRY-PI

The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and whilst maintaining the popular board format the Raspberry Pi 3 Model B that brings more powerful processer, 10x faster than the first generation Raspberry Pi. Additionally it adds 802.11 b/g/n wireless LAN & Bluetooth 4.1 connectivity making it the ideal solution for powerful connected designs. The Raspberry Pi has a Broadcom BCM2837 chipset, which includes Quad-core ARM Cortex-A53 1.2 GHz cores as the processor, Dual-core Video Core IV multimedia co-processor. It does not include a built-in hard disk or solid-state drive, but it uses a micro-SD card for booting and persistent storage. It also includes40pin extended GPIO, 10/100 Ethernet socket, 4 USB ports, CSI (Camera Serial Interface) camera port, full size HDMI, micro USB power that needs <2.5A and DSI (Display Serial Interface) display port. A micro-SD card is used to store the operating system and all the software related code for the design.

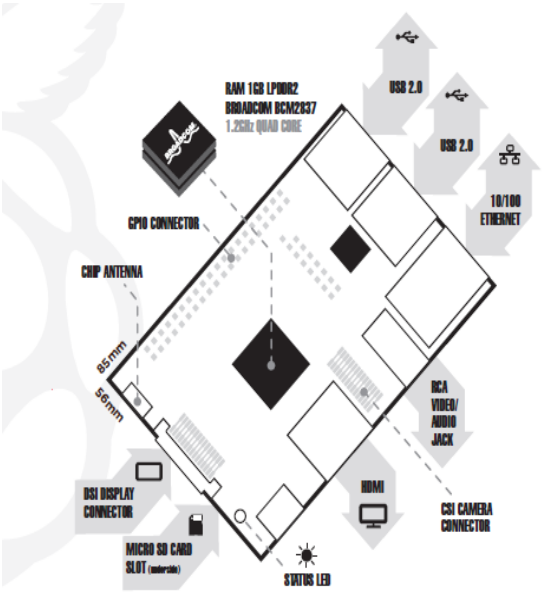

Figure 2: Outline of Raspberry-Pi 3 Model B

The Raspberry Pi is the back bone of thisproject and is used to complete all computational requirements. The embedded computer has come out with various versions over the years. The design employs the use of Raspberry Pi 3 Model B as embedded computer which performs the functions carried out with the proposed system. There's a couple good things about this design:It's really inexpensive, allows the Pi Model B to be simple and low cost. It has the consistent board format with added connectivity to develop number of applications.

3.1.2 WEB APPLICATION

The web application is claimed by the group furnished with Software for using its framework. The database was analyzed to ensure that information, such as user login credentials and the associated account preferences, is written and pulled properly In the future, the web application could be more customizable by allowing widgets to be placed anywhere in the display space. The current outline allows gadget only in specific locations. This design decision was made to limit the complexity of the prototype. Currently, the user can connect the configuration interface by making connection directly to the website hosted on the embedded computer through a hostname. The design is made with profile setting where only the authenticated person can interface with the gadget. This could be done by implementing a centralized Smart Mirror server in which the user would create and configure an account and then add his or her Smart Mirrors to this account. The server would then manage updating the user's Smart Mirrors automatically with his or her account information and configuration.

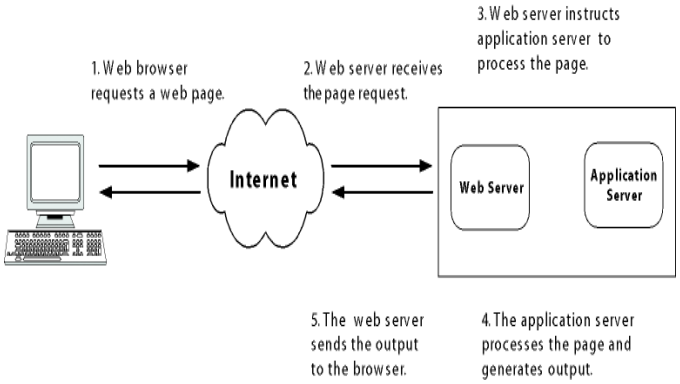

Figure 3: Model of Web Application

3.1.3 API

The customizable display was great extent driven from the combination of APIs from different sites and organizations to create "Smart Mirror". These gadget gives both real time and social media interaction. An assortment of APIs were researched todetermine what functionality they provide and any possible risks if they were implemented.This design allows the code from any widget to be used by developers in other websites or

web-based applications. Additional APIs may be implemented later, or additional functionality may be implemented with the selected APIs.

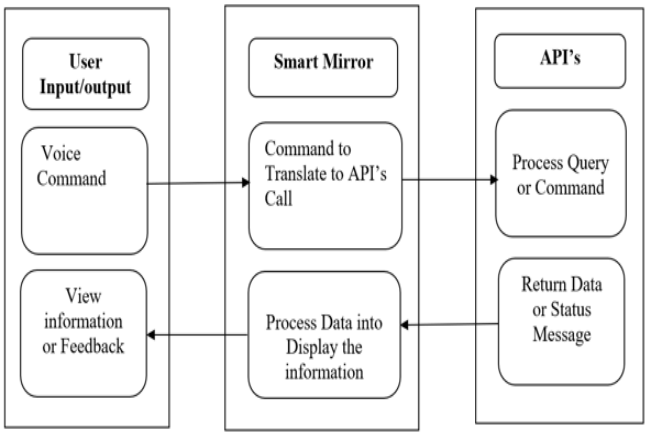

Figure 4: Program flow of the Smart Mirror

The model is defined with three categorization, user input/output, usage of Smart mirror and APIs. The voice command through Google Assistant is given as input to the Raspberry-Pi 3 that translates the APIs call and process the command. The data which is processed is then projected as output to display on the monitor. The process is carried out for each call of API and execute the related function.

IV.OUTPUT OF THE DESIGN

4.1 EXPERIMENTAL SETUP

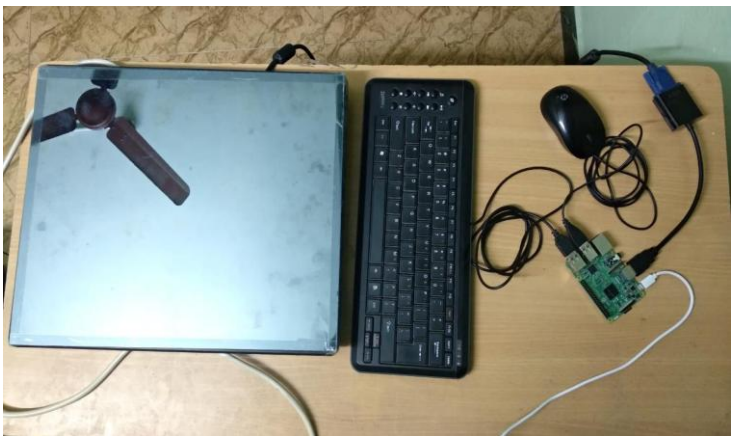

Figure 5: Complete Project Setup

4.2 LOGIN PAGE

The user creates Login page design and coding is associated during the C-Panel setup. The user created log in page is displayed with fields for necessary information to be entered. The required fields are username and password and once the input credentials is given the submit option is pressed. Now the user can interface with the Mirror using mobile application.

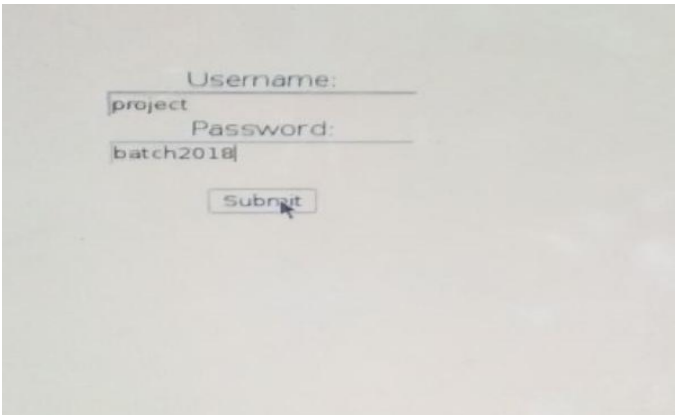

Figure 6: Interfacing Web and Mobile application for Login Page

4.3 TIME &DATE

The display shows time and date for set time zone and set hour format. The format used for time and date is HH:MM:SS and DD-MM-YY respectively.

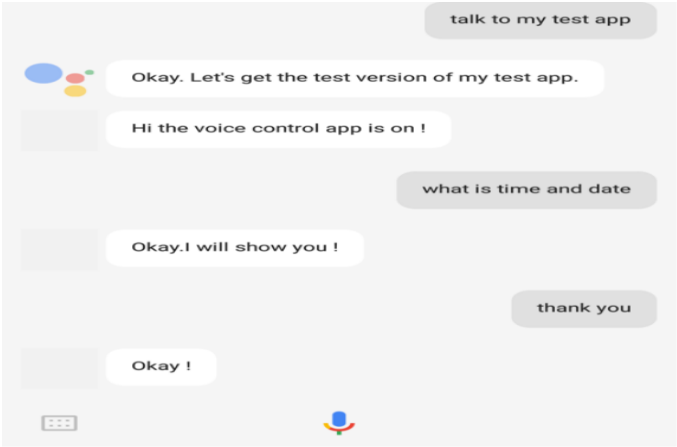

Figure 7: Mobile application user interface for Time and Date

Figure 8: Time and date displayed in smart mirror

4.4 WEATHER

It displays the current weather of the set location and in the set unit of the temperature using Open-Weather API. Weather runs with hits/sec for each cycle and continue the iteration process until the process gets over. It also monitors the temperature, humidity and provide at what time the weather is observed.

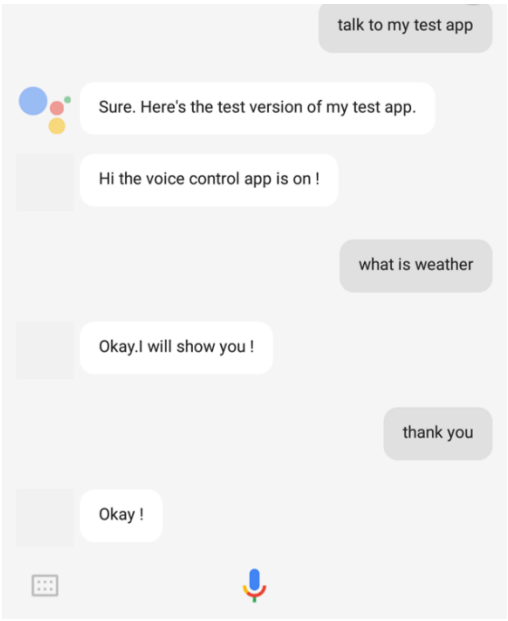

Figure 9: Mobile application user interface for Weather monitoring

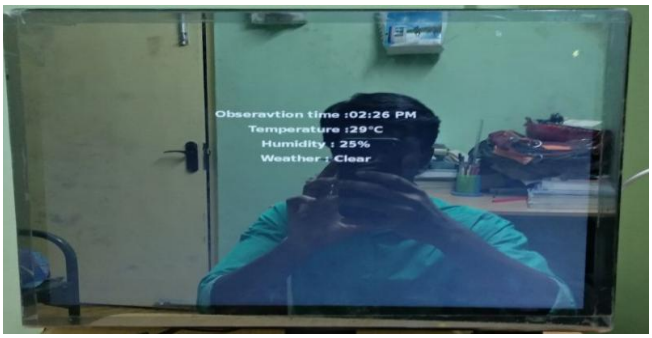

Figure 10: Weather status displayed in smart mirror

4.5 News Headlines

It display the news headlines from the set RSS feeds. The RSS feeds available are: Gulf News, BBC, CNN and New York Times.

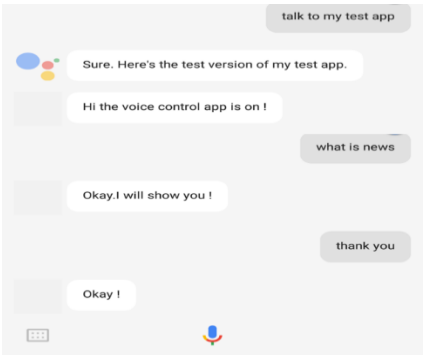

Figure 11: Mobile application user interface for News Headlines

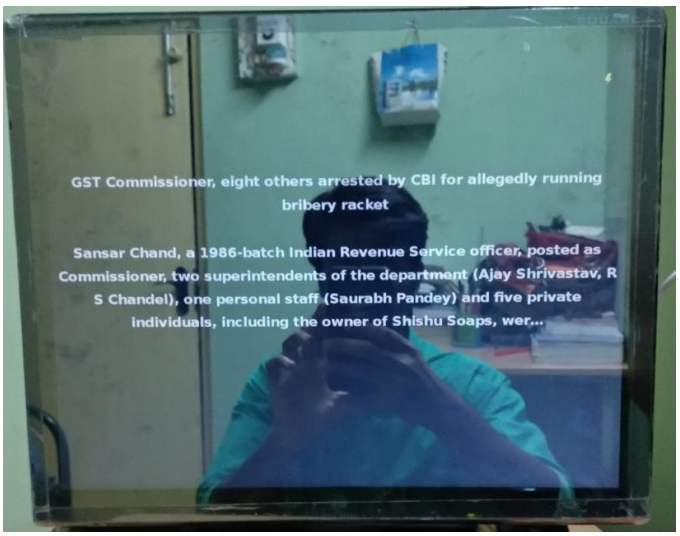

Figure 12: News Headlines displayed in smart mirror

V.CONCLUSION AND FUTURE WORK

The design of a futuristic smart mirror that provides natural interaction between users and the mirror. Mirror display is provided by a flat LED display monitor which displays all the necessary information which are useful for the user. We have developed a functional prototype to demonstrate our work.Device automation is implemented using voice module. Overall, the prototype provides an easily extendable framework that can be utilized to provide even more functionality to the user.PHP coding and API are used to display the time, date, weather, news and status of the device.

In our future work we will investigate how the surrounding context of the user and the environment can be utilized in order to provide optimal service experiences by implementing the user interaction by touch, voice and gesture features that interacts with the Smart Mirror in the home environment. The work will be done with more beneficiary information in more relevant way by adding functionality.We believe that the future of the home will be a brilliantly connected ecosystem of smart technology designed to make your life easier, more enjoyable, and efficient. Obviously there are a ton of opportunities in the home for technology integration but a mirror is one of the best places to start.

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