ISSN:2348-2079

Volume-5 Issue-1

International Journal of Intellectual Advancements and Research in Engineering Computations

Pseudo-science mirror with IOT for real time application using raspberry pi

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***Abstract*— In This Proposed Pseudo Science Mirror Introduced For Real Time Application Such As Image Capturing, Emotion Speech Using 64 Bit Processor. The Existing System Contains Limited Application Like Calendar, Time, Weather, News Feed, Notifications, Greeting. In This Proposed System Some Important Features Are Added Such As Reminder Service By Mobile Synchronization And Through Social Media, Camera and Speech Activated Music Player, To Enhance The Performance Of System By Using Raspberry Pi, Pi Camera And Voice Control Board.**

***Keywords*—Interactive services, Mobile synchronization, Human detection; Home automation; Passive Infrared sensors; Speech Recognition; Speech activated music player:**

I. INTRODUCTION

In this world everyone needs to be a comfort in life. Modern man has invented different technology for his sake of life. In today's world, people needs to be connected and they are willing to access to information easily. Whether it is through the television or internet, people needs to be informed and in touch with the current affairs happening around the world [1]. We propose a smart mirror which is an interactive system and helps to know notifications as well. It is an attempt to contribute something more to the design of mirror system so that the interface is used for virtual application [2].Today everyone is busy, but for a while he will looks into the mirror when he goes out. What if you look into the mirror and could see something more than yourself? It feels good what if your mirror could detect you and let you to know that you have an important business meeting at 4pm today? What if the mirror could tell you that it's cold outside and recommend you to wear a sweater? For this purpose we introduce an interactive mirror. We does not value efficiency at home in the way as we do in a business office [3]. The framework has application in the glass tables also. These information can be fetched into the table. At a same time we can access and get notifications of social media like Facebook, Google plus, Gmail etc, provided that the table is large enough. Smart Mirror was developed for application in a personnel room; its features include user detection, display method [4]. In several investigations in interactive systems, smart homes have been developed by combining monitor and mirror systems [5], [6]. Pyro electric infrared sensor is used to detect the infrared radiation changes in the environment and this has a relative sensitivity to the human[12].

II. RELATED WORKS

We surveyed existing methods of creating smart interactive mirror system. Most of the Researchers have analyzed the interacting systems for making the lifestyle to be something better. There are many researches done in this area, we adapted some of the features from the existing system. One of the attempts is that voice controlled automation system Speech recognition [1][4] can be used as to automate tasks which usually requires hands-on human interaction, such as recognizing spoken commands to perform something like turning on light ,shutting a door or

driving a motor. After speech recognition, a code particularly related to command which is transferred through wireless communication system to microcontroller and it works accordingly.

In the recent years, the Home Automation systems has undergone many changes due to the introduction of various wireless technologies seen the emergence of many standards,. ZigBee, 802.15.4 is an IEEE standard used for data communications [11]. Zigbee is target data applications that require reduced data rate, greater battery life, and secured networking. Zigbee is best suited for periodic or irregular signal transmission from the sensor. The wireless home Automation system is supposed to be implemented in existing home environments, without any changes in the basic requirements. The automation centers on recognition of voice commands and uses ZigBee communication module with microcontroller. The home automation system is intended to control electrical appliances like lights in a home using voice commands [1].

Researchers are in the field of speech recognition; we adopted it for home automation in our proposed system [1]. One of the attempts in smart interactive system is that the one for social emotion alleviation in the smart home. The prototype established to smart furniture for the smart home is a magic mirror table. In this paper, we propose a prototype of smart furniture for the smart home "a magic mirror table". The proposed system has a camera to capture the person's facial expression who is viewing [3].By analyzing these expressions, the system can determine the emotion of the person. If the person is in a negative emotion, then the system speaks positive sentences and plays the person's favorite music to mitigate his/her emotion. The experimental results confirm that the system is able to appease the sad mood of the viewer. In addition, the proposed system can serve as a calendar for event reminding. The proposed system has a camera to capture the person's facial expression [7].By analyzing the expressions the system can determine the emotion of the viewer. If the viewer is not in a pleasant mood, the system then speaks positive sentences and plays the viewer's pleasing track to mitigate his/her emotion. We analyzed this attempt and adapted smart interactive system, which displays the basic information like weather; time, to-do list, and notifications from social media.

III. SYSTEM ARCHITECTURE AND COMPONENTS

Every user gets fed up with the existing system and might wish for a system that will add additional flexibility and run with some common applications. The main functionality of the proposed system is to make the common mirror something smarter, ie rather than reflecting our face, if it displays something more. The features which are added to this mirror are weather, time, reminders, notifications from social Medias, news headlines that is displayed on the mirror in the presence of human. The proposed system supports additional flexibility and comfort ability. Smart mirror is a Raspberry Pi based display system; it is a smart display when connected to internet via Wi-Fi connectivity. A PIR sensor is used to detect the presence of a person .As shown in Figure1, our system is composed with the following components:

- Data collection and storage unit(Internet)
- Data processing units (Raspberry pi, arduino board)
- Data visualization unit (Smart mirror)

A. Data Collection and Storage unit

Data feed is one mechanism for users for receiving updated data from data sources. It is used by real-time applications in point to point links and on the World Wide Web. The latter also called web feed. News feed is one popular form of web feed. RSS feed makes distribution of blogs easy. Data feeds usually needed structured data RSS hold a family of standard web feed formats for publishing frequently updated information like notification in social Medias, news headlines, to-do list. We use RSS feed for retrieving data from the web. RSS feeds allow publishers to associate data automatically. A standard XML format ensures compatibility with distinct machines/programs. RSS feeds also benefit users that who want to receive appropriate updates from

our favorite website sort to aggregate data from many more sites. Subscribing to a website RSS discards the need for user to check the website for new content. Alternatively, their browser constantly monitors the site and informs the user if any updates. The browser can be also commanded to automatically download the frequent data for the user. The software RSS reader, feed reader, that can be desktop-based, mobile-device-based or web-based presents RSS feed data for the users. Users subscribe to feeds by entering a feed's URI into the reader. The RSS reader will check the user's feeds insistently for new information and it will automatically download the data, if the function is enabled.

B. Data Processing Unit

Raspberry Pi is a small low powered single board mini-computer which capable of running an operating system like Linux. We are using model B raspberry pi. This Model B board contains 512MB SDRAM and requires700mA.

Raspberry pi has:

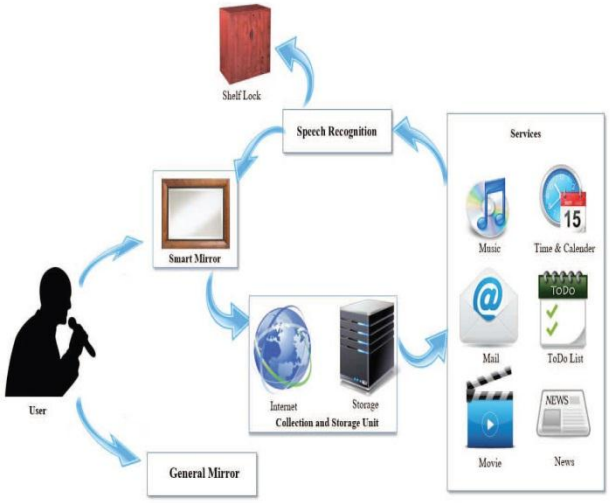
- 4 USB ports
- Full HDMI port
- 40 GPIO pins
- Audio jack
- Ethernet port
- Display interface
- Micro SD card slot

Components:

• Microcontroller
• Operating Voltage
• Digital I/O Pins
• Analogue Input Pins
• DC Current per I/O Pin
• Flash Memory
• SRAM
• EEPROM

C. Data visualization unit

Data visualization is viewed by many disciplines as the modern equivalent of visual communication. This involves the modern equivalent of visual communication. This involves the design and study of the visual representation of data, meaning information that abstracted in some schematic form, including attributes or variables for a unit of information.



The above Figure shows the system architecture of the proposed system. As we can see in the figure, we use communication technology Wi-Fi has been utilized in order to establish communication between user and the system. The prototype of the proposed mirror system itself is an LCD panel mounted with a one-way mirror, in front of the monitor. If the panel is turned off, the one-way mirror acts as a normal reflective mirror. On the other hand, if the monitor gets turned on, the mirror is transparent to the viewers to see the screen of the monitor. The power of the monitor is controlled by the system based on the state of the operation. When the user comes in front of the mirror, the mirror displays information that is being fed from the web. Passive Infrared sensor is used to detect the presence of a person. Using speech recognition, the user can control home appliances and also a shelf that is attached to the system. User can set a command for home automation and for controlling the shelf. To provide some sort of entertainment the user can play music tracks and movie. This feature also can be controlled using commands like play and next.

a) PIR sensor: Passive Infrared sensor is used to identify the presence of a person. When it detects the presence of a person the mirror displays the information that gets from the web.
b) Raspberry pi: The main task of Raspberry pi is to collect all the data and displays them into the LCD panel. It also provides the means to serve as a controller.
c) LCD panel: It is the main display of the smart mirror, and one-way mirror is attached in front of the LCD panel.

d) One-way mirror: It is the mirror in wh1ich one side is transparent and other side is reflexive where we can see us. The information that is displayed in the LCD panel can be viewed through the one-way mirror.

e) Dongle: A device which is used to provide wireless connectivity to devices over USB connections.

f) Arduino Board: Arduino Board acts as a controller to control home appliances.

g) Mini motor: It is attached to the shelf for shelf automation.

h) USB mic: It is used to input commands given to the system.

D. GUI Creation

We use Tkinter library for GUI creation. Tkinter provides a strong object-oriented interface to the Tk GUI tool kit. Tkinter provides many widget functions on which the user interaction relays. From Tkinter import*, imports every object in Tkinter into the file import Tkinter imports the "namespace" Tkinter in our namespace also, import Tkinteras tk does the same, but it "renames" it locally to 'tk' to save what we type.

E. Python programming

Our programming language is python and our building area is pycharm. Python is a widely used high level general purpose language. Its design highlights the code readability and the syntax that allows exposing concepts in fewer lines of code than would be possible in languages. Python carry an easy abstract. It features a dynamic system and automatic memory management, has large and comprehensive standard library. Python interpreters are available for the installation for many operating systems also allowing Python code execution to a wide variety of systems. Python code can be packaged into executable programs for some operating systems, allowing the action of Python based software to use on those environments without having to install Python interpreter.

IV. IMPLEMENTATION

Smart mirror is implemented in such a way that it displays information retrieved from the internet. Retrieved data includes weather condition, time, calendar, notifications from social media. The procedure for implementing Smart Mirror is realized in the following steps:

1. The idea and the mirror
2. The monitor
3. The casing
4. Hardware installation
5. Installing raspberry pi
6. Production of interface

A. The idea and mirror

Our lifestyle has progressed for optimizing time, it is the most important thing. Our work idea was evolved from thought when we looked at the mirror when we go out, thinking why don’t that mirror do something better.

B. The mirror selection

A regular mirror would not work. The mirror should be semi-transparent or to be more accurate, it has to behave like a mirror when the screen behind it is black, and should behave like a glass window when information is displayed on the screen.

C. The monitor

After a few measurements and some tryouts by tape on the wall where we planned to eventually mount the mirror, we figured an appropriate measurement that would give the perfect monitor size. Eventually we choose to use LCD monitors that met most of the expectations. They are relatively cheap simple touch buttons and the right connector

orientation. This control panel of monitor is to be connected and mounted within the casing.

D. The casing

Measured the dimensions needed for the new casing and we decided to make a wood casing that would create a strong and steady frame. This casing acts as a shelf where the things can be kept. Since the prototype would probably generate some heat, air ventilation holes were provided. Also a nice and firm mounting point was added on the backside of the casing.

E. Installing Hardware

Installing hardware required the following components.

1. The Monitor
2. A Raspberry Pi
3. A HDMI Cable (to connect the Raspberry to the Monitor)
4. A USB to micro USB cable (to power the Raspberry Pi)
5. A power cable to power the monitor

Installing hardware is just required to simply connect all the components, plugged in the power cable and then provide power to the monitor. The Raspberry is booted and the system didn't create any significant heat. The hardware installation part included mounting the panel behind the mirror and attaching the raspberry pi to it using HDMI cable. We make use of a micro USB cable to power the raspberry pi

F. Installing the Raspberry Pi

We had chosen the operating system Raspbian, due to its flexibility and wide open-source community support. It provides a platform for installation.

• Wi Fi connectivity

Since additional cables would reduce the flexibility of the Smart Mirror, we preferred wifi to connect the smart Mirror to the internet.

G. Production of the interface

The interface we built on top the Raspberry desktop is nota mysterious application. It is simply a full-screen web that allows us to use Python scripting. And as an added bonus, it allows to develop and test the interface on the usual PC, before pushing it to the Smart Mirror.

V. DESIGN

Smart Mirror has a pretty design. Since the Smart mirror will only function as a normal mirror when there is no light behind it. We use a black background, for the best contrast the content was chosen to be white. Along with the raspberry pi a Passive infrared sensor were used to detect a person's presence thereby automatically popping up the data fed from web. The PIR sensor itself consists of two slots; each of them is made of a special type material that is sensitive to Infrared. When the PIR sensor is in idle mode, both the slots detect the same amount of IR from its surroundings.

A positive differential change occurs when a person who has a warm body passes by, causing an intercept on one half of the sensor. And when the person with warmer body leaves the region, the reverse occurs, where the sensor generates a differential change in opposite direction. These pulses changes are detected thus leading to the detection of a human body. To retrieve the data that has to be displayed on the Mirror, API's and Feeds were used. API's included calendar API to display calendar similarly each data feed had corresponding Google APIs. Home automation was accomplished by using Speech recognition. During the coding phase, we set a keyword that is later used to control home appliances, say, turning on the lights closing and opening the door shelf.

Speech Recognition uses the API called Jasper, it as open program to which the scripting can be integrated as per user desire. When a user says a word, the word is converted to text using Google API via internet and the text is fed back to system where it is compared with the keyword in program. If a match is found it does the corresponding function. API looks like all the connections on the back of a DVD player: the device becomes much more useful when connected with other devices to it. Mirror interface of the system would seem like shown in figure 2. In the interface we could find that the mirror reflects the person front of it as well as it displays the basic information.

VI. RESULT AND DISCUSSION

When we started working on the system, it was figured that interface would allow any direct interaction with using the mirror. This would result in home automation shelf security which is accomplished using speech recognition. What was even more significant was the fact that the mirror should be usable as a normal mirror reflecting the person, and thus it should not be fully filled with unwanted information. Only the outer corners should be used for content display, leaving enough room to see the person. Thus it was figured that the essential information needed was the following:

A compliment

What is better than to start a day with a pleasing compliment?

Weather

That shirt your wearing? Looks pretty! But is it hot enough to wear a t-shirt?

Clock and calendar

Is there enough time to enjoy seeing myself in reflection?

News feed

what's out there?

The automation centers on recognition of voice commands wireless communication modules along with micro controller system is most preferable for the disabled and the elderly persons especially those who live alone[1]. Beside using the right type of mirror, getting the monitor, building a new casing, installing the hardware and then configuring the Raspberry Pi in the final stage of implementation of the interface, additional to some self written code, certain open source libraries are proposed to speed up things, it includes Google speech APIs etc.

VII. CONCLUSION AND FUTURE WORK

Our system integrated the concept and methodologies that have been implemented in many existing systems a smart mirror system. It is a novel application of creating a smart interacting system. The system is reliable and easy to use, in this interactive system; we have been concentrating on an interactive system for home. There exist many benefits from the smart mirror. A service-oriented architecture has been adapted for the development and deployment of the various services, where the mirror interface, the news feeds all use Web service communication mechanisms. By utilizing sensor, we can reduce the power consumption since the mirror will display information only in the presence of a human. The future prototype is ripe with potential and probably robust in terms of functionality. It utilizes facial recognition software to push up personalized data including health status, a calendar, news feeds, and other information relevant to your morning routine. It uses voice commands to switch between each views, and gestures to interact with content. Rather than confined to a home we can implement the functionality to a glass material. So that it can have a wide range of applications like one can setup this functionality to a glass table, which he used in office. This will help him to know about notifications from many sites at the same time in a single screen. Another application is that this functionality can be setup in public places.

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