SMART MIRROR FOR SMART LIFESTYLE

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ABSTRACT

This paper deals with topic of Smart Mirror.Our lifestyle has evolved in such a way that optimizing time is the most important thing. Based on the user studies and prototype implementation, we present the development of an innovating appliance that incorporates interactive services of information, offered through a user interface on the surface of a mirror. Our work is based on the idea that we all looks at the mirror when we go out, so why wouldn't the mirror become smart. With the advancing technologies, Smart Mirrors will take the place of regular mirrors in the future days, providing both mirror and computer aided information services to its users. With Raspberry Pi Zero microcontroller cards onboard, the systems can connect to the internet, take data from the internet and can show this information on the places located on the mirror. In the scope of the study, the developed intelligent mirror system includes the weather information, time and location information, current event information, user information taken from web services using Raspberry Pi 3 microcontroller card. The mirror will also have human detection module and shall light up when the user comes in front of the mirror.

Keywords: -*Smart Mirror, Interactive services, Raspberry Pi Zero, Web services, Human Detection*

1. INTRODUCTION

In this world everyone runs behind the comfort and convenience.Modern man has invented different technology for the same sake. In today's world, people need to be connected and theyare willing to access to information easily. Whether it isthrough the television or internet, people need to be informedand in touch with the current affairs happening around theworld [1]. We propose a smart mirror which is an interactivesystem and helps to know notifications as well. It is an attemptto contribute something more to the design of a real mirrorsystem so that the interface is used for virtual application [2].Today everyone is busy, but for a while he/she will look into themirror when he/she goes out. What if you look into the mirror andcould see something more than yourself? What if it notifies you about time every time you look into it? What ifyour mirror could detect you and let you to know that youhave an important business meeting at 5pm today? What if themirror could tell you that it's raining outside and recommend youto carry an umbrella or a raincoat? Sound interesting, right? For this purpose, we introduce an interactive mirror. Thus, it's a sagacious step towards a smart home, a smart office, even a smart bathroom.

1.1 Existing Systems

We surveyed existing methods of creating smartinteractive mirror system. Smart Mirrors are developed mostly for the purpose to display time, date, and weather forecast. Some also contains To-Do lists, traffic information, and notifications. Later, it got upgraded with music player and voice recognition. Thus, it can be personalized as per the requirements.

1.2 Problem Statement

There are plethoras of Smart Mirrors in existence by now. Mostly, developed to display time, date, and weather-related information. But you will hardly find all these features in a single Smart Mirror. Especially in India, this concept has not made strides yet. Also, human detection system is not implemented into Smart Mirrors on a large scale. By implementing human detection module,one can get instant control along with that can save electricity.

1.3 Proposed System

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 human Detection System. This will display the feeds only when the human face is detected and will turn off the system if no face is detected to save electricity and CPU power.

2. 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, i.e. rather than reflecting our face, if it displays something more. The features which are added to this mirror are weather, time, reminders, and 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.

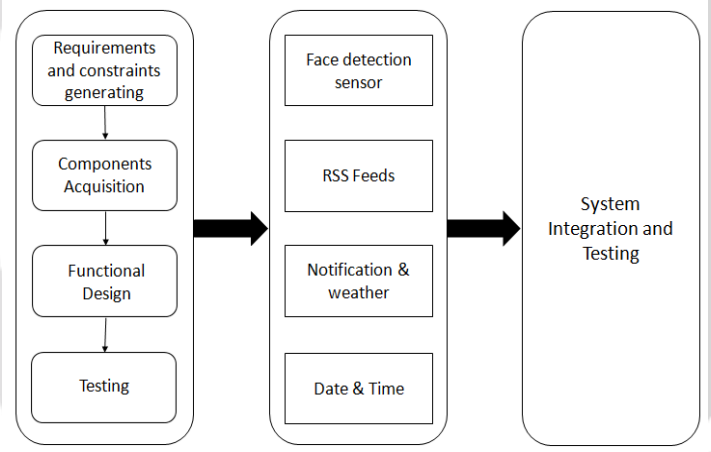

Fig -1: System architecture of Smart Mirror.

The above Figure shows the system architecture of the proposed system. It depicts conceptual model of communication between user and the system.

2.1 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. News feed is one popular form of web feed. RSS feed makes distribution of blogs easy. Data feeds usually need 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. 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 ifany updates. 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.

2.2 Data Processing Unit

Raspberry Pi is a small low powered single board minicomputer which capable of running an operating system like Linux. We are using Raspberry Pi Zero. For making digital devices and interactive objects that cancontrol and sense objects in the physical world, Arduino can be used; it is an open source computer h/w and s/w company that can be used in designing and manufacturing these digital devices.

Components:

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

2.3 Data Visualization Unit

Data visualization is viewed by many disciplines as 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.

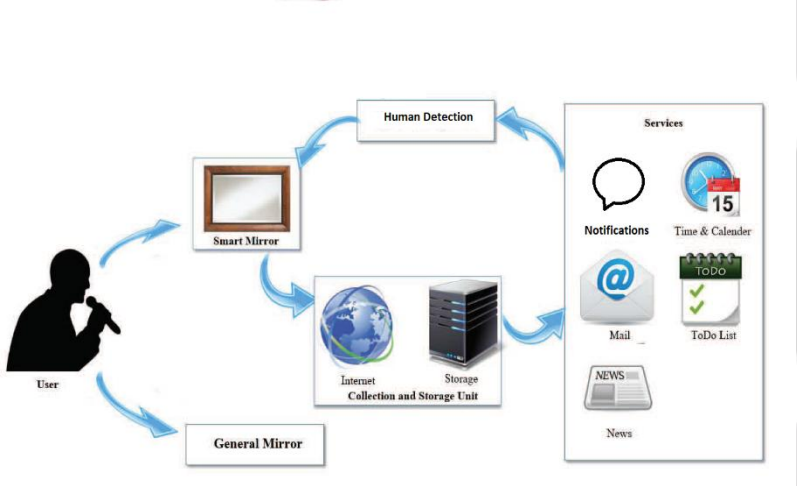

Fig -2:INTERACTION OF THE MIRROR WITH THE MODULES & USER

The prototype of the proposed mirror system itself is an LCD panel mounted with a two-way mirror, in front of the monitor. If the panel is turned off, the two-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.

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.

LCD panel: It is the main display of the smart mirror; one-way mirror is attached in front of the LCD panel.

Two-way mirror: It is the mirror in which one side is transparent and other side is reflexive where we cansee us. The information that is displayed in the LCD panel can be viewed through the one-way mirror.

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

Arduino Board.Arduino Board acts as a controller to control home appliances.

2.4. 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 to expose 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 packagedinto executable programs for some operating systems, allowing the action of Python based software to use on those environments without having to install Python interpreter.

2.5 GUI Creation

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

3. 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 realizedin 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

3.1 The idea and mirror

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.

3.2 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 theperfect 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.

3.3 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.

3.4 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.

3.5 Installing the Raspberry Pi

We had chosen the operating system Raspbian, due to itsflexibility and wide open-source community support. Itprovides a platform for installation. Since, additional cables would reduce the flexibility of the Smart Mirror, we preferred Wi-Fi to connect the smart Mirror tothe internet.

3.6 Production of the interface

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

4. CONCLUSIONS

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 aninteractive 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 view, 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.

5. REFERENCES

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