

Smart Mirror: An Interactive Reflector

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Abstract

A smart mirror is a device that functions as a mirror as well as additional features such as displaying text, images, videos and other multimedia data. This device allows users to access information such as news, weather and personal feeds and some other pragmatic details. The main features of Smart Mirror are : (1) It is lightweight, modular and extendable;(2) Useful for multitasking; (3) It supports many plugins written in multiple programming languages; and (4) Can be used as personal assistant. In this paper, we describe the design and implementation of Smart Mirror. We also discuss the potential uses and applications of smart mirrors with respect to new capabilities.

Keyword—*smart mirror, raspberry pi.*

I. INTRODUCTION

Everyone knows mirror, it is found in everyone's homes. Mirror is used to see reflections. But if we combine mirror with technology, it will give rise to smart mirror and this device is beyond an ordinary mirror. It has a screen inside that a user will able to interact with it by using voice commands, hand gestures and facial recognition. Smart mirrors are straight from science fiction. They are part of a future optimistic vision. The major appeal of a smart mirror is its physical design that changes an ordinary mirror into a smart mirror which can be integrated seamlessly into a home or any working environment. Requirements for building a smart mirror is to use a two-way mirror, a monitor, a frame to hold mirror and monitor, and Raspberry Pi to provide the software features and drive the display. In smart mirror, Plugin system exist but requires javascript knowledge to enable, disable, or configure plugins. They use server-side solutions for RESTful (Representational State Transfer) API (Application Programming Interface). Only javascript is supported, no other solution exist for supporting other¹ programming languages.

A web browser is a necessary feature for displaying information, as it supports all multiple media formats such as text, videos, and images. The information presented can be made interactive with the help of javascript and customizable with CSS.

II.OBJECTIVE

The main goal of the smart mirror is to develop a mirror which looks like a regular mirror but would have screen inside and user can interact with it using voice command and gestures to receive all the information that could affect how they prepare for the day.

By building these features into a mirror, which people are already using in their morning routine, it is possible to present this information to them in such a way that this information will blend seamlessly together with the task of morning grooming.

III.MOTIVATION

The main motivation of this device is to effective time management involving technology in day to day multitasking and provide necessary capabilities onto visually appealing mirror.

IV. LITERATURE SURVEY

FITMIRROR-

In this paper, the concept of a smart mirror for healthier living. Many people have serious problems to get up after sleeping, to get motivated for the day, or are tired and in a bad mood in the morning. The goal of FitMirror is to positively affect the user's feelings by increasing his/her motivation, mood and feeling of fitness. While concepts for these isolated problems exist, none of these combine them into one system. FitMirror is implemented to combine them and evaluate them in a study. It consists of a monitor with spy-foil, a Microsoft Kinect v2 and a Wii Balance Board and can recognize users and their gestures with these elements. Several hypotheses about the system regarding motivation, fun, difficulty and getting awake were investigated. Participants were grouped by the factors sportspersons and morning persons to investigate the effect based on these aspects. Results show that FitMirror can help users get awake in the morning, raise their motivation to do sports and motivate them for the day.

INTERACTIVE MIRROR FOR SMART HOME-

This paper describes the design and development of "Interactive Mirror" for smart home users. This paper explains the state of the art technologies for building the intelligent mirror. It identifies the user using facial recognition technique and provides services such as recognizing emotions, progress representation of measured health parameters, height identification, identify garments, suggest garments with suitable color, and reminds important events. The prototype is developed, and demonstrated in ubiquitous computing laboratory. The algorithms are being tested in the deployed environment and the results are discussed in detail in this paper. Initial user studies indicated a high appeal of the Interactive Mirror features.

DEVELOPMENT OF SMART MIRROR USING RASPBERRY Pi-

This project Which Would Collect Real World Machine Data And Data Would Be Transmitted From The Machine And Managed By The Raspberry Pi Board. This Project Is Used By Raspberry Pi3 Version Model-B. This Smart Mirror Is Latest Version Of Raspberry Pi. This Mirror Is Developed By Multimedia Futuristic Smart Mirror. The Mirror Is Implemented As A Personalized Digital Device With Peripherals Such As Raspberry Pi, Microphone, Speaker, Led monitor With Reflected One Way Mirror Provides Most Basic Common Such As Weather Of City, Updates Of News And Headlines Corresponding To Location. The Mirror Is Implemented As A Personalized Monitor With Reflected One Way Mirror Provides Most Basic Common Such As Weather Of The City, Updates Of News And Headlines Corresponding To Locations. The Mirror Is Implemented As A Personalized Digital Device With Peripherals Such As Raspberry Pi Microphone, Speaker, And Led monitor With Reflected one Way Mirror Provides Most Basic Common Such As Weather Of The City, Updates Of News And Headlines Corresponding To Locations. This Mirror Is Ability To Display Date And Time The Current Weather Condition outside Temperature. This Feature Of The Mirror Will Be Scraped From The Internet And Implemented Using Raspberry Pi board.

AN INTERACTIVE SMART MIRROR PLATFORM FOR WORKPLACE HEALTH PROMOTION-

This paper presents the design and implementation of a multi-user smart mirror system conceived to promote wellness and healthier lifestyles in the work environment through persuasive strategies. By means of a RFID reader, the interactive mirror recognises different users through their personal corporate ID card, which allows them to have access to their personalised user-interface. The smart mirror provides workplace's indoor environmental conditions personal physical exercise data obtained from wearable devices and general purpose information (e.g. weather and daily news). Additionally, motivational advice related to physical performance is supplied through request by applying speech-based recognition techniques. End-users can also inquire the mirror about their ranking position in a fair-daily competition that gives social recognition to the most-active-user. The implemented mirror has been evaluated in a one-week study conducted in the wild in the workplace premises. The quantitative data gathered throughout the study, as well as the qualitative users' feedback obtained in a post-trial focus group, provided promising findings for the acceptance and convenience of such a persuasive device in the work environment. Furthermore, valuable design-insights were obtained for future iterations of the smart mirror that encourages workers towards healthier lifestyles.

V. SYSTEM ARCHITECTURE

The mirror interface is decorated with lots of widgets. It is a simple window frame containing an embedded browser. Unlike window, it does not overlap nor do they contain complex interface elements.

It follows Model-View-Controller(MVC) design pattern. Model refers to plugins that manage data to be displayed. Plugin retrieve data from third party resources (e.g. API). View is the screen that displays data. Controller is the server component that controls the execution of each plugin.

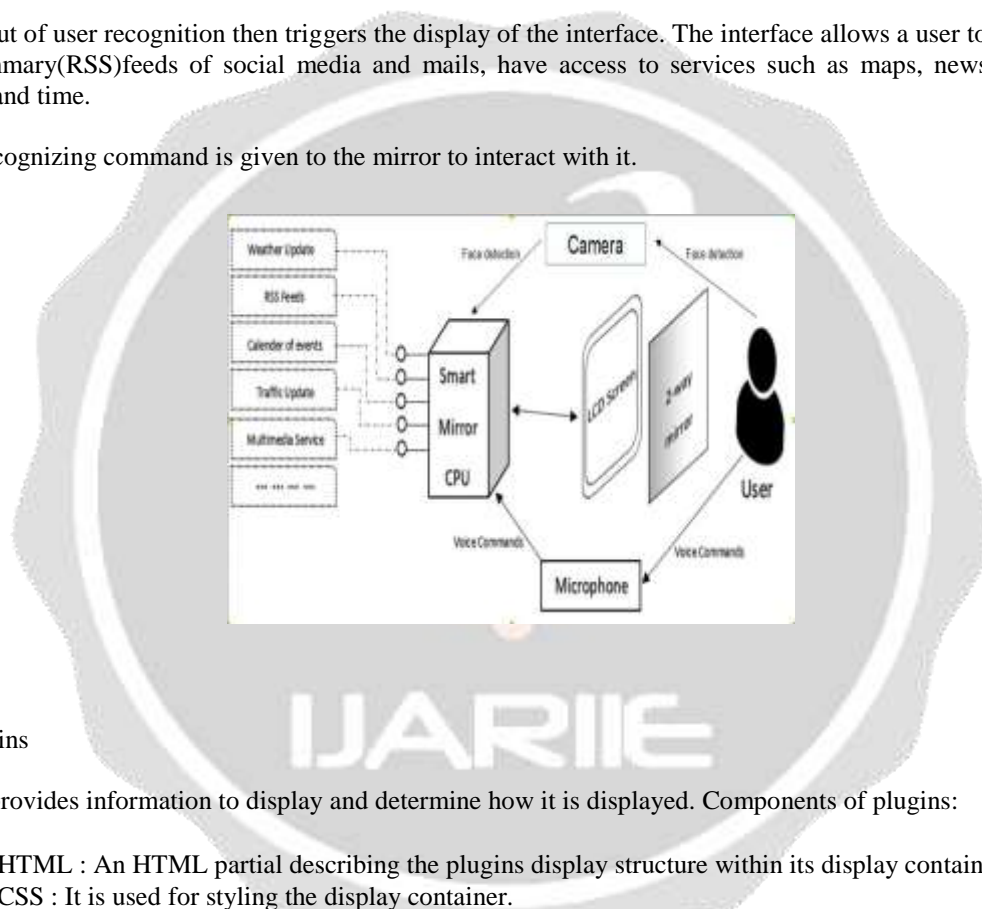
Communication between plugins, server, and plugin clients in the browser are all handled through WebSocket protocol. WebSocket allows the plugins and server to make rapid and multiple API calls for real-time dynamic display.

The mirror interface contains two categories of widgets, one that enables remote device control (e.g. light off/on, and temperature control), and other information services (e.g. news feeds, weather updates, personal notification)

A webcam placed behind the mirror is used to recognize the user standing in front of the mirror. By recognizing the person, the mirror then knows how to interact.

The output of user recognition then triggers the display of the interface. The interface allows a user to view Rich Site Summary(RSS)feeds of social media and mails, have access to services such as maps, news, calendar, weather and time.

Voice recognizing command is given to the mirror to interact with it.



A. Plugins

Plugins provides information to display and determine how it is displayed. Components of plugins:

- HTML : An HTML partial describing the plugins display structure within its display container.
- CSS : It is used for styling the display container.
- JavaScript: It is used to fetch information or control behaviour of plugins display container.
- Web GUI: An interface that allow users to customize plugin-specific settings.

B. Display

This platform uses a web browser to display information which is built-in support for various media formats. Users should be able to rearrange plugins as they want without having to reconfigure a plugin. Users must have the ability to enable and disable the plugins. Users can customize which plugins they want to use according to their need.

C. Server

Web browsers communicate with server based on user-generated events, and it responds only when a request is made.

The server components has three main responsibilities:

- (a) Manage plugins and their dependencies.
- (b) Schedule and execute their scripts when necessary.
- (c) Establish the communication between the client API and server API for plugin features.

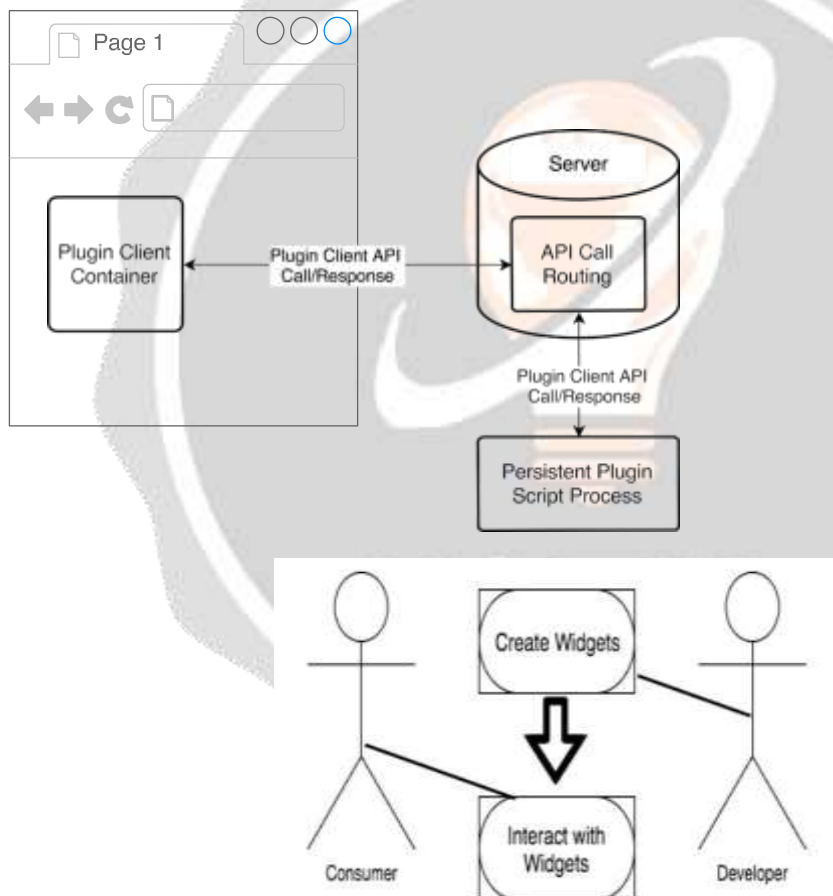
Communication between the plugins and the display are handled by the WebSocket protocol. Server is responsible for establishing connection to allow plugin client API calls to be made without interrupting other running plugins.

VI. APPLICATION PROGRAMMING INTERFACES

To facilitate communications between plugins, display, and server.

A. Plugin Client API

The plugin client API is used by server and persistent plugin scripts for sending and retrieving information to the plugin client container in browser.



B. Display API

Display API is used by server for loading and unloading plugins, and retrieving browser details.

VII. IMPLEMENTATION

The Smart Mirror interface is designed and implemented such that only when an authorized user appears in front of the mirror only then his/her customized data is displayed after proper authentication.

We followed typical smart mirror building instructions to implement our prototype. A pane of glass with a mirror film on one side is encased in a frame and placed on top of a monitor. The mirror acts in a similar way that a one way mirror works. When there is nothing displayed on the monitor (i.e., the monitor is black), users can see their own reflection in the mirror. When a non-black color is displayed on the monitor, that color appears to come through the glass from the monitor. To best utilize this screen, we have mounted the unit to the bottom side of the mirror. This modification was made to demonstrate the capability of Smart mirror to access external hardware interfaces—a task that is currently not possible with other similar smart mirror platforms that use a web browser as the display method.

VIII. APPLICATIONS

Smart mirrors have many potential applications in both personal and social settings. In personal settings, smart mirrors can be used to display relevant information, control household appliances, and provide emotional support to users. In bathrooms, smart mirrors could prove to be a valuable application for many people. As people prepare for their day, their hands are typically busy, but they typically stand in one spot performing low cognitive tasks. People could have their email messages, trending tweets or Facebook posts, and breaking news show up on their smart mirrors seamlessly.

In public, smart mirror can be use for displaying advertisements, information, and emergency alerts. Installed in clothing shops, someone don't need to physically try on all clothes they are interested in. Installed in Mall washrooms for advertising any product or displaying offers.

CONCLUSION

We have designed a futuristic Smart Mirror that provides natural interaction between users and the ambient home services. The mirror display is provided by a flat LED display monitor which displays all the necessary information and services which is useful for the user such as Maps and videos via YouTube. It has a great potential to enhance user experience for accessing and interacting with information effortlessly.

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