SMART MIRROR USING RASPBERRY PI

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Abstract—This paper describes the designing and implementation of a "Smart Mirror Using Raspberry Pi". The device that works as a digital display showing the contents such as time , date , weather and news simultaneously. The user can interact with the mirror by giving commands to it , so it can also be referred as an interactive display. It has various applications like displaying real time information updates and appliances control.

Index Terms—Smart mirror , Raspberry pi , appliances control.

I. Introduction

Day by day,the world is moving towards automation. We often hear from technology entrepreneurs, futurists and some media outlets that automation will lead to a bright future. At the same time , there is a significant number of intellectuals
, politicians and journalists depicting doomsday scenarios for our automated future. Many devices are being invented which uses the concept of multimedia communication , AI and IOT.

Everyday we look at the mirror to check how we are looking or how our attire is while getting ready. By this we are psychologically interacting with the mirror. So, the idea of a mirror which can responds to your commands can excite anyone.

Our daily routine includes reading newspaper , getting stock updates , weather updates , etc. This mirror is is one step towards the development of smart homes.

II. Literature Survey

The related work on this project has significant number of technologies that takes user towards automation and AI. Josep Cumeras i Khan in June 2016 developed a Magic Mirror. The main features of this project was that , the Mirror shows basic weather and time information , add alarms , reminders or notes in a similar way we stick post-it notes on a fridge[1][2]. Suryansh Chandel, Ashay Mandwarya, s.Ushasukhanya de-veloped a Mirror. It can function both as a mirror and an interactive display , that displays multimedia content such as time , date , weather and news simultaneously. It can be controlled by voice commands too[3].

We are developing a device similar to these. The mirror will show real time and date , news and weather updates. It will take the input from the webcam for face detection.

III. Theory

We are using python programming at the back end as Raspberry pi works only on python. Python is an high-level, general-purpose programming language. It was created by Guido van Rossum and first released in 1991. Python has a design philosophy that emphasizes code readability, notably using significant whitespace. It provides constructs that enable clear programming on various aspects.

For server to device connectivity we are using IOT platform. IOT offers some important parameters for communication to be established between devices which are device registry , data ingestion , message routing , storage and stream , analysis. These parameters give ease for business intelligence
, command control , admin and management and better user experience in day to day work. Basically IOT offers two types of devices - Field gateway and cloud gateway.Field gateway consists of non IP devices , e.g.SCADA-RTU , PLC , etc. Cloud gateway allows devices having proxy ,e.g.zigbee , etc. Two types of commands are available in IOT- Device to Cloud and Cloud to Device.

IV. Block Diagram

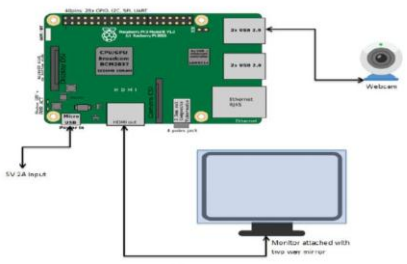

Fig. 1. Block diagram

System can be understood by the block diagram shown. Raspberry pi is a CPU for the whole system. We have aimed to create an interactive interface which can be used at homes as well as at work. It provides facilities to display real time

updates and also can be controlled by voice commands. The raspberry pi is powered by 5V/2A DC supply. Monitor is connected to it using HDMI cable. Webcam is attached for face detection.

V. System overview

A. Raspberry pi 3

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote teaching of basic computer science in schools and in developing countries.

CPU: Quad-core 64-bit ARM Cortex A53 clocked at 1.2 GHz
GPU: 400MHz VideoCore IV multimedia
Memory: 1GB LPDDR2-900 SDRAM (i.e. 900MHz)
USB ports: 4
Video outputs: HDMI, composite video (PAL and NTSC) via 3.5 mm jack
Network: 10/100Mbps Ethernet and 802.11n Wireless LAN
Peripherals: 17 GPIO plus specific functions, and HAT ID bus
Bluetooth: 4.1
Power source: 5 V via MicroUSB or GPIO header
Size: 85.60mm × 56.5mm
Weight: 45g (1.6 oz)

B. Display

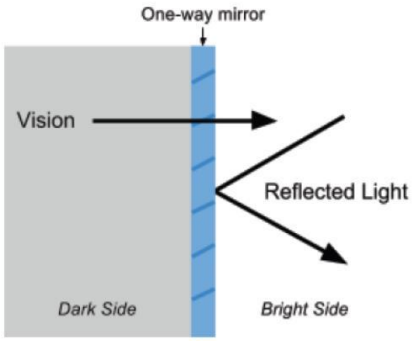

Fig. 2. Principle of working

We are using a two way mirror for display purpose. It is an important part because it helps in creating futuristic display. It will be attached at the top to a wooden frame which is used for the support to the monitor. We are using a LCD monitor which is connected to the raspberry pi using HDMI cable .One way to interact with the mirror is microphone. Voice commands for appliances control will be given using microphone. A webcam is attached to the raspberry pi 3 which detects the faces by making use of opencv. When the monitor goes into sleep mode it can be again turned on by detecting faces. This mirror acts as a normal reflective mirror when the mirror is off and the data is displayed simulteneously when the mirror is turned on.

C. Automation

The home appliances that are going to be controlled by voice commands are operated through high voltage relays which are connected to raspberry pi module operated over the thingsio.ai IOT platform.

D. Construction

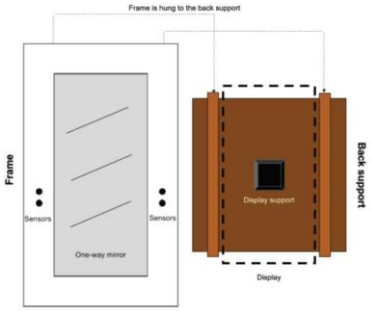

Fig. 3. constructional diagram

The monitor is fixed into the perfect shaped wooden frame whose dimension depends upon the size of monitor in which one slot is for raspberry-pi. Two-way mirror is fixed for reflection purpose

VI. Functionality

It works as a normal reflective mirror so that the user can use it as a regular mirror.
The two way mirror acts both as a reflective surface as well as transparent to display the updates.
Everyone using this mirror will get real time updates.
User will be able to give commands to the mirror using the microphone in the raspberry pi 3 for appliances control.

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