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Smart Mirror: Using Voice Control

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Abstract: So far, mirrors were just reflecting people. What if your mirror was more than just a mirror? To catch up the main trend of smart furniture, my team decided to integrate multiple functions and automation designs within a common mirror. No, we call it a Magic Mirror. Our team reimagined what a mirror can do for all of us. The smart mirror has potential to change the way we start our life. Our goal is to make a full use of time that is spent in front of mirror. It recognizes you and presents a personalized dashboard. It pleases people with a clean and meaningful user interface. Facial tracking ensures that no data will cover your face ever. So, a mirror stays a mirror. Navigation feels natural and easy through simple swipe or. If user does not feel like using swipe/gesture they can control the device with the voice.

Keywords: Raspberry pi, Smart mirror, Gesture, Dashboard, Voice Control, Navigation, Interface.

I. INTRODUCTION

This project has been developed within the context of a time where every day we see more and more device are connected. Based on this interactive and communication many devices/systems are invented. With the help of the multimedia intelligence it is providing comfortable, secure and personal services everywhere whether it is home or various industries and making a lot of users comfortable. We look at the mirror daily and interact with it psychologically to find out how we look. The system is a development effort to augment the mirror with proper embedded intelligence for enhanced features such as, latest updates of news, weather of the city and headlines and local time corresponding to the location. It is a wall hanged mirror which displays widgets items to the user such as scheduling, weather, messages and other fields of interest. The mirror will solve the problems that many people experience every day, getting information without distraction. Before going to bed, the user may want to know whether it will rain the next morning so that they can plan according to that information. Home Automation systems are mainly created using smart IoT (Internet of Things) devices. IoT is an integrated system of communicating devices in which each device is capable of carrying out tasks by themselves. IoT is an interconnection of Wireless Sensor Network (WSN) devices which includes embedded devices with wireless sensors. IoT is the game changer and any device can be used and operate from any location all over the globe. The aim of this project is to reduce the time and the how getting information my internet through mirror makes our life easier.
The rest of the paper is organized as below. In Section II, we present some related projects. Section III presents the overview of key hardware and software components of the Smart Mirror. Section IV discusses the design and architecture of the system. Section V concludes the paper with some discussion on future work.

II. RELATED WORK

Our Smart Mirror is a simple natural interface that help access to personalized services. This is an attempt to take the design of a smart mirror one step ahead by making the interface more simple and attractive not only the interface but the smart atmosphere. Below we briefly comment on some related research in this direction. The Smart Mirror contains some devices equipped with LCD panel enhanced externals devices. Most of them support entertainment and some interactive tasks. The work has been reviewed as follows:

- Mirror 2.0 [1] it's a basic version of smart mirror it is a simple interfacing between a smartphone and a mirror. In which the LCD panel is placed behind the two mirrors. The LCD shows the news feeds, weather and all basic information.

- Smart Washbasin [2] as the name suggested this mirror is used in washbasin displays different information in a washbasin mirror such weather forecast, mails, the calendar, the water temperature and pressure and the user's weight measured through a built-in-scale in the base portion.
Since the washbasin mirror is small we can't use regular LCD display because if its big size instead we use an android tablet as a primary display. The tablet shows the widgets on the mirror of body weight of user, step count for the day

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and all the useful schedule for the day. It is possible to control it by using the touch panel of an over lay screen without touching the screen surface.

- NEOD Framed Mirror TV [3] is for bigger LCD panel a standard LCD screen (up to 50 inches), covered by a two-way mirror, and specifically designed for the screen. The only disadvantage of this type of mirror is it has less interactive functionality

- Smart Mirror for home environment [4]. this type of mirror is used to control all the devices which are connected to mirror and allow to access and control all that device easily. All the device are jacked up with relay to main power supply. Suppose the mirror is in bed room and user wants to switch off the hall light then user can directly give command from mirror to OFF the light without going anywhere. Since the mirror is Iot based it can be easily access from anywhere.

-Multi Display in Black Mirror [5] by Toshiba is a prototype that combines the tablet and two-way mirror. It provides two different account in home atmosphere: the bathroom, the hall and the kitchen. For the kitchen mirror if will provide information related to that particular environment like interactive information for preparing recipes. The bathroom it will display information like fitness information from different devices, weather forecast and provides the full useful information to begin the day.

The Reveal Project [6], research and development which is created my New York Times, comprises of a LCD Display covered by a one-way mirror glass. Handler's movements are tracked using Microsoft Kinect in real-time. It will give the different information regarding (mails, news, instant messenger) it also responds to vocal commands. A peculiar feature is the medicine box scanner, which allows the user to buy medicines recognizing their packages.

- Cybertecture Mirror [7], use for a dedicated computer having approx. 37inch of mirror and 32inch LCD panel which is sandwich between the mirror and frame. In addition, IR provides all the information is physical state and the interface also allow the real-time instant message reply the mailbox service too. The device provides a set of external wireless sensors that allow to measure the user's weight, fat, muscle and bone mass.

- Interactive Mirror [8] Interactive Mirror launched by Panasonic: it appears like an ordinary mirror. E.g. If I place a phone in front of the mirror it won't sense that it is some smart device. As the user comes in front of the mirror, it shows a magnified frame for his/her face. It also has a menu for accessing various functions. The system is used to notice face crinkle, oiliness and other facial details to recommend treatment and product to take care of skin. It also provides fashion prevue, home automation and atmospheric conditions of the home, exterior and surrounding.

- Connected Store Demo [9] by eBay and Rebecca Minkoff provides interactive experiences in both the store showcase and in the fitting room. Once finished, the shopper prepares the fitting room with all the items. Inside the fitting room, the user exploits the mirror for looking for other items and/or providing feedback. In addition, she may select some of them for buying.

-Brushing Teeth Mirror [10] displays the information collected by a smart brush about inflammations or infections of the teeth and gums.

- Medical Mirror [11] combines computer vision and signal processing technique for measuring the heart rate from the optical signal reflected of the face. The prototype consists of an LCD display with built-in camera and a two-way mirror fitted onto the frame. The smart mirror recognizes the presence of a user when she stands in front of it and, after about 15 seconds, it displays the heart rate below the user's reflected image. In comparison to works described above, our work is different in that we aimed to develop a working system for providing services in the ambient home environment based on open standards and off-the-shelf technology, where the smart mirror is the interface to access/control various data feeds, information services, and appliances in the environment.

III.PROPOSED SMART MIRROR

Our main focus was to build a budget-friendly Smart Mirror. Reaching desired functions within the constraints of our budget, the Smart Mirror was divided into four hardware components. The following figure (1) depicts various components considered.

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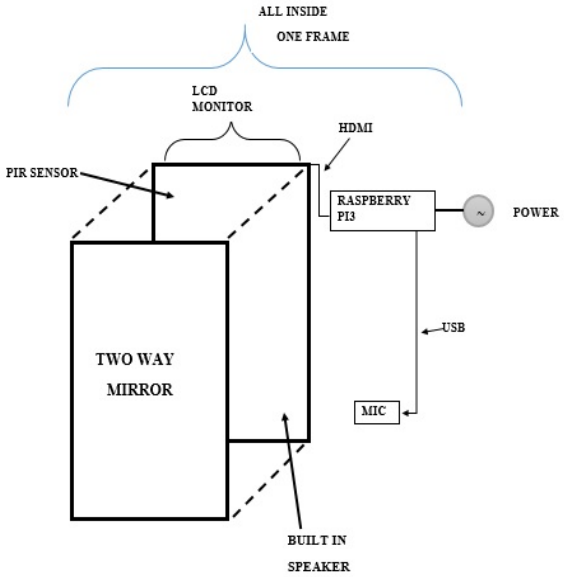

Fig. 1 Block Diagram

(1) Raspberry Pi3: the third generation Raspberry Pi which is B+ module is called as the Raspberry Pi3. It is a credit-card sized single computer board which is very powerful its two times faster than the previous version can be used for many applications and supersedes the original Raspberry Pi Model B+. The processor speed is fast among all the other raspberry pi's which is around 700MHz to 1.2GHz with on board RAM storage upto 1GB. SD (Secure Data) cards are used to store the data which SDHC or MicroSD. In the case of Pi 3 its MicroSD. In other pi module there is not dedicated HDMI port but in pi3 there is dedicated port for video output and it also does have 3.5mm audio output jack. Since there Wi-Fi connection in Pi3 there is not need to have a ethernet port for internet connectivity. There are 40 low-level GPIO pins which is used to control common control and in build Bluetooth too. The costing of this simple PC chip is around 2660(Indian Rupees) [12]

(2) LCD Panel & Two-way mirror: LCD acts as primary display. The output from raspberry pi3 is displayed first on the panel. LCD acts as an interaction between user and mirror. The user is unaware of the LCD panel, because of the two-way mirror. The reflection from panel is displayed on the mirror.

(3) It is used to sense motion. When a human moves it senses. Built-up of PIR sensor is small and is low power, budget friendly, don't fag out and easy to use. Therefore, they are usually found in gadgets used in house or office. They are frequently referred to as PIR, "passive infrared" "Pyroelectric" or "IR motion" sensor. It is made up of pyroelectric sensor (which is round metal with a rectangular crystal in centre), detecting levels of infrared radiation. Everything emits some amount of low level radiation, and the calorific something is, the more radiation is emitted. The sensor present in it is split in two halves. It is because we are looking to detect change not average IR level. The two halves are wired up so that that they cancel each other out. If one half perceives more or less IR radiation than the other, the yield will sway high or low [13]

(4) Microphone: Our project is based on voice recognition. Mic acts as source of interaction for user. It powers the device using voice recognition capability. USB microphone is used which is directly connected to Raspberry pi.

IV. FLOW CHART

The mirror is design like that all the components are kept underneath it so that the appearance of the system be just like a mirror. Initially the mirror is in sleep mode, which mean it is act like a simple mirror. if someone stands in front of mirror the PIR (Passive Inferred) sensor detects the radiation emitted from body and change the mirror sleep mode to active mode.
The mirror dashboard is ON which show the date, Time, current weather and news feeds.
If user wants to sign in to personal account then web camera recognizes the register face, if the match is found the user logged into the personal account. If a user wants check the current weather, then the user says a specific keyword like "show the current weather status "the microphone converter the audio signal in electrical signal. It is very difficult to convert process audio as compare to text, to do that process we use a module to convert audio to text which is simply

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called as a speech for the we r using google speech because google is really good and accurate to convert audio to text. after the we have a text ready we need to incorporated that what exactly user want, in order to do that we will use NLU (Natural Language Unit). This helps us to find the intent and entity of the user text. After that we need knowledge of that which is provided my internet. The knowledge provided the internet is very complex and difficult to understand by normal user, so we use NLG (Natural Language Generation)
Module the information provided my NLG is in text form, so we again use google text to speech converter. the output which current weather status is speech narrated and information is shown in mirror.

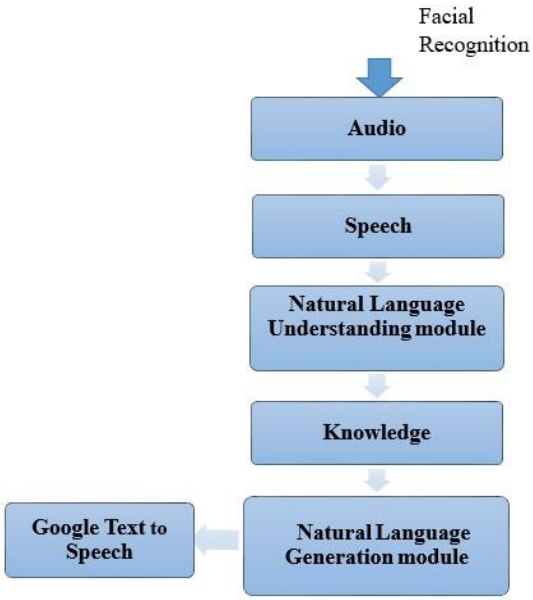

Fig2. Flow Chart

V. ARCHITECTURAL OVERVIEW

Figure.3 shows the architectural view of smart mirror. The mirror is a technological augmented human interaction device. The main objective of designing the mirror is to provide natural interface in house environment for accessing various services such as time, calendar, location-based services, weather notification etc. also providing an access to YouTube, Google play, Maps etc. Everyone has a mirror at home, so a general idea of a smart mirror that you can interact with is pleasing and can be portrayed in mind by anyone. Many times, a person has no time to read the newspaper or switch on the TV immediately in morning to check need headlines or weather forecast. What if this purpose is served by a mirror? The amount of time it will save and be of such a great cause. Smart mirror looks like a regular mirror but has a LCD screen inside it. It will collect real world data such as time, date, location, news headlines, weather etc. Our project includes use of Artificial intelligence in it wherein a Voice enabled supporter will ply to the needs of user. [14].

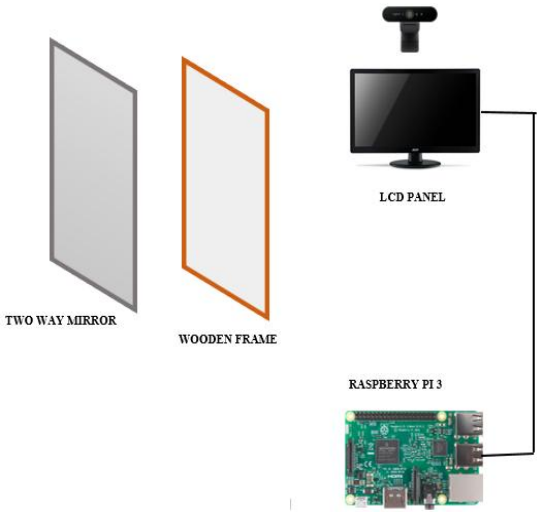

Fig. 3 Architectural overview

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The proposed mirror is designed to perform, several functionalities that can be summarized as follows:

a) The interface of the mirror is pretty natural and the widgets shows only useful information.
b) A LCD panel is used for the mirror display. A clear one-way glass is used to make it as close as possible to mirror display which is located in front of the Smart Mirror using Raspberry Pi thereby resemble the function of a regular mirror.
c) Personalized Information services: Users will be able to obtain minute updates of latest news and public headlines, weather reports as well as get reports of our interests. [14]

VI. IOT WORKING

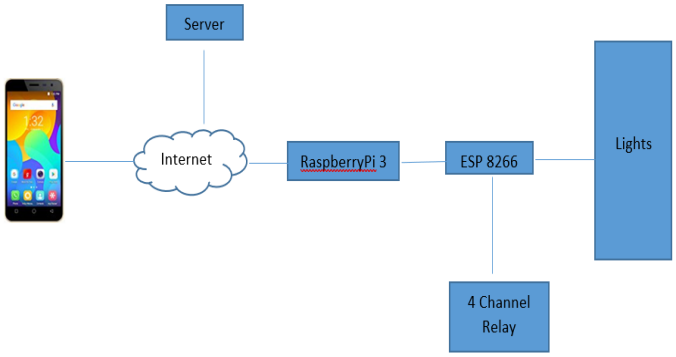

Fig. 4 Structure 1 of the planned product.

Figure 4 represents the structure 1 of the planned product where everything is controlled wirelessly. The product aims at being able to work with at least 4 house appliances.
We need ESP 8266 to control the hardware, provide the user with a way to communicate with the lights, connect to the internet (through wifi, for example) and allow for further modification and connectivity. Referring to the central unit, two of the most very often available microcontrollers are Raspberry Pi and Arduino.

Controlling Lights using Blynk App:

Step 1 : Hardware Assembly : Connect NodeMCU and relay using some jumper cables. To power nodeMcu, connect it with phone charger or power bank. To power relay board use batteries. Connect electrical appliance with relay board.
Step 2 : Install and Configure Blynk App: Download Blynk app and install it. Login in using Facebook. Click on new project and name it. Select nodeMCU as the device and connection type as Wi-fi. Select CREATE. You will receive a Auth Token to email id which is registered to facebook account. In blank project add 4 buttons named as ON/FF Light 1, 2, 3, 4
Step 3 : Downloading and Setting up Arduino IDE and Blynk Libraries: Open your email and copy the Auth token received from Blynk's mail. Open Arduino IDE. Go to blynks github page and download blynk library. Extract that zip file. Open Arduino folder, go to tools and copy all the blynk's libraries. Connect the node MCU to computer. Change some settings in Arduino ide. Go to tools and select board as "Node MCU 1.0"

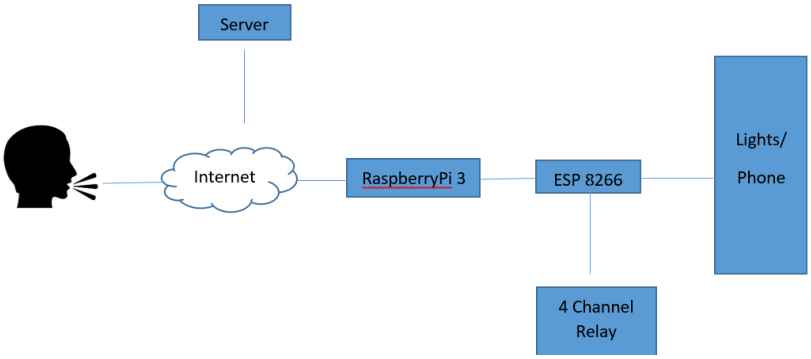

Fig.5 Structure 2 of the planned product.

Controlling home appliances using voice commands:

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Our goal was to control electrical appliances using voice commands. We used Amazon's Alexa for voice assistance. We use an intermediate tool called IFTT to bridge the gap between Alexa and Blynk app. If This Then That, also known as IFTTT, is a free web-based service to create chains of simple conditional statements, called applets. Over 400 apps work with *IFTTT* including Twitter, Telegram, Google Drive, Twitch, Weather Underground, Instagram, Gmail, and devices like Google Home, Amazon Alexa, Nest, Philips Hue, and your Android. Turn on Applets and Control everything. When we say a voice command like "turn on the light" to Alexa it will send that command to IFTT. It will then interpret the command and send appropriate request to blynk app. In the end blynk app sends the command to node MCU and then to the electrical appliances.

VII. CONCLUSION

The exciting moment of developing technology is when it is applied to our daily life to provide a better life. The exciting part of designing and building a product is when we combine our knowledge of technology and the understanding of life from youth point of view. We hope to spread the beauty of modern technology, essentially to improve life quality. By showing time, date, weather and synchronized daily schedule via a mirror, and by interacting with users, we are trying to deliver the concept of modern house and to create a fictional living environment along with the increase of life standard and efficiency. This smart mirror device will be an extraordinary fascinating decoration in house. We have invested our passion and curiousness into this project so that we hope this product can really impress customers and give them an exclusive life experience.

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