"CREATING INTERACTIVE MIRROR"

A smart mirror in the education sector

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Abstract— We have been using mirrors since a very long time. When you see a mirror in front of you, you see it in its capability of a mere decorative item or a basic requirement. In today's world, smart mirrors are used in the automobile industry, at malls for aesthetic as well as navigational purposes, medical and healthcare purpose. These applications are done world-wide in almost every major city of the world. However, our application of the smart mirror involves using the smart mirror in an educational backdrop using Internet of Things as well. We aim at designing and implementing a solution to the problem of manual work of the students and to avoid any mistake in keeping track of events, notices, deadlines which they may miss. It also solves the problem of asking for directions in a big campus and simplifying this by providing directions to the targeted location provided by the user via voice command.

Keywords—Smart Mirror; notices; events; deadline; navigation; voice command;

I. INTRODUCTION

In today's world, man is looking for comfort in every single thing. Right from brushing in the morning till, automatically switching the lights off at night, exploring for comfort is the top priority of the modern man. Further to implicate on our lifestyle, it has evolved to optimize time for every little task so that you get time for yourself in your busy schedule.

These days we depend mostly on the digital world just to speed up our work. Internet is the most important technology for us now. Ranging from our daily personal activities to our professional work, internet handles our task that seems to tedious or smart for us now.

Now if we have reached such lengths to incorporate the use of technology in our lives, why not start living smartly too.

Smart living implies using methods and options that are smarter than the normal manual or the other ways that we have been using until date. We have achieved smartness in different aspects like smart phones, smart laptops, smart TV, smart cities. So what about imbibing smartness in a basic object like a mirror as well?

We have been using mirrors since a very long time. When you see a mirror in front of you, you see it in its capability of a mere decorative item or a basic requirement. In today's world, smart mirrors are used in the automobile industry, at malls for aesthetic as well as navigational purposes, medical and healthcare purpose. These applications are done world-wide in almost every major city of the world. However, our application of the smart mirror involves using the smart mirror in an educational backdrop using Internet of Things as well.

Smart Mirror

A smart mirror is a two-way mirror which is placed in front of an electronic display and can display information like news, calls, contacts, events as per the user. Furthermore, the smart mirror has a brain of its own. The heart of the smart mirror is the Raspberry Pi through which the back-end is constructed as per the requirements of the user.

Internet Of Things

Before the era of IOT, fire hazards were handled very differently. Starting with calling the fire vehicle to waiting for it to come and till actually tackling the fire, took time. This is where IOT made its way and people started installing small sprinklers in their homes, which detected smoke or heat through sensors and automatically turned themselves on. This led to the millennials thinking this way about each small problem and led to the era of Internet of Things.

To give you a dictionary explanation, "IoT is a new technology which is growing fast and has many applications. The Internet of things (IoT) is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these things to connect, collect and exchange data." [10]

Raspberry Pi

A raspberry pi is often called the heart of any internet of things project. It is a mini computer that can be connected to an electronic display and can be used to explore the computing and coding in languages such as Python, JavaScript.

II. PROBLEM STATEMENT

This system will aim to provide an interactive mirror which will provide the students with notices, information of events, time-table and will also display the map to the desired location in the campus when asked upon by the new visitor, student or staff. Our Smart Mirror would start functioning after the user uses the keyword "JASPER" and this will trigger the voice assistant to ask what help the user needs. The User replies and the assistant analyses the keywords in the reply and checks for a match ,wherein the keywords would be 'time table' , 'event' , 'deadline' , 'news'. The speech from the user would be detected by a microphone which will be connected to the Raspberry Pi3.

III. BACKGROUND AND RELATED WORK

The main purpose of our project is to club notices, events, navigation and make it stress-free by making the mirror completely voice controlled. Internet of things is used here as we are going beyond the use of internet in standard devices and incorporating IOT in embedded systems applications such as Raspberry pi.

Some of the papers published on smart mirrors are about applications of it in the following category:

1. Automobile
2. Consumer & Household applications
3. Medical & Healthcare
4. Advertising & Retail

In a research paper publication on "IOT Based Smart Mirror using Raspberry Pi", it explains the use of Internet of things in using a smart mirror to represent information in an aesthetic way and taking information from the internet like news, temperature. It incorporates an application of detection of thief or any malicious activity when nobody is home. The home owner will be alerted via message. The PIR sensor will detect the movement and an alert will be sent immediately using the internet. [5]

In a recent study, it was stated that the smart mirror market is mostly used by the automotive sector as the interactive mirrors will play a major role in providing comfortable drive and safety to the driver. It was also stated in the study that the mirrors are available in different types by offering complete rear-view and control over the reflections. [6]

In another paper on An embedded non-contact system for health monitoring at home, by using the smart mirror to detect key factors such as Heart Rate, Respiratory Rate, inter-beat interval, blood pressure by analyzing the user standing in front of the mirror and taking in key factors and displaying the results. It also works as a personal reminder to remind about the daily medicine alarm by using a dataset which includes the information about the medicine timings. [7]

According to a research paper dated October 2015, Smart Mirror is a solution to implementing primary prevention in terms of a healthy lifestyle. Primary prevention is the most viable approach to reduce the socio-economic burden of chronic and widespread diseases, such as cardiovascular and metabolic diseases. The Mirror detects and monitors over time semeiotic face signs related to cardio-metabolic risk, and encourages users to reduce their risk by improving their lifestyle. [8]

There is no prior application of Smart Mirror in the field of education that has been worked on. Therefore our paper would be in a complete new direction wherein we start from scrap by taking input from students and professors.

We took suggestions from them as to how their time and work can be optimised by incorporating all the information in a database which is to be placed in an interactive system and is voice controlled for ease of access.

IV. PROPOSED SYSTEM

We aim at designing and implementing a solution to the problem of manual work of the students and some mistakes that they make in keeping track of events, notices, deadlines which they may miss. It also solves the problem of asking for directions in a big campus and simplifying this by providing directions to the targeted location provided by the user via voice command. [9]

1. The mirror will be constructed by using a LCD screen attached to a Raspberry Pi3, and will be covered by a two-way mirror.
2. Jasper will be used to make the mirror voice-controlled. The mirror will be completely voice controlled, so the work of manually typing commands and words will be eliminated. This will also increase the accuracy as well as optimize the work of the user. The mirror will be activated when the user uses the keyword to activate the mirror. The user will speak what he wants from the interactive agent, and the voice controlled mirror will detect the keyword and accordingly give a reply to the user in terms of notices, weather, time, news, time tables or directions as well.
3. Updates regarding the changes in time-table, notices and deadlines would be managed by a single administrator. The administrator can access the Smart Mirror database through an application wherein he/she can input the data to database that will eventually be accessed by the interactive mirror when asked by the user.

Our system acts as:

1. Smart Mirror as a Mirror : It basically acts as a simple mirror and increases the aesthetic value of the place as it works as a mirror when idle. [5]
2. Smart Mirror as an Interactive Screen: Activities completed by voice command is always preferred over typing . Here we use Jasper for voice control which is an application of NLP(Natural Language Processing) being an Artificial Intelligence tool. [5]
3. Smart Mirror as a Informative System : Widgets for Time , Date , Weather details and news are fetched from online using predefined URL. [5]
   a. News is fetched from websites like CNN, BBC etc.
   b. DHT11-digital sensor is used to get humidity and temperature details which will be connected to the GPIO pin of the Raspberry Pi 3.
4. Smart Mirror as a Database Hub : Students searching for event details , exam time table , submission deadline and other notices related to their department/class from the ERP is a tedious task . Instead

a Smart Mirror outside each department would be the best solution as it will fetch the respective information called out by the user from the database which would be managed by the admin.

5. Smart Mirror used for Navigation : Any new student or staff is always confused about the direction to their desired location (i.e classroom/department/labs/library) when new to the college specially which have huge and complex campus.

V. IMPLEMENTATION OF PROPOSED SYSTEM

The LCD screen will be attached behind the two way mirror. The LCD screen will be connected to a raspberry Pi3, which is a mini computer that can be connected to an electronic display and can be used to explore the computing and coding in languages such as Python, JavaScript.

Basic widgets such as news, weather will be customized in the backend of the Raspberry Pi 3. Further, there will be an admin, who will be provided with a simple application wherein he/she can input data to database that will eventually be accessed by the interactive mirror when asked by the use. The Jasper will act as a platform for the voice controlled aspect. The keywords will be customized into the module of Jasper and the mirror will reply accordingly by analyzing the input from the user. There will be a microphone and a speaker connected to the GPIO pins of the Raspberry Pi 3.

The database will consist of all the information regarding the time table which will be sorted according to different classes and labs. It will also consist of different notices and deadlines for the respective class.

The Raspberry pi 3 supports an inbuilt Wi-Fi module to communicate with the network inside the house and other devices as well.

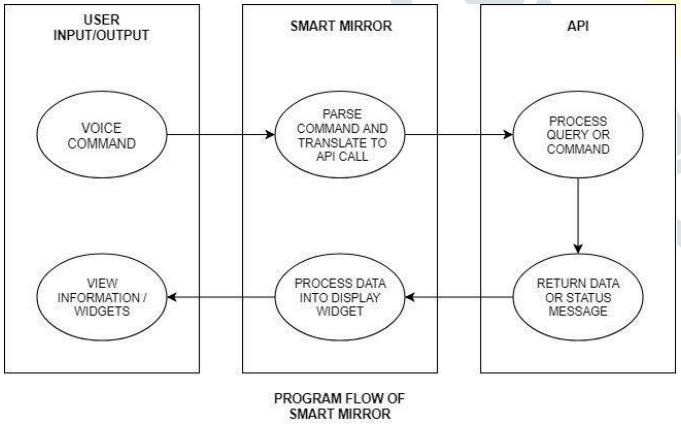

Fig 1: Program Flow of Smart Mirror

If the user wants the information about current notices for a particular class only then the assistant will match this requirement using the keyword and fetch the data from the database that is worked upon by the admin.

The admin will be provided with a simple application on their phone from where the data can be updated regarding any notices or event or examination time table. If any user asks about the direction to any place on the campus, for example the nearest vending machine, so for this the MapBox is used by making customized maps of campus. MapBox outdoor includes openstreetmap data offers commercial mapping services

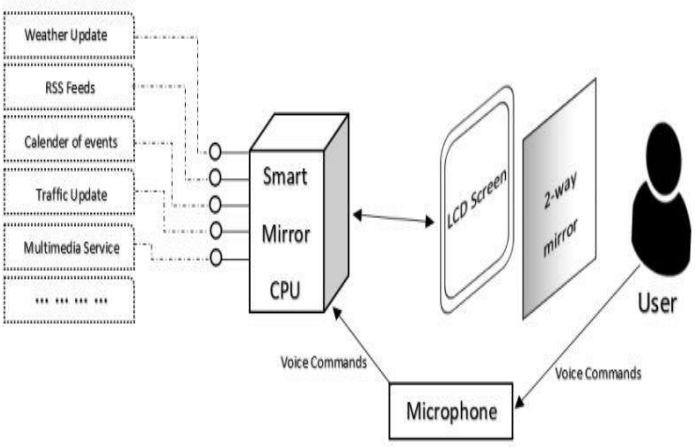

Fig 2- Process Block

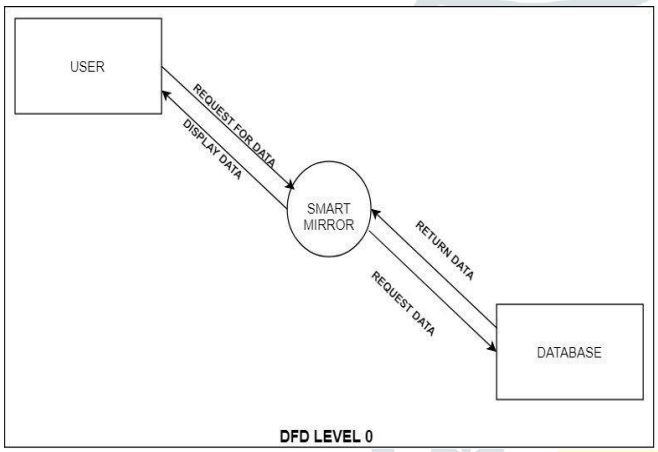

Fig 3-DATA FLOW DIAGRAM LEVEL 0

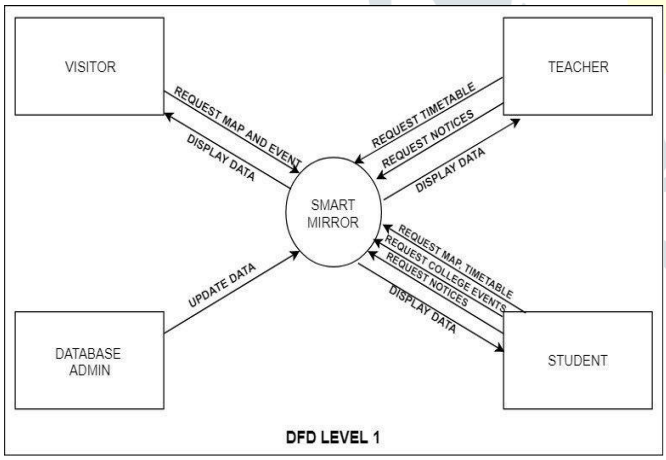

Fig 4-DATA FLOW DIAGRAM LEVEL 1

V. RESULT

In this section, the end results will be discussed. The purpose of this project was to automate all the manual tedious tasks of the students and teachers by making an interactive mirror which is voice controlled. The daily activities of students such as fetching the time table and deadline of their respective class, along with the event details related to their department will get easier by the implementation of this mirror. Real time notices would be displayed as pop up so that none of the important notice is missed upon. This mirror also provided with an additional feature of navigation system to different classrooms by making a customized map of the college campus.

The project was divided into three parts:

1. The hardware section of constructing a smart mirror by using raspberryPi.

2. The android application for putting in the updates of the time table, notices, events by the administrator.

3. The navigation system that will direct the students or visitors to the places inside the campus.

During the course of the project, there were some difficulties faced by the implementation team such as, finding a two way mirror of the appropriate size same as of the LCD screen used. It was later found by searching it online and browsing through different websites to get it for a reasonable price.

There were some other minor defects related to the setting up the raspberry pi on the LCD screen but they were settled by the team and all the functionalities were working properly as per numerous testing cases.

VI. CONCLUSION

In this paper we have proposed a system, Smart Mirror which provides all the detailed information to the student , teacher , or any other staff just with the help of commands . Jasper is used to make the system voice controlled . The system also ensures that correct data is been displayed to the user by conforming the classroom details required.

The system keeps track of real time changes done by the admin and displays it . The admin will make the changes by using a simple android application wherein the information added by him/her would be reflected on the Smart Mirror too .

In future work we have decided to broaden our system horizon by connecting it to the ERP of any college if available to access the attendance details of each student . The smart mirror can also be made touchscreen which would further help to add new features such as mailing .

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