IoT based Smart Mirror using Raspberry Pi

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Abstract— **This project depicts the design and development of smart mirror that represents an elegant interface for glancing information and also used for thief detection in a home environment. A smart mirror is a system that functions as mirror with additional capability of displaying date, time, current temperature, weather details. To design a smart mirror that receives a online news and display it using Internet of things (IoT) circuitry and to detect thief when nobody is in home.**

Keywords— IoT, PIR,Raspberry-Pi

I. INTRODUCTION

In this world everyone needs a comfort life. Modern man has invented different technology for his purpose. In today's world, people need to be connected and they are willing to access the information easily. Whether it is through the television or internet, people need to be informed and in touch with the current affairs happening around the world[5].The Internet of Things means interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data. The Internet of Things with its enormous growth widens its applications to the living environment of the people by changing a home to smart home. Smart home is a connected home that connects all type of digital devices to communicate each other through the internet.[11]Our lifestyle has evolved in such a way that optimizing time is the most important thing. Our work is based on the idea that we all look at the mirror when we go out, so why wouldn't the mirror become smart.**[5]**A common approach for building a smart mirror is to use a high quality one-way glass, a LCD monitor, a frame to hold the glass and monitor, and a web browser with python to provide the software features and drive the display.[3]

This project has been developed with the idea of making home smart to save time . The Internet transformed our lives by connecting us more easily to information and other people in the virtual world. The state of innovation currently is to provide more information with less interaction to get it. The device that has been researched and designed is called "Smart Mirror". It is a wall mounted mirror which displays relevant items to the user such as weather, time,date,temperature,humidity and news and other fields of interest.[4]IoT emerged the idea of remotely monitoring objects through the Internet . When it comes to our home, security is crucial issue to the general public. For enhancing the security of home this framework is used by owner of the house. Assume you are not at home anda thief enters your home then this framework will give a caution through alert message. When thief enters the home, PIR sensor will detect the movement and gives the owner alert message.Wireless Home security and Home automation are the dual aspects of this project. The currently built prototype of the system sends alerts to the ownerover message using the Internet if any sort of human movement is sensed near the mirror[6].

II. LITERATURE SURVEY

In2003Phillip sunveiled their Mirror TV that was built using the same principles that of smart mirrors. Their product was a normal TV that was put behind a two way mirror so that the TV would appear as a mirror when turned on and as TV when turned on. They also had a option to have the mirror be larger than the TV. A usage example presented by Phillips was to have the children watch cartoons while brushing their teeth at the same time.

Later in 2005 Phillips announced their research project MyHeart that built upon the idea of an informative mirror. While their original Mirror TV was simply a TV that also functioned as a mirror, the MyHeart project would integrate a display to showcase various medical statistics. However this project required onbody electronics to collect and analyze the data. The mirror itself simply served as an informative display.

James Law Cyber tecture developed a commercially sold smart mirror in 2011. This mirror is more in line with the smart mirror we've come to know today. The product consists of a 32"LCD-display covered by a 37" two way mirror. The display can show weather forecasts, stream internet, TV, the current time and various widgets. The smart mirror has numerous input methods such as remote controller, smartphone app and onscreen virtual keyboard.

Paper by Franco Chiarugietal (2013) discusses the motivation and rationale behind the project. Their idea was to extract quantitative features official expressions related to stress, anxiety and fatigue and use those features to quantify an individual's well-being. The features would be extracted from data collected from multisensory devices. The data

would be collected in the form of videos, images, 3D face scans and breath samples. The project is first and foremost a research project to digitalize semeiotics - the physical signs produced by diseases - from facial images.

At the 2014 International Consumer Electronics Show (CES) Toshiba showcased their smart mirror concept. It utilized gesture control as an input method. Toshiba showcased their smart mirror in different home environments. Their idea was that the smart mirror would be customized for the purpose it would serve in each room. The bathroom smartmirror would show   information such as weather forecast and a personal fitness monitor.

In 2016 Microsoft released detail on the smart mirror they have been working on. Their intention does not seem to be to create a commercial smart mirror to sell to consumers, but rather they unveiled all the details on how to build one and made all the code publicly available at a github repository. Rather than selling a finished product consumers have the option toassemble their own mirror as a do-it-yourself project.

Daniel Besseretal (2016) created a smart mirror for adding interactive fitness exercises to a person's morning routine. Their project utilizes the Microsoft Kinectv2 for tracking gestures and a Wii Balance Board for presence detection.

Chidambaram Sethukkarasi et al. (2016) created an intelligent mirror that identifies users based on facial recognition, recognizes emotions, records health parameters and gives clothing advise. Their paper does not go in-depth on any of its subjects, but rather try to unite the ideas under the concept of an intelligent mirror.

In 2017 a company called New Kinpo Group launched their take on the smart mirror called Hi-Mirror. This smart mirror has a camera to specifically monitor your skin health. The mirror will scan your skin and give you metric to tell you what to improve. The mirror uses facial recognition to log a user's skin firmness, texture, clarity, brightness and health on a day to day basis.

GriffinTechnologies unveiled their take at the smart mirror at the 2017 CES convention. They call their product the Connected Mirror and it will serve as the smart home hub for several smart home appliances made by Griffin Technologies. The mirror can display local time and weather, notifications from your phone and statuses from other Griffin smart home tech connected to the mirror. The mirror does not employ any user recognition, but the interface can be customized through a smart phone app that is also used to control any other Griffin smart home devices

III.   METHODOLOGY

A. Smart Mirror As A Mirror

We can see our view as we can see it in a natural mirror while looking and grooming with the help of one way mirror with high concentration of aluminum content.

B. Smart Mirror As A Information System

Time, Date, weather details and news are fetched from online using predefined URL. News is fetched from websites like CCN, BBC etc. DHT22 –digital sensor is used to get the humidity and temperature details.DHT22 is connected to GPIO pins of Raspberry Pi board using jumpers.

C. Smart Mirror As Security System

When there is nobody in home it can be switched into security system by using VNC viewer to detect human presence. When someone enters into room ,PIR sensor will detect the movement of the person when he passes by the mirror and capture the image and stores it in the drop box .Also informs the owner by updating captured image in the dropbox ,by this way smart mirror system can also be used as a security system.
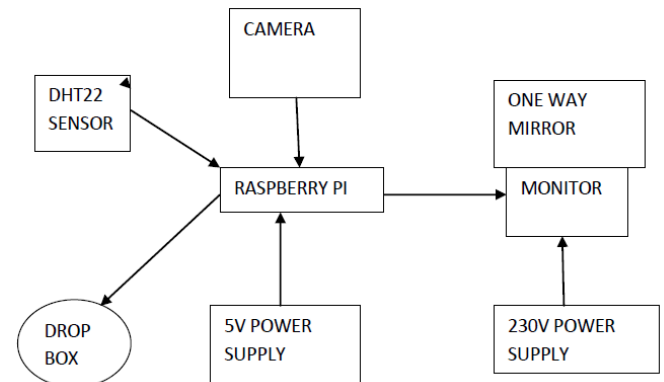

Fig. 1.   Block Diagram For Smart Mirror

D. Algorithm For Information System

- Step 1: Switch on the power supply.
- Step 2: Get the date, time, and weather details from predefined from URL.
- Step3: Get the news from www.zeenews.com
- Step 4: In code section write down all the compliments to be displayed on mirror.
- Step 5: Display it on mirror via LCD monitor
- Step6: Switch to thief detection mode using VNC viewer.
- Step 7: .Switch off the power supply when it is of no use.

E. Algorithm For Thief Detection

- Step 1:Start
- Step 2: Setup the Camera
- Step 3: Check whether PIR sensor output is high or low
- Step 4: If it is low, go to step 3.
- Step 5: If it is high, camera is turned ON.
- Step 6: Image is captured and stored on raspberry pi.
- Step 7: Check for Wi-Fi connection.
- Step 8: If it is connected image is uploaded to dropbox.
- Step 9: Notification is updated in dropbox.

IV.   RESULTS

A futuristic smart mirror system that provides information like time, date, accurate temperature and humidity, and latest news while looking and grooming in front of mirror and also helps in thief detection.

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Fig. 2.   shows the information system

V.   CONCLUSION

Smart mirrors have great potential to enhance user experience of accessing and interacting with information. Not only do they allow users to see relevant information effortlessly, they can also be integrated as a thief detection system. Our smart mirror saves time and makes it easier to access information. In today's society security is of crucial importance. By keeping this in mind we have integrated a thief detection system into our smart mirror .In future this project can be improved by adding interactive touch screen ,geo-location, Alexa and some more features.

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