Intelligent Mirror Using IoT

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Abstract: **There is never an end to the things that can be made 'smarter' with the aid of the appropriate technology. There are many smart display devices, but mirrors, while displaying information, provide an interactive environment. This proposed system describes design and development of an intelligent mirror using raspberry pi with additional features for security and energy saving. The contents are projected on an LED monitor housed in a wooden frame and lined with a two way mirror reflective surface. The mirror offers basic amenities such as city temperature, time and news etc. With the support of a raspberry pi, all the programming is finished. Using the technique of face recognition, we can detect the face of the user and verify the user. It provides a better security system and also we can use the Solar energy to switch on the system, so that use of conventional energy can be minimized.**

Keywords: **Raspberry pi, Solar energy, face recognition**

1. Introduction

Intelligent mirror is a mirror mounted on a wall that shows temperature, time, news and other areas of interest. More and more gadgets have been connected to the internet in recent years. The internet has played an important role in connecting people around the world. Devices have begun to become smarter and smarter, mobile phones have become smartphones and the most important thing is that the internet has been connected to a variety of devices and the concept came to be known as the 'Internet of Things'.

Our paper aims to discuss other areas where it is possible to use this technology. It aims to integrate this technology into a mirror, because people usually spend considerable time in front of a mirror. We observed clocks mounted on the wall, we have also seen displays at the airports, likewise we aim to bring this technology to our homes.

Another advantage of this device is to provide face recognition, which helps the user in home security aspect. Intelligent mirror can also help you quickly view your Google feeds or access gmail accounts with Google Assistant. Now a days the source of energy is critical part as it has so many problems, so we can implement this proposed system with the help of solar energy which is non-conventional source of energy.

2. Literature Survey

"A Mobile-Programmable Smart mirror for Ambient IoT Environment" published at 5th International Conference on Future Internet of Things and Cloud Workshops in 2017, describes Interactive Smart mirror design and development that offers simplified and customizable home environment services [1]. Their Smart Mirror also uses a mobile application to monitor home appliances with very less human intervention. The smart phone needs to be coupled successfully with the smart mirror to manage home appliances.

"Smart Mirror for Smart Life" published at IEEE Conference publication also explains the monitoring and control of home-appliances with the help of mirror. Their mirror system uses Sonus technology as a tool to ease human tasks and improve communication between humans and system [2]. The Smart mirror takes voice commands as a response input and Sonus is a text library speech that can quickly and easily connect VUI (Voice User Interface) to any hardware or software. Security in IoT is developing but not much strong, in order to make Smart mirror secure and to display information according to a person's choice facial recognition algorithm.

The "Implementation and Customization of a Smart Mirror through a Facial Recognition Authentication and a Personalized News Recommendation Algorithm published at 13th International Conference on Signal- Image Technology & Internet-Based Systems (SITIS) in 2017, includes the above advancement. In that the daily news recommendation predictive model is implemented through the facial recognition algorithm.

The "SmiWork: An Interactive Smart Mirror Platform for Workplace Health Promotion" defines a multi-user Smart mirror that encourages a healthier lifestyle and wellness [4]. Each user has a personalized user interface that can be accessed using an RFID card reader.

Toshiba unveiled their smart mirror design at the 2014 International Consumer Electronics Show (CES). It used gesture control as a form of input. In various home environments Toshiba demonstrated their smart mirror. Their thought was to customize the smart mirror, to serve the purpose in each room. For example, the bathroom smart mirror would show information such as weather forecast and a personal fitness monitor.

Microsoft released details about the smart mirror they were

International Journal of Research in Engineering, Science and Management
Volume-2, Issue-12, December-2019
www.ijresm.com | ISSN (Online): 2581-5792

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working on, in 2016. Their aim does not seem to be to develop a commercial smart mirror to sell to customers, but rather to disclose all the information about how to build one and make all the code available to the public in a github repository. Instead of selling a finished product, customers have the option of installing their own mirror as a do-it-yourself project.

Smart Mirror: A Novel Framework for Interactive Display Published in Circuit, Power and Computing Technologies (ICCPCT), March 2016 International Conference [5] describes that our lifestyle has changed so that the most important thing is to optimize time. Based on user studies and prototype implementation, they presented the creation of a revolutionary system that integrates interactive information services provided on a mirror surface.

Their research was based on the idea that when we go out we all look at the mirror, so why not make the mirror smart. The platform will provide basic services such as displaying customized weather data, time, date, and integrate some additional features such as mobile scheduling alert service and social media.

Their platform uses Passive Infrared sensors and Wi-Fi networking to detect the presence of humans. Once a person arrives in front of the mirror, it displays the web-fed information that includes calendar, date, weather, news feed etc.

Design and development of a smart mirror using Raspberry Pi [6] published at International Journal of Electrical, Electronics and Data Communication, tells that Interactive computing, with wirelessly connected embedded devices used in day-to-day operations, is evolving and enhancing quality of life standards. Several devices / products are now evolving on the basis of digital computing and communication technology and provide easy, safe and convenient personal services with this multimedia intelligence and it offers easy, safe and convenient personal services anywhere, whether at home or in a wide range of industries, and puts many users at ease. We look at the mirror every day and mentally connect with it to figure out how we look and how our clothes are. The interactive mirror is a technology effort to increase the mirror with proper embedded information to provide enhanced features such as the city's weather, the latest news and media alerts, and many more.

3. Proposed Methodology

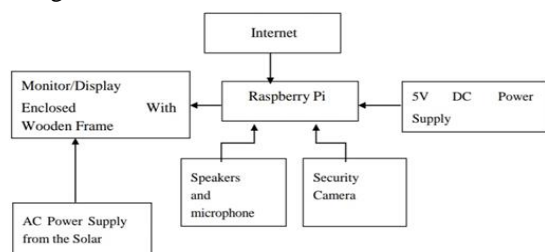Proposed system and block diagram for intelligent mirror is shown in fig. 1.

Fig. 1. Block diagram

The proposed system basically consists of the following modules:

- *Raspberry Pi:* In this proposed model, Raspberry Pi acts as the main control unit. The Raspberry Pi has a micro SD card that can be loaded with Raspbian operating system. Upon running the OS, you can use the Magic Mirror code to run the program.
- *Dual Purpose Display:* We use a two-way mirror for the purpose of dual functionality. Using a wooden frame, it will be mounted on top of the monitor to hold the whole system together. When the monitor is turned off, the two-way mirror will operate as a regular reflecting mirror and the data can be viewed simultaneously while the monitor is switched on.
- *Security Camera:* Home security systems work on the simple concept of securing entry points to a home with sensors / software that communicates with a control panel or command center installed somewhere in the home in a convenient location. With the assistance of the Face Recognition technology, we are implementing this in our project, where system will deliver warning notification via voice or message about the person.
- *Solar Energy:* Solar panels work by absorbing sunlight with photovoltaic cells, generating direct current (DC) and with the help of inverter technology we can convert it into usable alternating current. Then that alternating current is used to power up the system.
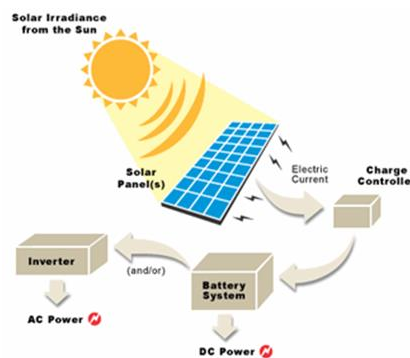

Fig. 2. A schematic explaining how solar works

4. Conclusion

Intelligent mirrors improve the user experience of information access and interaction. The intelligent mirror saves time and makes it easier to access details. Security is crucial in today's society, so we have integrated an intelligent mirror with home security system as well as allowing users to easily view relevant information. In future this project can be improved by adding interactive touch screen. This intelligent Mirror can be upgraded to be used in beauty parlors, fabric shops, hotels etc… and with better technological advances, mirrors can be used in many other fields.

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