Design And Development Of A Intelligent Mirror Using Raspberry Pi3

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Abstract — This paper presents the design and development of an intelligent mirror. Intelligent mirrors, which proceed with the works today and will have its spot later on innovation, give both mirror and PC supported data administrations to its user. Because of the microcontroller cards ready, these frameworks, which can interface with the web(internet) and take information from the web, can demonstrate this data on the spots situated in the mirror. In the extent of the examination, the created intelligent mirror framework incorporates the climate data, time and area data, recent development data, user data, and camera picture taken from web administrations utilizing Raspberry Pi 3 microcontroller card. Some of the hardwares can be constrained by voice directions through the amplifier on the smart mirror. Everybody recognizes what a mirror is. It is a thing that found in many people's homes. In mirrors, we see our appearance. In any case, what happens when you join the possibility of a mirror with Innovation? What potential outcomes are there, and how smart could a mirror be? A thought which planned to build up an Intelligent Mirror and a little work framework to control it. The primary objective of this task was to build up a smart mirror gadget just as a working system to keep running on comparative gadgets. The principle includes the Smart Mirror would have demonstrated fundamental climate and time data, having the capacity to include cautions, updates, or notes along these lines we stick notes on an ice chest. To overcome these issues, a framework called "INTELLIGENT MIRROR" is proposed.

Keywords— Smart Mirror, IoT, Magic Mirror, Raspberry Pie.

I. INTRODUCTION

Everyone knows what a mirror is. An intelligent mirror is a mirror with "unique" capabilities, which like how cell phones have become Intelligent or smart. That is, it is a display that looks and acts like a mirror, but has the capability of displaying multimedia data through the mirror glass as if the mirror was a screen on its own accord. An intelligent mirror is a physical design that embeds a computational device in an ordinary piece of furniture that can integrate into a home or working environment [1]. So far, no intelligent mirror that offers added value has been developed. A common approach to building an intelligent mirror is to use a pane of two-way glass, a monitor, a frame to hold the glass, and a monitor. Intelligent mirrors are also called "magic mirrors or smart mirrors," which allow displaying information.

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The world and everything around us are continually evolving. With the progression of science, technology, and innovation, we are moving towards an increasingly robotized way of life. We have savvy urban communities, shrewd homes, cell phones, brilliant vehicles, and that's only the tip of the iceberg. This quick lifestyle requires further advancement of home mechanization ventures. Home computerization frameworks are, for the most part, made utilizing the Internet of Things (IoT) gadgets. IoT is a coordinated arrangement of imparting gadgets in which every gadget can complete errands self-sufficiently. IoT is an interconnection of Wireless Sensor Network (WSN) gadgets(devices) [2].

A Smart Mirror is equipped for showing the date, time, climate, and traffic conditions on its reflecting surface. These highlights will be acquired from the web and actualized utilizing the Raspberry Pi. The Raspberry Pi runs Raspbian Jessie with PIXEL Operating System (OS). A typical way to deal with building a Smart Mirror is to utilize a sheet of two-way acrylic reflect, a screen, a casing to hold the glass and screen, and an internet browser with JavaScript to give the product highlights and drive the presentation. A program is utilized as the primary technique for showing data. A program makes a sandbox for the code that keeps running inside it, that is, all associations and procedures are segregated from other running procedures and equipment collaborations on the PC. An internet browser is as yet a fundamental element forgiving and showing data, as it has worked in help for numerous media groups, for example, content, pictures, and recordings. The data introduction can be made intuitive with JavaScript and is adaptable with Cascading Style Sheet (CSS) [3].

As the innovation and utilization of advanced frameworks are getting mainstream, the chips away at these fields are expanding. Presently a-days the world is getting more into man-made reasoning/AI.

Intelligent Mirror utilizes IoT with the assistance of a Raspberry Pi3. Imagine a scenario in which your mirror could give you to realize that you a chance to have an imperative conference at 4 PM today. Imagine a scenario in which the mirror could disclose to you that it's cold outside and prescribe you to wear a sweater. For this reason, we present an intuitive Intelligent Mirror.

The Intelligent Mirror is equipped for showing the date, time, climate, and traffic conditions on its reflecting surface.

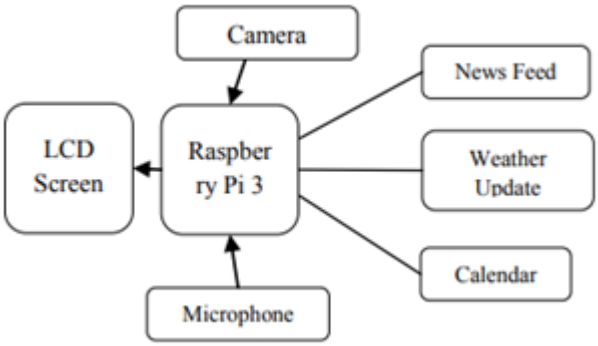

Figure 1 Schematic view of smart mirror

1. Internet of Things (IoT)

The Internet of Things is an idea characterized as a system of associated physical items. It's regularly seen as the subsequent stage for the web. As of late, it has picked up a ton of prominence anticipating that, later on, most ordinary items will be associated with one another and will almost certainly interface in keen ways. The Smart Mirror will, in the long run, become one of these associated items in our families, and all things being equal, having the option to speak with other objects, the possibilities become endless [4].

2. Raspberry Pi3:

The Raspberry Pi is a solitary board PC, created by the Raspberry Pi establishment in the UK. It has turned into the most prevalent PC of it's caring gratitude to extraordinary help and a major network behind it just as an economical cost. The Pi does not work out of the crate. It comes up short on a hard drive, and it doesn't accompany a pre-introduced working framework. To introduce an OS, you need a smaller scale SD card arranged with an OS picture. Also, in light of the fact that the product that will keep running on the mirror will be coded on the equivalent device at a screen, a keyboard and a monitor is required [5].

II. BACKGROUND

1) Artificially Intelligent Smart Mirror using Raspberry Pi:

This examination was directed in the Department of Computer Science and Engineering, BRAC college, Dhaka, Bangladesh, amid the year 2017. The necessities and particulars of the Smart Mirror took motivation from individuals' consistently gadgets that they use, including PCs, tablets, and cell phones. The incorporated comparative highlights from each to give the client what they would expect out of a cutting edge 'brilliant gadget'. Some essential highlights like a clock, schedule, news source, and so forth, which are a basic piece of the regular daily existence, are incorporated into the shrewd mirror with the goal that individuals would now be able to approach these highlights more effectively than any other time in recent memory [6]. Figure 1 is a schematic perspective on the savvy that reflects the idea that has been proposed in this investigation. There are a ton of past activities identified with a keen mirror, yet just a few with AI incorporated with it. Individuals will almost certainly cooperate the mirror through AI progressively and get to data accessible on the web, for example, getting to maps, climate, news channels, and so on [7].

For CPU, Raspberry Pi 3B small scale PC was utilized, and all product parts were introduced into the working framework. The CPU will take the video and sound data from the camera and amplifier individually, and through facial acknowledgment and voice acknowledgment show it will recognize users. Once the brilliant mirror (smart mirror) detects the nearness of any individual, it will 'wake up' and show fundamental highlights like a clock, date-book, climate refresh, and so forth. The savvy mirror will likewise have some fundamental AI highlights incorporated into it. Clients will probably communicate with the mirror continuously and look for data on the web, make inquiries, play out specific assignments like setting caution, update, and so on with the assistance of a shrewd mirror. All the data is shown on the LCD screen associated with the raspberry pi. All parts dwell behind an exceptional mirror known as two routes see-through mirror, which is made of acrylic material.

2) Raspberry Pi Powered Magic Mirror:

The Smart Mirror furnishes the client with an improved mirror involvement. By making utilization of different showcases, the client can remain refreshed on the time, climate, and news features while planning for the day in with the completely practical Smart Mirror. Consequently, it structured a futuristic keen mirror that gives regular cooperation among clients and the encompassing home administrations. The mirror shown is given by a level LED show screen, which shows all the fundamental data which are helpful for the client.

The framework can be made significantly more helpful to the clients by including greater usefulness, like incorporating light settings, discourse handling, etc. The client didn't need to stress over killing on and the framework on the grounds that the mirror will distinguish movement and take every necessary step for them.

In figure 2, you can see the device looks like a normal mirror but would have a screen inside. This framework is also called SMART MIRROR, which is proposed to coordinate distinctive gadgets.

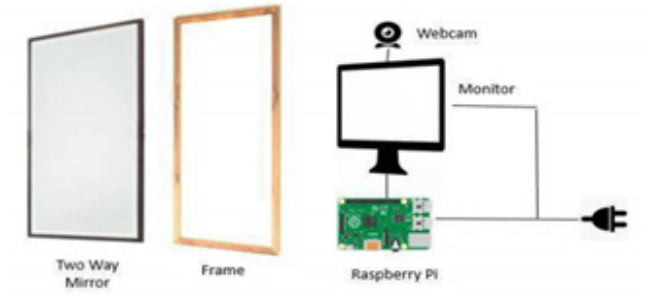

Figure 2 Overview of smart mirror

3) A Comparative Study and New Model for Smart Mirror:

In the late 1990s, Eli Zeikha and his group at Palo Alto Ventures exhibited a dream for the future known as Ambient Intelligence (AmI). This vision is for the time allotment 2010-2020. This vision drives the industry to create brilliant conditions. The vision is to build up a situation and characteristic interface which comprises bound together heterogeneous registering gadgets associated with regular items. This condition can perceive and reacts to the client's activities.

This condition utilizes distinctive kinds of brilliant innovations like systems administration, voice acknowledgment, facial acknowledgment, computerized reasoning, AI, detecting, thinking, and so on.

- Bluetooth
- RFID (Radio Frequency Identification)
- Sensors
- Software Agents
- Nanotechnology
- Biometrics
- Artificial Intelligence

The AmI gives home robotization, socialization, diversion, and so forth. They will probably build up a brilliant mirror for AmI condition. In this venture, they had proposed the structure and advancement of the savvy reflect. Today keen homes and menial helper are inclining among the general population. Amazon, Google, and Phillips are showing their development innovation in the field of shrewd home or AmI. Individuals are energized too for their astonishing items and for these modern gadgets. Phillips Home Lab is the main organization for making computerized home situations. The intelligent mirror is one of their task for home conditions. This mirror bolsters playing music or recordings. This mirror comprises an ordinary mirror on an LED which plays out the playback included.

4) Fit Mirror: A Smart Mirror For Positive effect in Everyday User Morning Routines:

A few "smart mirrors" or "magic mirrors" have just been concocted to, assessed in studies, or composed as a hypothesis. They show data or demonstrate the client itself on a standard screen or an intelligent screen with a government agent foil. In this segment, a portion of these mirror ideas are exhibited and depicted dependent on a class of two unique sorts:

Augmentation and Information

I. Augmentation:

Augmentation mirrors are brilliant mirrors that render extra data, for example, cosmetics (makeup) or dresses, on 3D perceptions of the client. Iwabuchi et al. Built up a cosmetics reflect, which helps ladies when putting on makeup. This mirror utilizes a camera with a goal of 1624 x 1224 pixels and 30 fps to take the photos of the ladies. The framework's calculation is prepared for ladies. The recorded pictures appear on a screen. At the point when a lady is near the screen and camera, the showed picture ends up obscured, in light of the fact that the camera has no coordinated auto center. To repay that, a programmed zoom was actualized that responds when the lady is utilizing a particular control marker. The marker is perceived by another camera. Distinctive lighting modes give the ladies diverse perspectives on the cosmetics they utilized (splendid light, dim light, etc.). Another capacity of these cosmetics reflected showing photos of the lady when she utilized cosmetics.

II. Information:

Another kind of keen mirrors is the supposed "enchantment mirrors," which permit showing data. In their venture, Blum et al. Show an enchantment reflect for educating life structures. They utilized a showcase gadget, shading camera, profundity camera, and the Microsoft Kinect v1 from the Xbox 360 gaming console. At the point when the client remains before the showcase, the mirror loads processed tomographic perceptions or 3D models of organs to give the client "the deception to investigate his body." With basic hand-signals, the client can change the cuts or zoom in and out. Further enchantment mirrors utilize single-board PC advances, for example, the Raspberry Pi, and screens with covert agent foil. On many occasions, those mirrors just show only data. A case for such a mirror is displayed by Stuckler.

5) IoT based Smart Mirror using Raspberry Pi:

In this world, everybody needs a solace life. The current man has created distinctive innovations for his motivation. In this day and age, individuals should be associated, and they are happy to get to the data effectively. Regardless of whether it is through the TV or web, individuals should be educated and in contact with the present undertakings occurring the world over. The Internet of Things implies interconnection by means

Figure 3 In this picture, you can see, a user performing the exercise “Boxing” in front of Fit Mirror.

of the web of registering gadgets installed in regular items, empowering them to send and get information. The Internet of Things, with its tremendous development, broadens its applications to the living condition of the general population by changing a home to shrewd homes. Savvy home is an associated home that interfaces all kinds of computerized gadgets to convey each other through the web. Our way of life has developed so that streamlining time is the essential thing. Our work is in view of the possibility that we as a whole take a gander in the mirror when we go out, so for what reason wouldn’t the mirror become keen. A typical methodology for structure a brilliant mirror is to utilize an excellent single direction glass, an LCD screen, an edge to hold the glass and screen, and an internet browser with python to give the product highlights and drive the presentation.

This undertaking has been created with making home savvy to spare time. The Internet changed our lives by interfacing us all the more effectively to data and other people in the virtual world. The condition of development right now is to furnish more data with less communication to get it. The gadget that has been examined and planned is classified as “Keen Mirror.” It is a divider mounted mirror that shows significant things to the client, for example, climate, time, date, temperature, moistness and news, and different fields of intrigue. IoT rose the possibility of remotely observing articles through the Internet. With regard to our home, security is a vital issue for the overall population. For improving the security of home, this system is utilized by the proprietor of the house. Expect you are not at home, and a cheat enters your home, then this structure will give an alert through an alarm message. At the point when cheat enters the home, the PIR sensor will distinguish the development and gives the proprietor ready message. Remote Home Security and Home mechanization are the double parts of this task. The present fabricated model of the framework sends cautions to the proprietor over message utilizing the Internet if any kind of human development is detected close to the mirror as shown in fig 3.

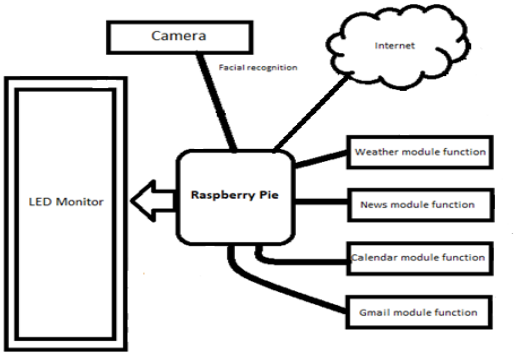

Figure 4 Circuit Diagram

Features:

- Smart Mirror As A Mirror.
- Smart Mirror As An Information System.
- Smart Mirror As Security System.

III. FRAMEWORK

The “Intelligent Mirror” is a kind of mirror that conveys all necessary information to the user like time, calendar, local weather, news headlines, and emails. The mirror is run on an LED monitor for display consists of a wooden frame and a low profile monitor which sandwiches the acrylic sheet (see-through mirror) to the back of the frame and connected by Raspberry pi3 through HDMI cable. The operating system in which has installed software called a magic mirror. It is open-source software that runs modules written in JavaScript. The device connected to the internet through Wi-Fi, which allows us to know the latest information. Webcam also connected to a Pi, which helps in the face recognition of a user to access their email account according to their identification. It will run profiles according to the person in front of it, such as for kids, it will run videos, and for the guest, it will show general information. The mirror keeps refresh itself with the latest updates.

1. Circuit Diagram:

For CPU, Raspberry Pi3 small scale PC was utilized, and all product parts were introduced into the working framework as shown in fig 4

Hardware Components:

- Raspberry Pie
- Two-way mirror
- Webcam
- LED monitor

IV. OPEN ISSUES

Some open issues are faces when you develop the intelligent mirror are as below:

- Coloured Image.

- Calendar not working.
- The weather is not working.
- Cannot Get Weather, latitude.
- Will not install dependencies.

V. CONCLUSION

We have planned a modern keen mirror that gives regular cooperation among clients and the surrounding home administrations. The center of the mirror depends on a home mechanization framework, which we created to exhibit the different functionalities given by the mirror. These functionalities incorporate the control of family unit machines and access to customized data administrations. The mirror shown is given by a level screen, which constantly listens from a web camera associated with the mirror to imitate a conventional mirror work. Likewise, voice actuation innovation has been utilized to verify a client to give customized administration get to. We have built up a useful model to exhibit our work. By and large, the model gives an effectively extendable system that can be used to give considerably greater usefulness to the client. In our future work, we will research how the encompassing setting of the client and the earth can be used so as to give ideal administration encounters in the home condition.

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