RASPBERRY PI MYSTIC MIRROR USING ALEXA

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Abstract*:*A Mystic Mirror is a Raspberry Pi device connected to a monitor fronted by a two-way mirror. This gives the illusion that the text/words/images appear from the mirror. People have been making smart/Mystic mirrors for years; lately there have been some that are enabled with Alexa (or other voice activated services). We wanted to make our Mystic Mirror a step further by adding a few features, such as: Building Alexa functionality within the mirror, controlled by a button. This would allow the mirror to work with specific Alexa skills that would display messages. This would also let us use the Alexa for "base functionality" (set an alarm, use another skill, etc).Build functionality into Alexa skill that would support "visual push notifications" to the Mystic Mirror.

Index Terms-Mystic Mirror using Alexa

I. INTRODUCTION

A Mystic Mirror is a Raspberry Pi device connected to a monitor fronted by a two-way mirror. This gives the illusion that the text/words/images appear from the mirror. People have been making magic mirrors for years; lately there have been some that are enabled with Alexa (or other voice activated services). We wanted to make our Mystic Mirror a step further by adding a few features, such as:

1. Building Alexa functionality within the mirror, controlled by a button. This would allow the mirror to work with specific Alexa skills that would display messages. This would also let us use the Alexa for "base functionality" (set an alarm, use another skill, etc).

2. Not having the display always on. My requested information appears for a few seconds (depending on the request) then fades away.

3. Building the functionality "modules" using Lambda, this would allow others to use the skill (even without a having a mystic mirror).

4. Build functionality into the Alexa skill that would support "visual push notifications" the Mystic Mirror. This was really centered on reminders that would appear at the appropriate time.

5. Leverage Alexa to extend functionality of a typical magic mirror. For example, most mystic mirror has the location "hard coded" into code on the Raspberry Pi. We wanted to provide flexibility to get things (like weather) for any requested location.

II. MOTIVATION AND BACKGROUND

Our background is Electronics and Communication Engineering, we have been doing lot of projects using raspberry Pi, and as we know Raspberry Pi is booming among students to do lot of application orientation projects,so we have implemented a virtual AI know as Alexa using Amazon's open source platform,but we wanted to implement much more challenging and fun project using the combination of Raspberry Pi and a Alexa, so we have come up with a project named as Raspberry Pi Mystic mirror using Alexa. We will add many more operations in Alexa mirror so that it can be very user friendly and easy to interact.

As technology advances, we continue to find more and more uses for it that wouldpreviously be inconceivable. Originally, technology was primarily useful forperforming tasks humans struggle with, but today it is used in even the mostmundane tasks in an attempt to simplify our lives. With the technological revolution,we have been able to save time in a number of ways; however, as mediaconsumption has increased, we also lose time. Due to this, saving time in our dailyroutines is always helpful.

One-way technology has been implemented to savetime is by integrating computers into numerous elements in our home, thuscreating "Smart Home" devices. The "Mystic Mirror" project is based upon thisconcept.

The Mystic Mirror will merge technology with a mirror to provide users informationwhile they use their mirror. The primary motivation behind the Mystic mirror is toimprove quality of life. Providing information to users in the most convenient waypossible is a driving motivation behind the majority of technological developmentfor smartphones and tablets. The Mystic mirror will provide convenient informationto users on their mirror every day. Allowing the user to multitask by consumingmedia while preparing for the day will save people time nationwide. The goal ofthe mirror is to provide people with information they may require in the morningwhile getting ready for the day or at night before going to bed. This will save userstime every day and help to ensure they are aware of important details for their day.

A user will be able to check their calendar for any upcoming events, peek at theweather forecast, and not to mention, consult the mirror for traditional personalappearance adjustments.Motivation for this project stems from multiple sources. In the Iron Man films, themain character utilizes holographic displays around the home to perform a numberof activities. A couple years back, Corning released a video about their productcalled Glass which is intended to allow a smart surface anywhere in the home.

While these examples, and a multitude of others, are well beyond the scope of thismirror, their realization also seems to be well into the future. One benefit to theMystic mirror is that, while it does not provide the advanced capabilities of theseexamples, it is readily feasible. Another driving factor in this project is the fact thatsmart home technology has been developed for many parts of the home but smart/Mysticmirrors are lacking. While there are plenty of tinkerers projects posted around theweb, no fully realized implementation has been marketed to users thus far.

III. PROPOSED METHOD

The two-way mirror is the most essential part of this build. To create this component, wecan apply Gila Mirrored Window Film to any piece of glass or acrylic. This works equally well for glass and acrylic, and only takes about 15 minutes. The goal here is to get 4 pieces of wood around the monitor.

Then we start by removing the monitor's bezel by removing screws and jabbing a knife or paint scraper in the seam of the monitor. If there are loose monitor controls, cover the exposed backside of the circuit board with electrical tape, and tape it to the back of the monitor. Usingmost basic wood working skills we size the wood frame, and then use the 90 angle brackets to attach the inner corners. Then screw 4 small screws in the front and back corners to hold the monitor in place.Note, we painted the frame black shortly after this for aesthetic purposes. We have our IKEA frame mirror, and a wooden monitor enclosure, and we need to stick them together.

We can achieve this by cutting a hole within the rigid frame on the back of IKEA frame, and gorilla glued some angle brackets at the back to attach to the outside of the frame. The hole in the frame back was done using multiple passes of an exacto knife. Then we lay the monitor flat over the hole, centered everything, and used the all surface gorilla glue to fasten 4 angle brackets around each edge.

Once the glue has set, simply screw the bracket into the monitor frame and visualize how one can arrange your electronics behind the mirror. We punched some holes in the frame to run wires for the speaker and mic using a drill, and another through for the power cable using a hand saw. And pi case is just wedged in place.
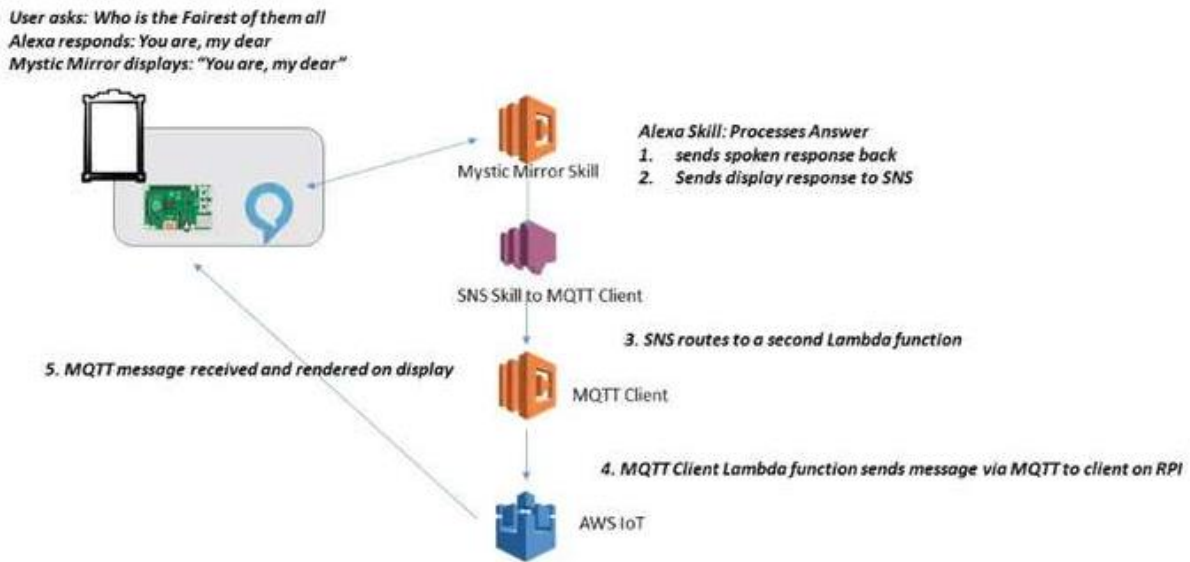
Figure 1: Sample question being asked

So, we have built the hardware!That's awesome, now it's time to get the raspberry pi running the MysticMirror and Alexa software. Of course, the first step is just getting an operating system. We strongly recommend Raspbian Jessie, which already has a great install guide. Once the Pi starts up, run the following in terminal to get the software up to date:

sudo apt-get update

sudo apt-get upgrade

Also follow these steps to enable VNC Viewer, a remote desktop tool that allows to you access your RI desktop from any computer on the same network.
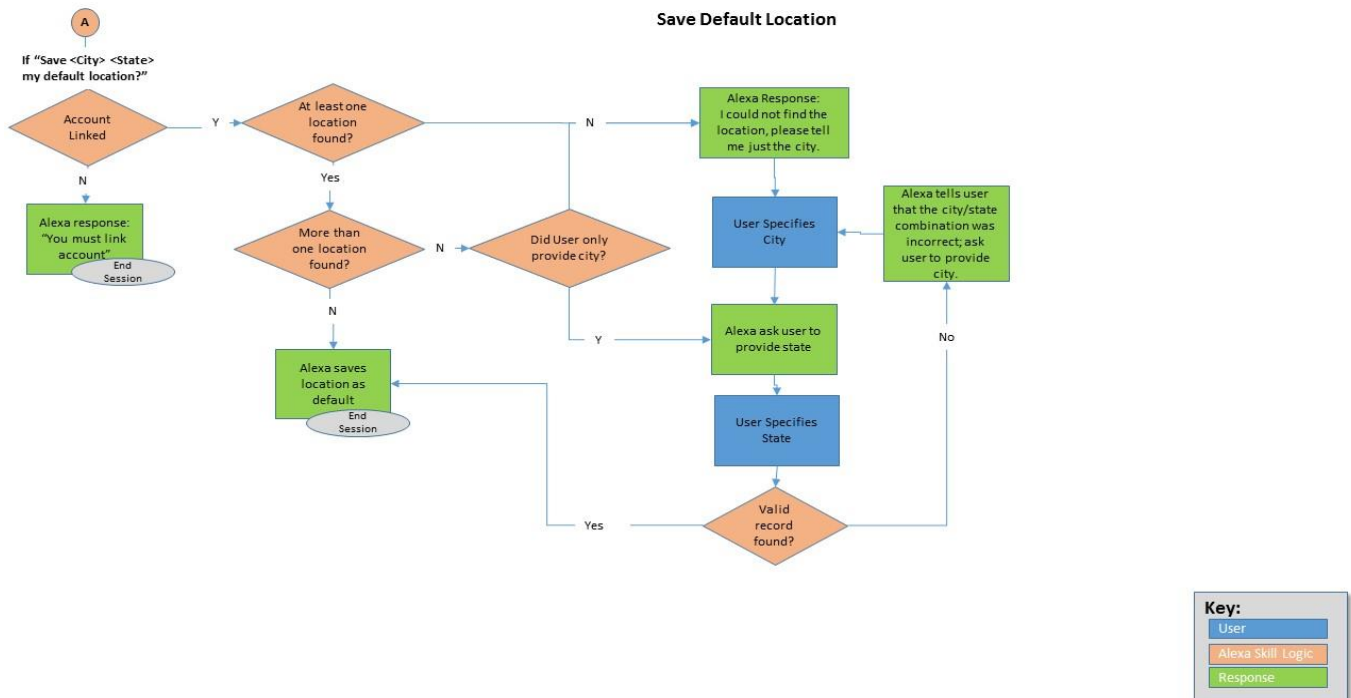
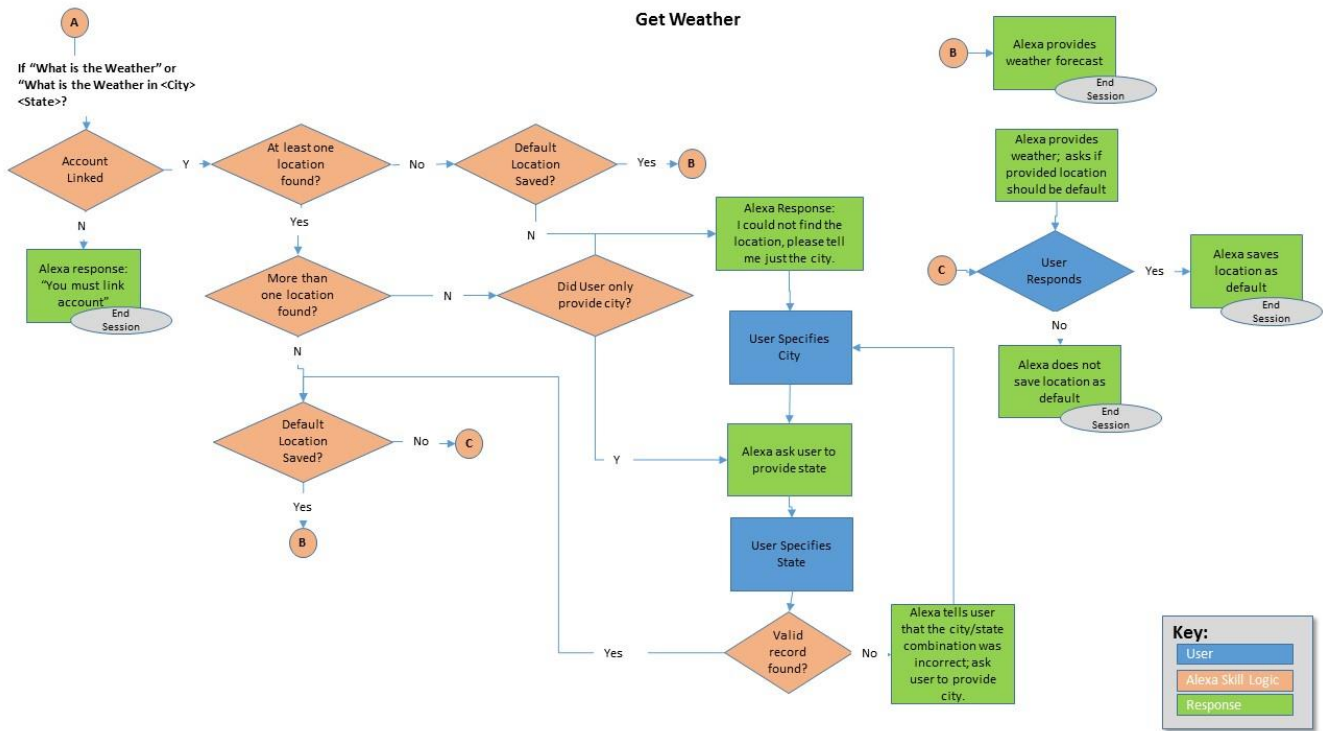

Figure 2: Background process for "Save Default Location"
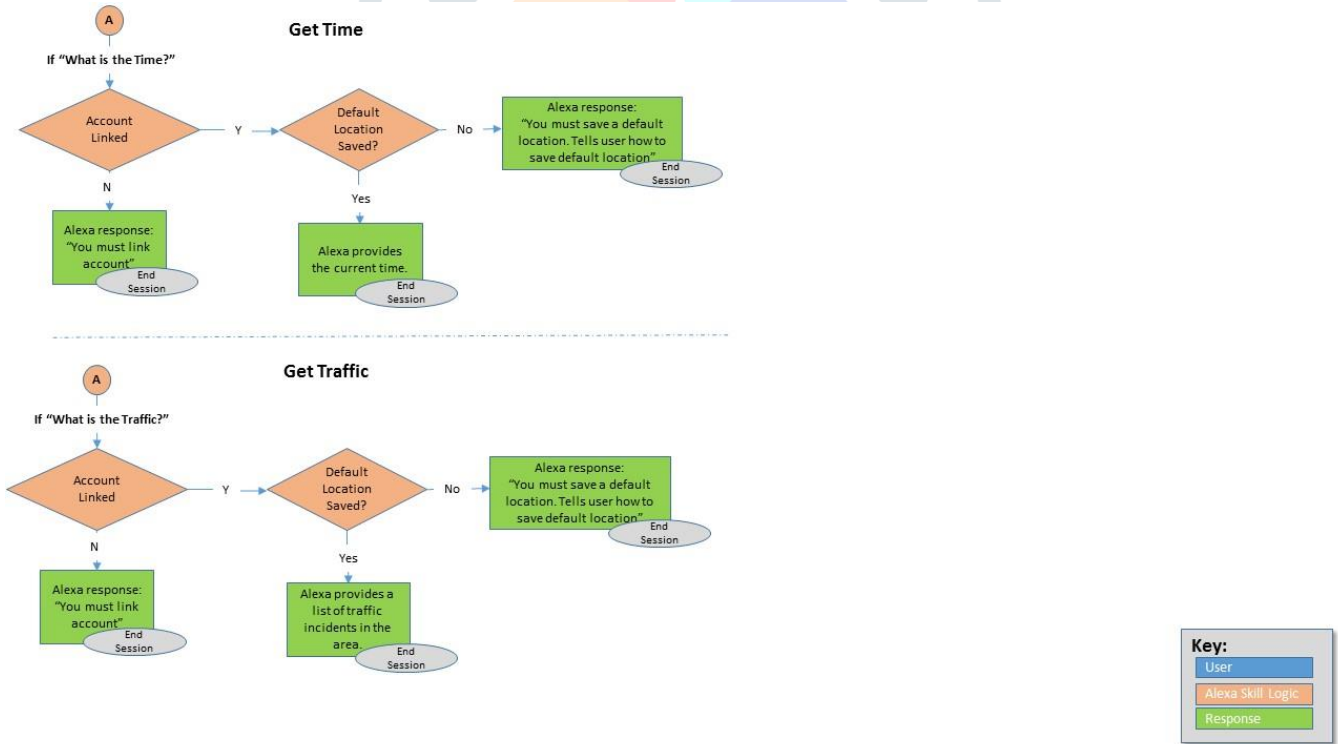
Figure 3: Background process for "Get Weather"
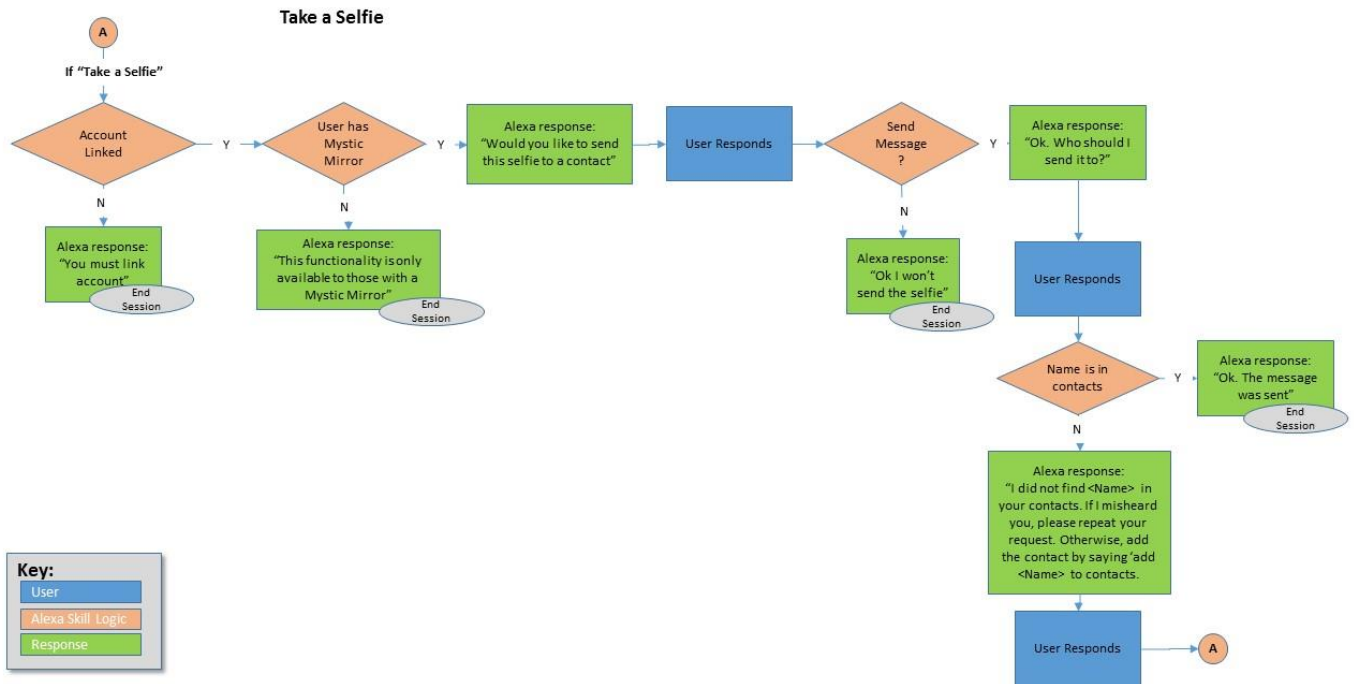
Figure 4: Background process for "Get Time and Get Traffic"
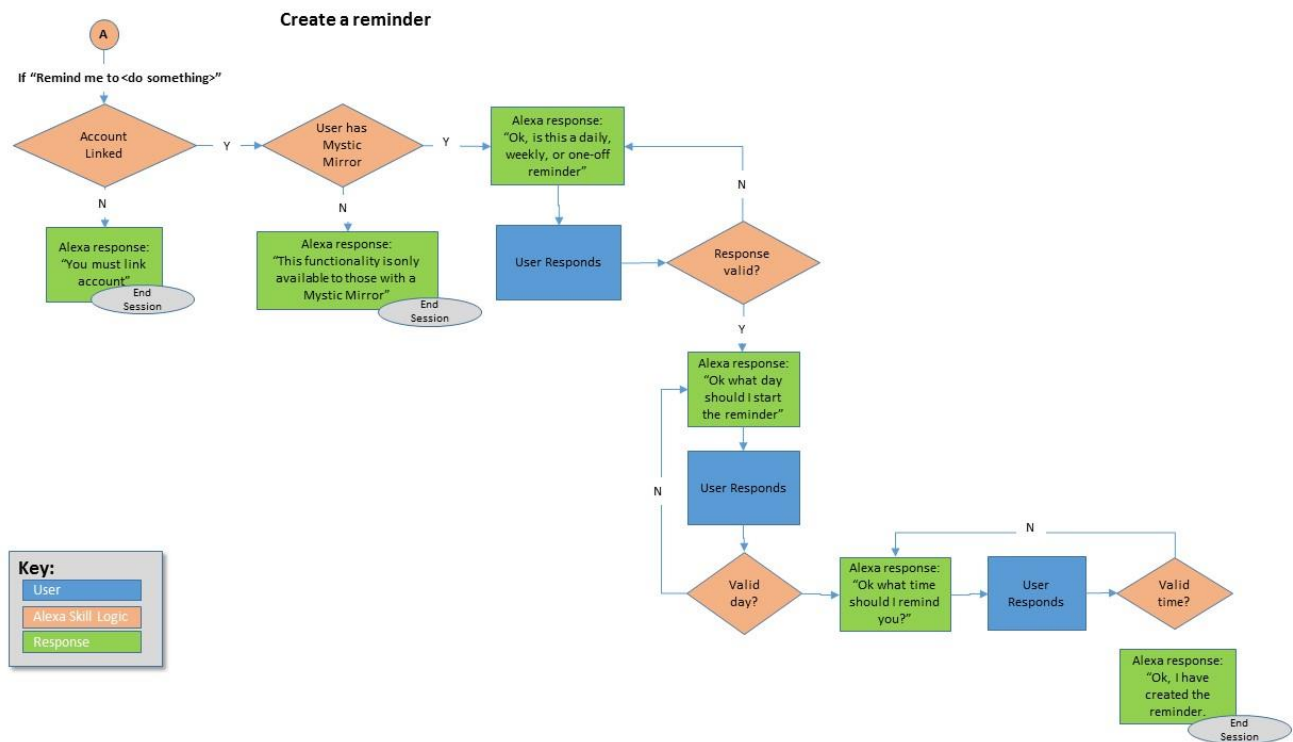
Figure 5: Background process for "Take a Selfie"

Figure 6: Background process for "Create a Reminder"

Installing MysticMirror: -

With the basic setup done, we will now install the core application called Mystic Mirror.

Step1: First we need to update NodeJs and electron by running the following commands:

curl -sL https://deb.nodesource.com/setup_4.x — Node.js v4 LTS "Argon" | sudo bash -

sudo apt-get install nodejs sudo

npm install electron

Step 2: Then we need to download and install magic mirror using:

curl -sL https://raw.githubusercontent.com/MichMich/MagicMirror/master/installers/raspberry.sh | bash

If these ran successfully, we can just navigate to the Mystic Mirror directory, and run npm start. This should show the default mirror dashboard which we need to immediately need to customize. To edit this, navigate to the Mystic Mirror/config/config.js file and add custom location, calendars, modules, etc.There are also some additional configuration details regarding screen orientation, screensaver settings, and Wi-Fi.Alexa and Mystic Mirror will then run simultaneously on the same Raspberry Pi (at about 25 - 50% CPU).

How it works:

There are four major components to the Mystic mirror. The attached highly technical drawing illustrates how these components work together.

1. **The two-way mirror**: - The two-way mirror is made of acrylic and sits flush over the monitor, allowing the graphics on the monitor to shine through while maintaining a mirror effect. I ordered my mirror through Tap Plastics (this one). Order the thicker mirror option (3/16") to prevent a "funhouse mirror" effect.

2. **The monitor**: - I recommend an LED monitor for minimal power consumption, maximum crispness, and to prevent mirror glow at night. I also recommend a monitor with built-in speakers, but this is optional.

3. **The Raspberry Pi**: - The Raspberry Pi is a small, credit card-sized computer that powers the whole thing, displaying the Magic Mirror interface and running Jasper, the voice-control system.

4. **The box/frame**: - The box/frame houses all the components, including the microphone, and looks pretty.

IV. CONCLUSION

This product has great potential mostly in luxury markets due to current high costs. As of today, do-it-yourself electronic hobbyists produce most smart/Mystic mirrors, aside from a few small companies. From a small survey, we concluded that it is extremely interesting to people and that they would be interested in purchasing one for their own home. Smart/Mystic mirrors can be produced quite easily depending on how complex one wants to make it.

The goals of the smart mirror were to aim to reduce time needed in a user's daily routine and provide a merger of user and technology that becomes an enhancement, not a new burden. The functionality must meet these descriptions in the design. The Mystic mirror did the thinking for the user with intelligent, commonly used applications. Apps like their calendar, music, news, Twitter, to-do lists, and weather will be available. The apps were unobtrusively displayed on the screen, hidden by the two-way mirror, as to look like a seamless experience. The user didn't even have to worry about turning on and off the system because the mirror will detect motion and do the work for them. A good project can't be produced without proper research first. Similar projects and products were analyzed for similarities, improvements, and flaws. The group researched each important parts of the mirror system such as the gesture control, voice control, MCUs, and others. Once enough information was collected about specifications and prices, strategic components were selected to be part of the project from both a hardware and software perspective.

Few investigations have been carried out in this area. Byadding technologies in the mirror multiple tasks can beperformed simultaneously. With advancements in Internet ofThings and its applications, the mirror is designed such thatthe residents are able to control their smart home appliancesand they can also access personalized services whileenhancing the user profile.

Face Recognition based authentication can be used to detectmultiple users in home environment. Webpage basedinterface is used provided to access the data.Mirror can be embedded with various electronic featuressuch as GPS navigation, Bluetooth connectivity, wirelesscommunication which enables voice recognition and hands-free calling.

Mystic Mirror can be applied in various fields like Hotels,Retail stores and also in workplace environment. It can beused in offices where it can be accessed by multiple users. It can also be used to monitor the health of elderly people athome by incorporating IoT. This IoT connected mirrorprovides updates and location of an elderly parent to theirrespective patient.

This paper proposes a smart system which allows users toutilize a household object as an interactive interfaceproviding customizable services. The tracking of health is anadded advantage in leading a healthier life. With thefunctionality of controlling the light settings it can be appliedin various fields such as beauty parlors and hotels.

Further to keep the mirror secure face recognition techniquecan also be incorporated as a means of security. It makessure that only authenticated users can access theinformation on the mirror while others cannot. It can also beused as an evidence for theft detection. Life can be madeeasy and enjoyable by embedding more and more featureson to the mirror interface such as getting the traffic updates,emotion recognition and also tracking of our attire daily.

Success is not only the hard work and innovation but also the inspiration and motivation.We feel great pleasure to submitting this research paper on Mystic Mirror & it's voice assistant Alexa. We wishto express our deep gratitude towards our guide whose untiring efforts only, to bring our best out of us.

REFERENCES

[1] http://www.ijsrp.org/research-paper-1217
[2] http://www.itu.int/en/ITUT/gsi/iot/Pages/default.aspx
[3] Arlo Carreon's Magic Mirror project
[4] https://github.com/alexa-pi/AlexaPi/wiki/Installation
[5] https://pimylifeup.com/raspberry-pi-alexa/
[6] https://www.wired.com/story/voice-assistants-ambient-computing/amp
[7] https://www.technologyreview.com/s/608571/alexa-understand-me/