Smart Mirror For Vehicular System Using Raspberry Pi

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Abstract :

Intelligent mirrors, which continue the works today and will take its place in the future technology, provide both mirror and computer aided information services to its users. Thanks to the micro-controller cards on board, these systems, which can connect to the internet and take data from the internet, can show this information on the places located on the mirror. In the scope of the study, the developed intelligent mirror system includes the weather information, time and location information, cur- rent event information, user information, and camera image taken from web services using Raspberry Pi 3 micro-controller card. Some equipment can be controlled by voice commands via the microphone on the smart mirror. Internet of Things (IoT) is a concept where an object having the ability to transfer data over a network without the need for human interaction to computer. IoT is known for its advantage that can help simplify people's everyday routine. It shows the information such as time and date, weather, news updates and navigation in it which continue the works today and will take its place in the future technology, provide both mirror and computer aided information services to its users. In the scope of the study, the developed intelligent mirror system includes the weather information, time and location information, weather condition, news feed, and road map for navigation by using Raspberry Pi 3 micro-controller card.

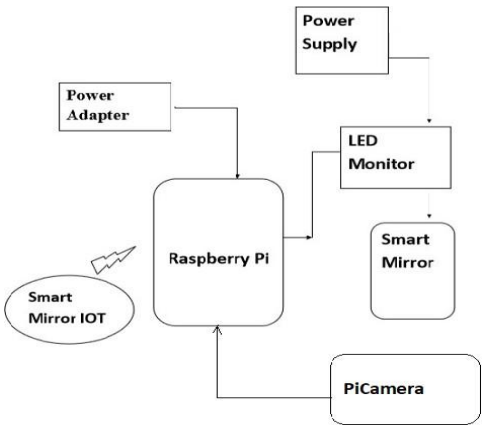
Keywords - *Smart Mirror, Raspberry PI, Weather, Time, News, Date, Google map, Camera.*

I. INTRODUCTION

This concept of IoT has been used here along with two different ecosystems i.e. Android and Adriano. This project is to make a mirror which does the smart things like it shows Weather forecasting, Navigation, Google map, Date and Time, News etc. All these smart features are to be done using raspberry pi. Due to use of smart mirror effectively utilization of time can be achieve. It is a smart and user friendly solution presented in the form of a mirror that also acts as a gateway to interactive services, particularly those of information oriented nature, such as multimedia and news feed among others. Hence, the system allows users access to customizable services, all while they are performing other tasks .As such, it is a convenient time-saver. The proposed smart mirror represents a natural interface that facilitates access to personalized services and control of vehicles to find out the correct path using the Google map and Navigation without using any mobile device. The map and navigation directly shows on mirror in a car or any vehicle. A smart mirror combines the uses of a traditional mirror with a digital aspect to bring up-to-date information to the user directly on the mirror surface. For the most part this information is simple like time, weather, calendar, and news. In the vehicular system the major problem is to find the way to reach at the destination and for that we must have the Google map which shows the correct path to reach at to the destination, but when we use Google map while driving, it causes for accident. That's why we are going to use smart mirror in vehicular system.

1. To design a prototype Smart Mirror using Raspberry PI.
2. To carry out the testing process on Raspberry PI for usability evaluation to users.
3. To design a mirror to show the Road map while driving with guidelines.

II. SYSTEM ARCHITECTURE



III. SOFTWARE TESTING

Software testing is defined as an activity to check whether the actual results match the expected results and to ensure that the software system is Defect free. It involves execution of a software component or system component to evaluate one or more properties of interest. Software testing also helps to identify errors, gaps or missing re- quirements in contrary to the actual requirements. It can be either done manually or using automated tools. Some prefer saying Soft-ware testing as a White Box and Black Box Testing. In simple terms, Software Testing means Verification of Application Under Test (AUT).

IV. TYPES OF TESTING

Testing for IoT devices broadly revolves around Security, Analytics, Device, Networks, Processors, Operating Systems, Platforms and Standards.

Usability Testing:

There are so many devices of different shape and form factors are used by the users. Moreover, the perception also varies from one user to other. That's why checking usability of the system is very important in IoT testing. Usability testing is a way to see how easy to use something is by testing it with real users. Users are asked to complete tasks, typically while they are being observed by a researcher, to see where they encounter problems and experience confusion. If more people encounter similar problems, recommendations will be made to overcome these usability issues. Usability testing is a method used to evaluate how easy a web- site is to use. The tests take place with real users to measure how usable or intuitive a website is and how easy it is for users to reach their goals.

Compatibility Testing:

There are lots of devices which can be connected though IOT system. These devices have varied software and hardware configuration. Therefore, the possible combination are huge. As a result, checking the compatibility in IOT system is important. Compatibility is nothing but the capability of existing or living together. In normal life, Oil is not compatible with water, but mil can be easily combined with water. Compatibility Testing is a type of Soft- ware testing to check whether your software is capable of running on different hardware, operating systems, applications, network en- vironments or Mobile devices. Compatibility Testing is a type of Non-functional testing.

Reliability and Scalability Testing:

Reliability and Scalability is important for building an IOT test environment which in- volves simulation of sensors by utilzing virtualization tools and technologies. Reliability testing is defined as a software testing type, that checks whether the software can perform a failure-free operation for a specified period of time in a specified environment. Reliability means yielding the same, in other terms, the word reliable mean something is dependable and that it will give the same outcome every time. The same is true for Reliability testing. Reliability testing in software assures that the product is fault free and is reliable for its intended purpose.

Data Integrity Testing:

It's important to check the Data integrity in IOT testing as it involves large amount of data and its application. Data integrity corresponds to the quality of data in the databases and to the level by which users examine data quality, integrity and reliability. Data integrity testing verifies that the data in the database is accurate and functions as expected within a given application.

Security testing:

In the IOT environment, there are many users are accessing a massive amount of data. Thus, it is important to validate user via authentication, have data privacy controls as part of security testing. IoT Security challenges: IoT is data centric where all the de- vices/system connected operate based on the data that is available. When it comes to the data flow between devices, there is always a chance that the data can be accessed or read when getting transferred. From a testing standpoint, we need to check if the data is protected/encrypted when getting transferred from one device to the other. Wherever, there is an UI, we need to make sure there is a password protection on it.

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Performance Testing:

Performance testing is important to create strategic approach for developing and implementing an IOT testing plan. When we are talking about a system for a healthcare domain, we need to make sure the system is scalable enough for the whole hospital. When the testing is carried out, it is done for 2-10 patients at a time and the data is propagated to 10-20 devices. When the whole hospital is connected and 180-200 patients are connected to the system, the data that is propagated is much bigger than the tested data. As testers, we need to make sure the system performs the same even though the added data is propagated. We should also test the monitoring utility to display the system usage, power usage, temperature etc.

IV.TEST CASES AND TEST RESULTS

Defining test cases for IoT devices can be considered as a uphill task. Other than testing the real life scenarios there are a few common test scenarios you need to consider while testing IoT devices and the network.

Security

If you don't run adequate security validations, there is no point in testing the functions of the device. Here are a few reasons why:
The hub and devices should be properly authenticated (registering to the network) before communication starts. For example, in the case of Bluetooth connection, only paired devices should be able to communicate. Any unauthorized connection should be discarded.
Data connection should be easily established after successful registration. The sent data should be in encrypted form.
If a maximum number of connections have been attempted, the device should not try to connect again for a pre-defined time period.

Performance

Testing the performance of IoT devices will be another crucial aspect. Every authenticated device in range should be able to connect to hub.
The device should be able to send any amount of data to the hub (as per the requirements).
If data sent by the device exceeds a predefined amount, transfer of data should be initiated only after a pre-set delay or after confirmation has been received from the hub.
The device should be able to send data, even during a low power status. A power
status update should be sent to the network if the device goes low in power.
Connectivity
The success of an IoT system depends on how well the devices and hub are connected. Even a loss of connection for a fraction of a second can lead to inaccurate data, which will in turn make the system unusable. So testing the connectivity is as important as testing security and performance.
The device should be connected to the hub even if the hub is in sleeping/power saving mode.
The device should send regular ping messages to make sure the connection is not lost.

Usability

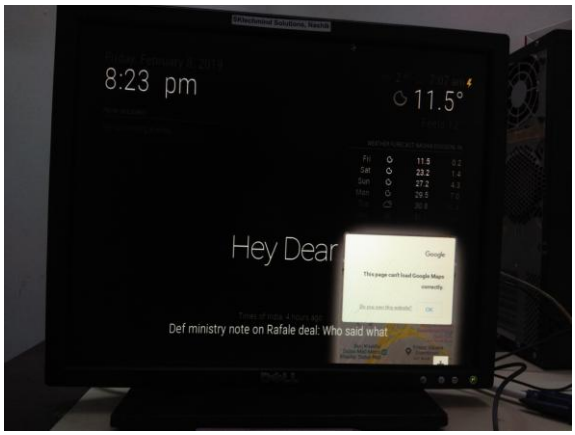
The usability of IoT devices is also an important aspect to consider while testing. For example, if I am using a smartwatch to make NFC (near field communication) payments with my bank, usability concerns might arise that need to be tested and verified. As well as being usability concerns, they could also be security concerns for users as the bank transfer deals with their confidential information. Here are a few usability test cases for the above mentioned situation:
Verify if payment can be made only on authenticated NFC enabled POS machines. If the wearable is lost, the user should have the provision to block the device (maybe from a mobile device or through an IVR) as soon as possible.
There should be a pre-set limit for payment so that the chances of unauthorized payment can be minimized in case of lost/stolen cases.
Multiple payments should not happen if the user waves the wear- able over the POS machine multiple times.

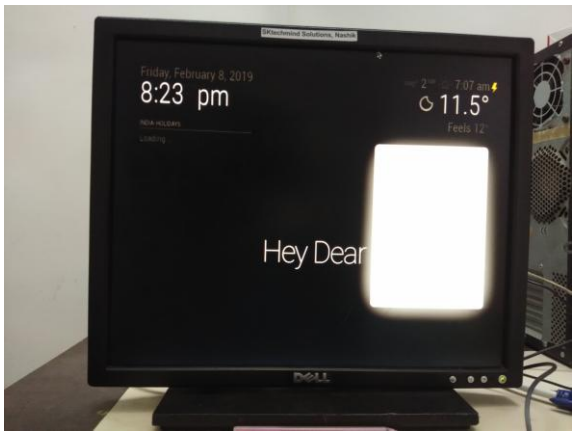
V.RESULTS

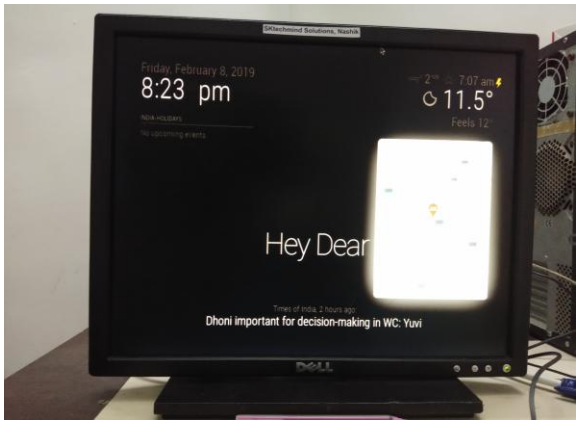
A. OUTCOMES

1.Easy to Access any information from mirror.
2.Very easy to locate Google maps.
3.Fast and Reliable system.
4.Driver can able to concentrate on Driving.

B. SCREEN-SHOTS







VI. CONCLUSION

As a conclusion, the application is the new technology for smart life. From the result testing, most of the function of the application are functioning well and there still need some improvement to the development of the newest functionality on smart mirror. We have designed an intelligent mirror keeping in mind the up-coming future advancement in the field of vehicular system as well as commercial purpose. The prototype of the magic mirror is powered and controlled by the Raspberry Pi 3 and all the final output in form of real time data feeds are displayed on LED screen fixed with a two way mirror. We have built a working model to demonstrate various functionality of the mirror using voice raspberry pi. It gives a layout that can be extended in future to accommodate even more functionality. Raspberry Pi is an innovative technology. The sheer number of users and fan base support the fact that the device can see an abundant future ahead. The device can certainly help anyone who really needs to learn electronics and computers. Raising the processing power can certainly assist the product in the future.

VII. REFERENCE

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