Virtual Switch

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YouTube Video Link :

https://youtu.be/7NM2M4jolTQ

Github Repository Link :

https://github.com/devanshhu/TCSXR2019

1. Usecase / Abstract:

" Virtual Switch " is a system which is developed keeping in mind the challenges faced in day to day life in big houses, villas, public and private infrastructures.

Some of the challenges are:-

 Confusion in finding right switch to ON an appliance from large number of switches.

 Unable to find the switch control board.

 Wastage of electricity in various events as people don't know how to switch OFF lights.

 Difficulty in reaching the control board to turn ON/OFF appliances

 Problems faced by disabled person to use appliances.

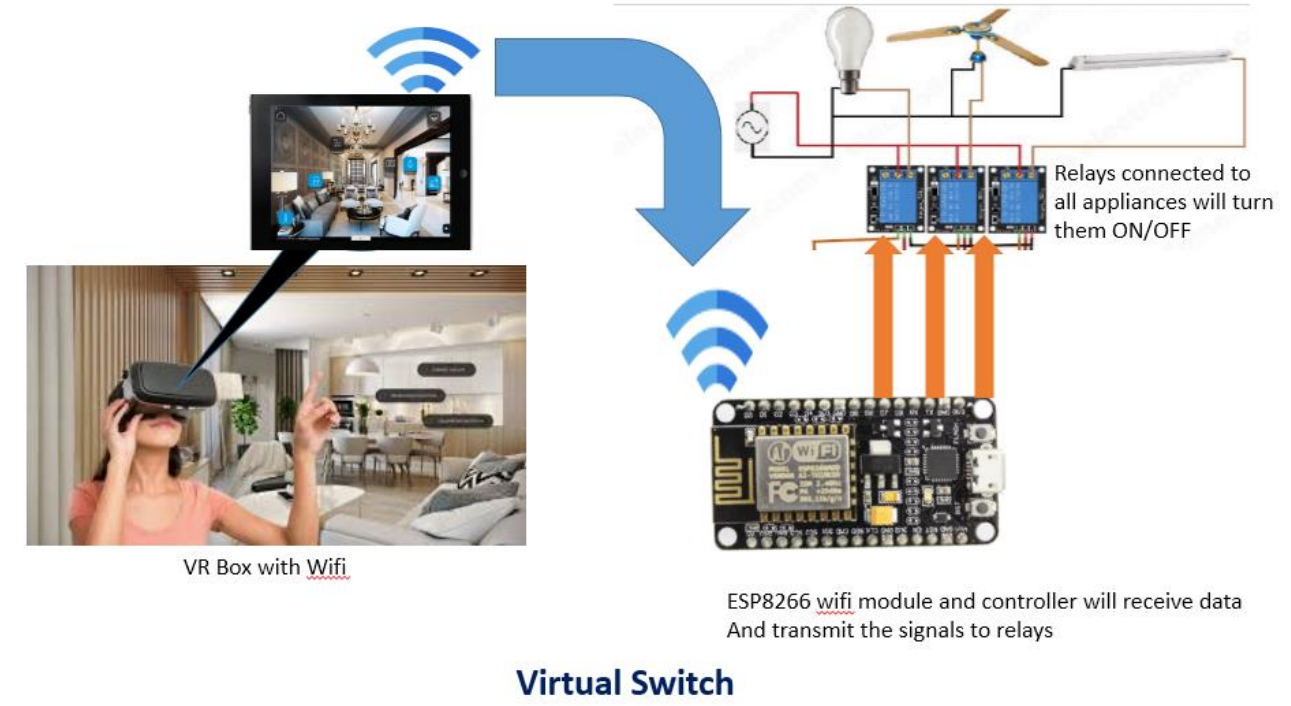
Virtual Switch is developed to solve all the above challenges and provides following advantages:-

- With virtual switch, the user can experience virtual home automation experience.
- Now it is easy to turn ON/OFF appliances just by looking at them.
- More **Power Saving** as Virtual Switch provides notification when appliances are ON and no one is using them.
- NO NEED OF INTERNET OR CLOUD, making it cost effective and more reliable.
- There will be no hackle of having switch boards.
- Provides comfort to the user, no need of wasting time and energy in turning ON/OFF appliances.
- It is provides more convenience to organizers during event management.
- A perfect gadget for people with disabilities, children and diseased person.
- New interactive mean of saving energy.

2. Introduction (Currently technology ; Innovation in your project)

The Virtual Switch is an AR app that can recognize electronic object and provides switch to turn ON/OFF devices in virtual environment. When the user click on virtual switch, the app sends the the message to turn ON/OFF device through Wi-Fi. The microcontroller in turn switch ON/OFF appliances using relays connected to each appliance.

The microcontroller used here is ESP8266. It is microcontroller with build in WiFi. The ESP8266 will act as local server as well as controller for switching devices when it receives message from smartphone on which VR app is installed. Thus, appliances can be controlled using local network without using internet.



Working of Virtual Switch

2. Technology Stack (Hardware / Software involved; Algorithms involved ; Domain involved(Computer Graphics/Computer Vision/Networks / etc)

ESP8266 12E:

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. This module has onboard 80Mhz low power 32 bit processor which can be used for custom firmwares. This also means that you can host small webpages without any external controller.

INTERNET OF THINGS:

The Internet of things (IoT) refers to the concept of extending Internet connectivity beyond conventional computing platforms such as personal computers and mobile devices, and into any range of traditionally "dumb" or non-internet-enabled physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware (such as sensors), these devices can communicate and interact with others over the Internet, and they can be remotely monitored and controlled.

Vuforia SDK:

Vuforia is an augmented reality software development kit (SDK) for mobile devices that enables the creation of augmented reality applications. It uses computer vision technology to recognize and track planar images (Image Targets) and simple 3D objects, such as boxes, in real time. This image registration capability enables developers to position and orient virtual objects, such as 3D models and other media, in relation to real world images when they are viewed through the camera of a mobile device. The virtual object then tracks the position and orientation of the image in real-time so that the viewer's perspective on the object corresponds with the perspective on the Image Target. It thus appears that the virtual object is a part of the real-world scene.

AR Computer Vision:

Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside in the real-world are "augmented" by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory, and olfactory. The overlaid sensory information can be constructive (i.e. additive to the natural environment) or destructive (i.e. masking of the natural environment) and is seamlessly interwoven with the physical world such that it is perceived as an immersive aspect of the real environment. In this way, augmented reality alters one's ongoing perception of a real-world environment, whereas virtual reality completely replaces the user's real-world environment with a simulated one. Augmented reality is related to two largely synonymous terms: mixed reality and computer-mediated reality.

Computer Graphics:

Computer graphics are pictures and films created using computers. Usually, the term refers to computer-generated image data created with the help of specialized graphical hardware and software. It is a vast and recently developed area of computer science. The phrase was coined in 1960, by computer graphics researchers Verne Hudson and William Fetter of Boeing. It is often abbreviated as CG, though sometimes erroneously referred to as computer-generated imagery (CGI).

Some topics in computer graphics include user interface design, sprite graphics, vector graphics, 3D modeling, shaders, GPU design, implicit surface visualization with ray tracing, and computer vision, among others. The overall methodology depends heavily on the underlying sciences of geometry, optics, and physics.

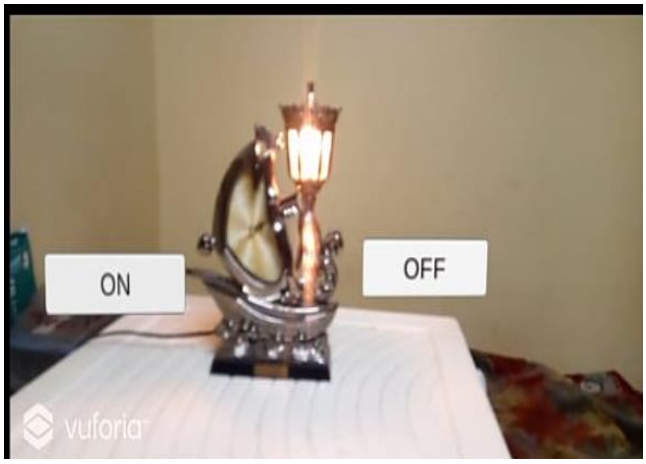
Computer graphics is responsible for displaying art and image data effectively and meaningfully to the consumer. It is also used for processing image data received from the physical world. Computer

graphics development has had a significant impact on many types of media and has revolutionized animation, movies, advertising, video games, and graphic design in general.

Unity 3D:

Unity is a cross-platform real-time engine developed by Unity Technologies,first announced and released in June 2005 at Apple Inc.'s Worldwide Developers Conference as an OS X-exclusive game engine. As of 2018, the engine has been extended to support 27 platforms.The engine can be used to create both three-dimensional and two-dimensional games as well as simulations for its many platforms. Several major versions of Unity have been released since its launch, with the latest stable version being Unity 2018.3.8.

3. Working Methodology – Detailed Description - Screenshots :



5. Conclusion :

The app can easily be used in various Environments. It requires minimal setup and It’s upon the user whether they want it on the cloud or on the local server. The Augmented reality is the future of various fields of Computer Science and Home Automation being one of them.