Legal Analysis

Year: 2019 Semester: Fall Team: 1 Project: IntelliFace

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Assignment Evaluation:

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| --- | --- | --- | --- | --- |
| **Item** | **Score (0-5)** | **Weight** | **Points** | **Notes** |
| **Assignment-Specific Items** | | | | |
| **Regulatory Analysis** | 5 | x3 | 15 |  |
| **Analysis of Patent 1** | 5 | x3 | 15 |  |
| **Analysis of Patent 2** | 5 | x3 | 15 |  |
| **Analysis of Patent 3** | 5 | x3 | 15 |  |
| **Writing-Specific Items** | | | | |
| **Spelling and Grammar** | 5 | x2 | 10 |  |
| **Formatting and Citations** | 5 | x1 | 5 |  |
| **Figures and Graphs** | 5 | x2 | 10 |  |
| **Technical Writing Style** | 5 | x3 | 15 |  |
| **Total Score** | 100 | | |  |

5: Excellent 4: Good 3: Acceptable 2: Poor 1: Very Poor 0: Not attempted

Comments:

1.0 Regulatory Analysis

The Intelligent Interface a product designed for usage in the user’s residence. The product is comprised of multiple electronic interfaces including a standard 24” monitor, an NVIDIA Jetson Nano, and two PCBs, one containing peripheral attachments for mirror interactivity and the other housing an STM32F051R856 Chip, along with other ancillary peripherals. For saleability in international markets, the product is to be compliant with regulations as per local guidelines due to the intensive electrical nature of the product.

For North American retail, the product requires FCC Compliance for Class B Digital Devices for Residential Usage, as defined by the FCC [1]. The Acer SB220Q Monitor Component of the product has already been FCC Certified as a Class B Digital Device. The peripherals in use by the product including the IR (TCRT5000), temperature (TMP36), and light sensors (PDV-P8104) are all FCC Compliant. The NVIDIA Jetson Nano is also FCC Certified as a Class B Digital Device under the Personal/Portable Computers subclassification.

The custom PCB devices are pending FCC certification, and are currently the only components of the product that do not already have this. They are classified as the Peripheral Board and the Primary Board.

The Peripheral Board houses the three sensors that are already FCC compliant listed prior. None of these house any “intentional radiators”, and are in the specified 9 kHz - 3000 GHz range as defined under *Equipment Authorization - RF Devices* [2]. The Primary Board contains an STM32F051R8T6 Microcontroller Unit that, similar to the Peripheral Board does not house any similar radiators and falls within the specified frequency range under the same classification.

The two boards are hence to be considered under the Class B Digital Devices category, and will require testing and certification for full FCC Compliance under the specified category, in the process of which the product will be scrutinized through a series of tests conducted by the FCC, including one that evaluates the amount of radio waves emitted by the device, a successful result upon which the product is certified FCC Compliant and declared saleable in the United States.

2.0 Legal Liability Analysis

2.1 Analysis of Patent 1: US Patent Application US 62367669 [3]

Patent Title: Smart mirror

Patent Holder: Joshua Broxson

Patent Filing Date: July 11, 2017

Abstract:

An image storing and display system that is combined with a conventional mirror to create a "smart mirror." A one-way reflective surface is provided over the top of an interactive display. A person in front of the reflective surface can see a normal reflection as would be provided by a conventional mirror. The person can also see images created by the interactive video display that are transmitted through the one-way reflective surface. A camera provided as part of the smart mirror can be used to record digital images that are stored for later recall. The recalled images can then be displayed on the interactive display. A computer is used to drive the interactive display. The display preferably includes touch-based interaction.

Potential Infringements:

* The patent describes an interactive smart mirror that is comprised of a chassis and an attached one-way mirror. The system is also described to have an outward facing side and an inward facing side.
* The patent describes the presence of a computer with associated memory connected to an interactive display. The display is placed on the inward facing side of the one-way mirror and configured to portray an image through the one-way mirror to the outward facing side.

Patent Liability Analysis:

The smart mirror described in the patent and IntelliFace have several features in common, such as the use of a one-way mirror and an interactive display connected to a computer. However, the key difference between the two lies in the manner in which the user interacts with display and system overall. The patent describes a one-way mirror with a touch-based interface. The one-way mirror in the patent is connected to a computer so that a touch detected by the touch-based interface can be communicated to the computer. IntelliFace does not require users to interact with the display using a touch-based interface, because such a design would render unwanted fingerprints and marks on the surface of the one-way mirror. IntelliFace instead requires gesture based interaction between the user and the system.

The smart mirror described in the patent is also described to have a magnetic strip and a camera mounted on a camera shuttle with a magnet. The camera is configured to be held on the outward facing surface of the one-way mirror by the magnetic attraction between the magnet and magnetic strip. Hence, the position of the camera on the outward facing surface of the one-way mirror can be adjusted and the images from this camera can be stored within the memory associated with the computer. IntelliFace also uses a camera that stores images in computer memory; however, the camera is fixed in place. Hence, the physical design of the two systems is quite disparate.

2.2 Analysis of Patent 2: South Korea Patent Application KR20140092832A [4]

**Patent Title:** Smart Mirror Device

**Patent Holder:** 오치영

**Patent Filing Date:** July 22, 2014

**Abstract:**

Disclosed is a smart mirror device. The smart mirror device according to one aspect of the present invention includes: a mirror body; a camera module provided at one side of the mirror body to photograph a user facing a mirror; a storage processing module to store images photographed by the camera module in an embedded storage medium or to store the images in a storage medium provided in another device; a control module to identify a user by analyzing a present image photographed by the camera module and to extract a previous image according to information of the identified user from the storage medium; and a display provided in the mirror body to output a screen image according to the present image and the previous image under the control of the control module.

**Potential Infringements:**

* This smart mirror uses preset facial expression (stored in a storage module) to recognize the user standing in front of the mirror by the camera mounted on the mirror in real-time.

**Patent Liability Analysis:**

The IntelliFace product is very similar to this smart mirror device. It almost has the same mirror body and the camera placement. This also as may extra features that the IntelliFace does not support yet. It can detect faces based on mood, clothes, facial expression, and by comparing to previously stored images. The IntelliFace module uses a pre-trained neural network written in Python using the Keras Library to detect real-time faces which is based on deep learning models. The interface also has features that this mirror does not have, like the display of the date, time, greeting, quote, stocks, weather, and email on the HUD. This mirror also does not have a specific ON or OFF activation for the mirror interface, and the IntelliFace module has an IR sensor mounted on the sensor board to detect user presence and gestures.

2.3 Analysis of Patent 3: US Patent Application US 20170330380 A1 [5]

**Patent Title:** Smart mirror system for hairstyling using virtual reality

**Patent Holder:** Deog Geun Ahn

**Patent Filing Date:** December 19, 2016

**Abstract:**

Disclosed is a smart mirror system for hairstyling using virtual reality, the smart mirror system including: a mirror display provided with a camera and an angle adjusting means, the mirror display being provided on a wall of a hair salon; a chair rotatably provided in front of the mirror display; and a smart device for being mirrored with the mirror display, such that a user uses the mirror display by manipulating the smart device, wherein the smart device is configured to allow hairstyles that match sex and an age group provided by using an app or a server or hairstyles of celebrities provided by Internet search to be displayed on the mirror display by mirroring; and when one of the hairstyles is selected, a selected hairstyle is applied to an image of the user displayed on the mirror display, thereby being three-dimensionally displayed in response to a user's movement.

**Potential Infringements:**

* The patent describes a mirror display manipulated through an automatic setting function for automatically showing a database including a matching hairstyle. This is done by automatically determining a user’s sex, age group, and face shape through image sensing by the camera.

**Patent Liability Analysis:**

The smart mirror system for hairstyling using virtual reality has a variety of features that are similar in nature to the IntelliFace project. Both systems rely on processing camera data in order to recognize the person who is viewing his/her reflection in the mirror by analyzing details of his/her face. However, the patent describes a function that has options for allowing the user to select a type of coloring or coating based on a selected hairstyle. The mirror display that is manipulated through the smart device includes a recording function and a comparison function for comparing the shapes before and after hairdressing. These functions are completely different compared to those of the IntelliFace project. The use cases are also quite different. The product described in the patent is meant to be used in hair salons. On the other hand, the IntelliFace display is primarily meant to be stationed in the user’s home/bedroom. Its primary purpose is more involved with presenting relevant data and less involved with VR.

3.0 Sources Cited:

[1] US Legal, Inc, “FCC Regulations,” *Telecommunications*. [Online]. Available: https://telecommunications.uslegal.com/fcc-regulations/..

[2] “Equipment Authorization – RF Device,” *Federal Communications Commission*, 20-Mar-2018. [Online]. Available: https://www.fcc.gov/oet/ea/rfdevice.

[3] Broxson, J, *“*Smart Mirror*”, US 62367669. United States Patent and Trademark Office*, Jul 28, 2016.

[4] 오치영 , “Smart Mirror Device” *KR20140092832A. International Journal of Recent Trends in Engineering and Research*, vol. 4, no. 3, pp. 353–358, 2018.

[5] Ahn; Deog Geun, *“*Smart Mirror*”, US 20170330380 A1. United States Patent and Trademark Office*, December 19, 2016.