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Project Proposal

Smart Mirror

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# Background

Mirrors, invented many years ago, here to serve mainly one purpose, to reflect everything that is across from one. Fridges, invented years ago, here to serve only one purpose, to keep food fresh by cooling it down. Door locks, also invented years ago, made to serve mainly one purpose, to keep an object locked. All the above listed objects, and may more, have been used for mainly to their own simple purpose. Yet technology has been growing and expanding day by day, taking these simple used objects and turning it into a multipurpose utility.

Fridges for example, have certain bits of technology, that display useful information in form of a small interface on their doors. That Information displayed varies from fridge to fridge. Most of them however display temperature controls and temperature information on their displays. Samsung, one of the market leaders in electronics, have taken fridges, a simple purpose utility machine, and turned it into something that can be fun and interactive and house more features than its original simple purpose by introducing common technologies into their machines. Some of their machines even take this concept further and introduce technologies into these types of objects that would be even unimaginable 60 years ago, e.g. their so called “Smart Fridge”. A simple fridge with a built in micro computing system and a touchscreen interface where the user can interact with their fridge operating system run by android.

It always depends on how the technology is used. Some objects do not have technology introduced like a Samsung “Smart Fridge” has. Simple locks, have also had their introduction to modern technology however they are very different. “Smart Locks” work by having an electronic ID card close to the lock, if that ID card has a permission to open the lock, the lock will automatically open, if not it will stay shut.

If locks, fridges, watches and many more had their introduction to electronics and technology why can’t mirrors. Almost certainly every human, that has experienced the 21st century, has had their interaction with mirrors at least once in their life. For some people Mirrors are even an object, they interact with on a day to day basis. Therefore, this project will focus on turning a simple mirror into something that would be useful in more than just one way using technology.

## Feature and problem description

Technology can be introduced to simple objects in multiple ways and forms. Companies and technologic enthusiasts have their own descriptions of what an object needs to be of something used modernly. Often Major Companies, giants in the technology industry, such as Samsung, JTV and Kenwood use the term “SMART” when they expanded something with a simple purpose to something with multi purposes. However, the definition of “SMART” can be different from person to person or project to project. This Project will follow its own definition of “SMART”. The Mirror itself will have multiple features with one key feature, which will be its main feature.

People look into mirrors to view their appearance and judge their attractiveness. This mirror will have an Artificial Intelligence features that measures a user’s attractiveness in real time, so that they can improve on it. Each person in the world, has their own opinion and definition about attractiveness. At times people see something attractive, that other people do not think is attractive, which can lead to Controversy. This project will aim to unify these opinions and give a direct definition and measurement of how attractive somebody is. With that information measured and defined, the project could take this measurement data and push it a bit further. With that data, e.g. programs can pass that to users and they can rate weather the information is accurate or not. Another example, match people who have an equal amount of attractiveness rating measured and let them get in contact with each other. There is a wide range of expansion for this project.

Other Features?

If time permits this project will also aim to provide additional features to the user. Users will be able to view instant quick information upon walking up to the Mirror, that will assist them for their day.

Quick Information and additional features will target to include:

* Time and Date
* News Snippets and Headlines (Global and local)
* Weather Forecast for the day
* Snapshot Mode (Including viewing of previous taken pictures)
* Gesture Control
* Voice Assistant Control (Featuring Google Now or Amazon Alexa)
* Clothing Suggestion
* Calendar expansion, displays future events on the mirror (e.g Dentist Appointment)
* Horoscopes
* Food Suggestion based on regional favorites

### Hardware

Logically, this project will require some hardware to fulfill all the software features specified. This Project, will utilize a raspberry PI 3, for its computing power to run the software. There are other options, such as an Arduino, which also is a small miniature computing unit, however the raspberry PI 3 stands out over any other miniature computing system, mainly because of its size, its ability to run operating systems and its computing hardware:

* SoC: Broadcom BCM2837 (roughly 50% faster than the Pi 2)
* CPU: 1.2 GHZ quad-core ARM Cortex A53 (ARMv8 Instruction Set)
* GPU: Broadcom VideoCore IV @ 400 MHz
* Memory: 1 GB LPDDR2-900 SDRAM
* USB ports: 4
* Network: 10/100 MBPS Ethernet, 802.11n Wireless LAN, Bluetooth 4.0
* Expandable Storage (16GB micro SD EX card)

Gesture Tracking and Facial Recognition are technologies, that require quite some heavy-duty computing power. This project will utilize a Server to do the heavy-duty computing power and the raspberry PI 3 will provide the users computing power for the computing interface that interacts with the server and the user, therefore it is an excellent choice for this project.

For the Visual Representation, this project will utilize a LVDS controller board connected to an FITJITSU 24-inch Laptop screen, which then will connect to the raspberry pi via HDMI. The screen will then hide behind a glass panel including the raspberry pi 3. The drawbacks for this combination will be, that this will require a bit of time and income to setup together, however it will prove to be more functional, portable solution than a fully-fledged Desktop Monitor. Portability is a very important factor of the entire project. A mirror is very portable and can be put anywhere, therefore the technology behind Magic Mirror must also follow.

For Video graphic features, such as the snapshot mode, and for the “attractiveness rating” module, this project will require a camera. For that, this project will utilize the “Raspberry Pi v2.1 8 MP 1080p Camera Module”. This module provides an 8mp 1080p sharp image, while taking barely any space. The Module itself is about 25mm x 23mm x 9mm and weights just over 3 grams, which helps a lot with the portability of the Smart Mirror. Alternatively, a Desktop webcam will also suffice, but due to the weight and size, the camera module is a more suitable and preferred option.

Most of the technological hardware has been covered so far, yet there remains a key component to make everything work, the Mirror itself. There are multiple ways of adding the mirror reflection to this project. One way of doing so is to simply add a mirror in front of the laptop screen and let the screen illuminate everything through the mirror, this way the user will only see the reflection with the added overlay. Another way of achieving that is to have a glass overlay on top of the display and then add a Silver Reflective Window Film on that glass panel. This way it will turn the actual glass panel into a self-made mirror. By using this method, the weight and thickness of the mirror is greatly reduced, offering better portability and it allows the display to illuminate through easier.

## Software

In the development time given and limited founding of this project, it seems reasonable to include work from the MagicMirror² API. The API will help display and map most of the features and make it configurable. The Magic Mirror API is written in JavaScript, the attractiveness rating module and some of the other features will also be written in JavaScript therefore, the entire project’s Software will be written in JavaScript.

For the Facial Recognition and the attractiveness rating, this Project will also aim to work with FacePI and PIUI. PIUI is a library that works via SSH and allows any type of device to send direct commands to the raspberry PI. This will allow for the User to interact with the mirror via their other devices, e.g. Such as a smartphone or any other device with an internet connection and JavaScript support.

The Project will have its own repository, on GitHub, open and accessible.

## Project milestones

In this section of the document, milestones will be listed to be achieved in that order:

|  |  |
| --- | --- |
| Title | Time in Weeks |
| Project Brainstorming and Research | **1-4** |
| Project Proposal | **4-6** |
| Hardware Prototype | **6-8** |
| Software Core Development | **8-9** |
| Software Additional Features Prototype | **9-10** |
| Literature Review | **10-12** |
| “Beauty/Attractiveness Rating” Prototype | **12-19** |
| Installation and Implementation | **19-20** |
| Final Draft and Changes | **20-21** |
| Final Product Testing | **21-22** |
| Final Project Report | **22-24** |

This order and the milestones may be subject due to change during development. Development in individual milestones might end earlier than scheduled. Stages might start earlier than planned.

## References

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