

ECE4011/ECE 4012 Project Summary

Project Title	
Team Members (names and majors)	Jessey Sperrey (EE)
	Brennon Farmer (CmpE)
	Daniel Yue (CmpE)
	Khoa Phan(CmpE)
Advisor / Section	X. Ma / B05-B06
Semester	Fall, 2019 Circle: Either Intermediate (ECE4011) or Final (ECE4012)
Project Abstract (250-300 words)	<p>The Smart Mirror is designed with entertainment at the forefront. Using dielectric glass technology, the mirror can stand as a standard bathroom mirror, but also can act as a display screen for the user to view while he or she is in the bathroom. Music will be playable either through wifi or audio jack on the mirror and speakers will be placed on the corners of the mirror to output sound. The display will allow the user to view their calendar, memos, current song and other user defined options. Voice recognition will also be an option to further the convenience if a phone is not in reach. The voice input option would allow for skipping songs or changing the display. The display will be placed in one of the corners of the mirror so as to allow for standard mirror use while still viewing the display. Programmable LEDs will be placed on the border of the mirror display for customization. A Raspberry Pi will be the embedded controller that allows for the connection of wifi, screen signal, LED signal, and speaker signal. All of the components will be placed in a shadow box that will safely house the dielectric glass mirror pane, LCD display screen, and power supply. As for power to all of the components, the goal would be to have a single power source outputting to all necessary components. While the design of the mirror is mainly for entertainment, it also provides the user with convenience that they would not otherwise have with a standard bathroom mirror, an everyday usage household item. Utilizing a Raspberry Pi for the design provides multiple avenues for flexibility and upgrades. As the design progresses, the shadow box will provide the necessary room and housing for any future improvements.</p>

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List codes and standards that significantly affect your project. Briefly describe how they influenced your design.	<p>The standards that influenced the design of the Smart Mirror were HDMI, Cascade Style Sheets, http, html, javascript, and Bluetooth. The interface that will be used to display the contents of the Raspberry Pi will be HDMI. HDMI is a standard for connecting devices with high definition. The team would like the Smart Mirror to display the contents of its applications (such as the calendar and memos) in the sharpest manner. The standard of HDMI was the solution to that request. Cascade Style Sheets (CSS), javascript, and HTML are markup language standards for applications. The standards will be incorporated in the production of the application used to connect a smart phone to the Smart Mirror. The UI of the application will be developed using the mentioned standards. The last standard is Bluetooth. Bluetooth is a networking standard that will allow smartphones to connect to the Smart Mirror. The team wanted a simple way to connect devices to the Smart Mirror besides using Wifi. The standard of Bluetooth influenced that design decision. Google assistant will also be implemented to allow for easier connectivity to smartphone input.</p>
List at least two significant realistic design constraints that applied to your project. Briefly describe how they affected your design.	<p>One of the two significant design constraints is that we must use a mirror that has enough reflectivity to be used as a mirror, and is transparent enough to see the screen. Without the right mirror, there is no smart mirror possible; generally, the more transparent two-way mirrors are more expensive, but there are no options available outside of using these mirrors. Another significant design constraint is that we must use hardware that is small, yet powerful enough to operate a screen. We cannot build a sizable computer for a mirror, and thus must use an embedded system. Such a constraint also constrains us in what software we can upload and what OS we can use, as an embedded system is not very powerful and cannot handle much duress. Another constraint with an embedded system is how it is programmed, as memory and efficiency must be optimized, otherwise it affects customer usage.</p>
Briefly explain two significant trade-offs considered in your design, including options considered and the solution chosen.	<p>Our likely current solution is to use a Raspberry Pi, and install the OS on the Raspberry Pi and boot the program on startup. That creates a massive trade off, as using an OS is very time consuming, and boot-up times would be very bad. If the program is always on, boot-time would not matter, but if the Smart Mirror is turned on at usage, that is the trade-off we would have to make. If we code it remotely, and upload the code onto the embedded system, it would work much more effortlessly and better, but such a solution is much more difficult. So the trade off is difficulty of implementation with boot time and optimization. Another trade off is how expensive the embedded system is with how many software programs we can upload and implement. A cheap embedded system will have much more limited usage, and things such as voice control and face recognition would be impossible. However, if we spend more money, we would make the product cost more, but functionality would easily be improved. Furthermore, problems such as boot-up time can be solved by simply purchasing a more expensive CPU. Such a trade-off can only depend on how expensive we want our product to be and how much software we want to include in the mirror.</p>

<p>Briefly describe the computing aspects of your projects, specifically identifying hardware-software tradeoffs, interfaces, and/or interactions.</p> <p><i>Complete if applicable; required if team includes CmpE majors.</i></p>	<p>Smart Mirror has certain hardware – software trade offs such as the amount of RAM in the Raspberry Pi. The CompE majors must determine how many software programs (such as online calendars, memos, music player, voice recognition software) can run on the Raspberry Pi at a given time without using too much RAM. If the RAM is overused, the mirror responsiveness will suffer, lowering user satisfaction. A software application must be developed so that a smartphone can connect to the mirror for the purpose of playing music.</p> <p>Integrating the music player, voice recognition, calendar, and memo software into the Raspberry Pi must also be completed and is a computing aspect of the project. The main point is keeping the device responsive and user-friendly, as the success of the Smart Mirror relies on the convenience and straightforward nature of integrating entertainment and reminders to an item of everyday use</p>
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<p>Leadership Roles (ECE4011 & Forecasted for ECE4012) (NOTE: ECE4012 requires definition of additional leadership roles including:</p> <ol style="list-style-type: none"> 1. Webmaster 2. Expo coordinator 3. Documentation 	<p>Jessey Sperrey: Hardware (Expo Coordinator) Khoa Phan: Embedded Systems director (Webmaster) Brennon Farmer: Software engineer (Documentation) Daniel Yue: Sound Systems (Webmaster)</p>

<p>International Program: Global Issues (Less than one page) (Only teams with one or more International Program participants need to complete this section)</p>	<p>(10 point font, single spaced)</p>
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