UCF Senior Design I

Department of Electrical Engineering and Computer Science

University of Central Florida

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Initial Project and Group Identification Document

Divide and Conquer

Group 8

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1. Narrative Description

As technology continues to advance, smart homes are becoming more of a reality rather than a thing of the future. Lights and window blinds are becoming automated, and smart phones are becoming the control center for appliances and home accessories. Along with these devices, one DIY project that is becoming popular is the Magic Mirror. The MagicMirror acts as a normal mirror, allowing the user to see their reflection, but also displaying information in the corners such as time, weather, and calendars. The creator behind this MagicMirror, Michael Teeuw, says on his website he wanted the MagicMirror to be a passive device. For this project, we are proposing modifying the MagicMirror to become a more interactive device, one that allows the user to receive more information in just a few moments time.

The functions of the current MagicMirror that we intend to implement are the weather, the time/date, and a calendar. To make the device more personal, it will also display the users' social media feeds. The device will recognize which user is in front of it and display information specific to them. Additional feeds and information can be accessed through the use of buttons, allowing access to more information than what can be displayed in the corners of the mirror.

Michael Teeuw's of Xonay Labs implementation of a smart mirror

Another aspect of this project will be to implement a sleep mode into the device. The MagicMirror is typically always on, so the information is always displayed, even if no one is around it. We want to make the device inactive when no one is in front, and recognize when someone is. Once someone is in close proximity, the mirror will light up and display. This feature will allow for the device to save power. This feature is also more aesthetically pleasing. Some Smart Home devices can appear

gimmicky and out of place, but having the device look like a normal mirror from a distance will allow it to fit better in typical home décor.

The motivation behind the project is to not only create a device that seems “of the future” but is helpful in providing the user information they could want each day. Rather than taking time out of their mornings to check various apps on their phone, they can get all the useful information they need in a matter of seconds.

2. Requirement Specifications

The Smart Mirror project will conform to the following product specifications:

- The Smart Mirror *shall* be within the boundaries of 22x22x5 inches
- The Smart Mirror *shall* not exceed 10lbs
- The Smart Mirror *shall* allow the user to view their appearance
- The Smart Mirror *shall* be powered via a single cord
- The Smart Mirror *shall* connect to a user’s Wi-Fi
- The Smart Mirror *shall* display the following information:
    - Current Time
    - Current Date
    - Weather Forecast
    - Social Media
- The Smart Mirror *shall* enter a power saving mode when no user is detected after 2 minutes
- The Smart Mirror *shall* wake and power on the display when a user is detected
- The Smart Mirror *shall* utilize facial recognition software to:
    - Determine the user
    - Show data applicable to their account
- The Smart Mirror *should* allow a user to scroll through their social media feed

3. The Engineering to Market Tradeoff Matrix

This matrix is used to determine how each of the factors related to the design and implementation of the project will affect the market requirements of the product.

The matrix shown below clearly shows that many of the engineering requirements will increase the cost and dimensions of the product. Also, an increase in the number of features implemented into the final design will impact the ability for the designers to implement speakers with better sound quality due to cost and size limitations.

			Engineering Requirements			
		Relative Importance	Power Usage	Functionality	Dimensions	# of Features
			-	+	+	+
Market Requirements	Cost	-	↑↑	↑	↑	↑↑
	Usability	+		↑	↑	↑
	Dimensions	+		↑		↑

Relationship Key

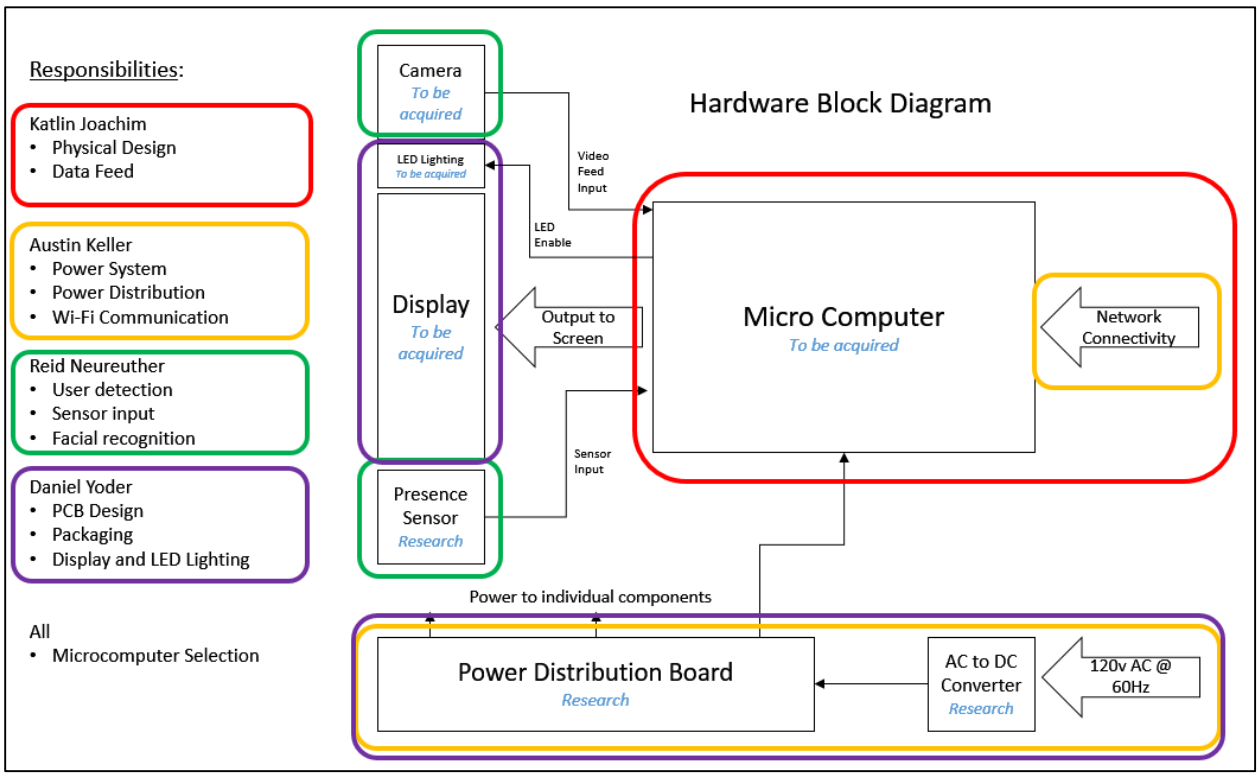
↑ - Positive
↑↑ - Strong Positive
↓ - Negative
↓↓ - Strong Negative

\+ High Importance
\- Low Importance

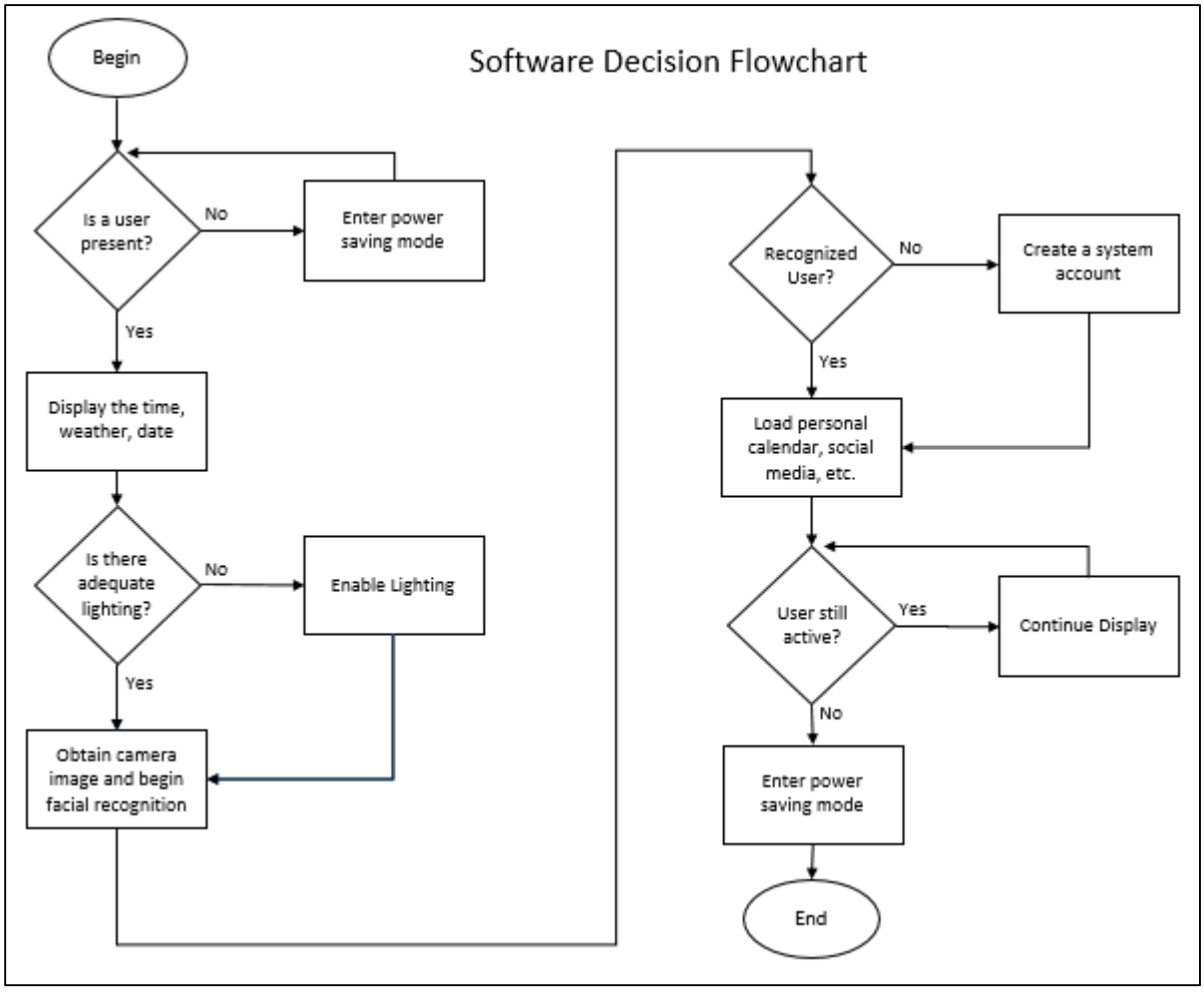
4. Block Diagram

The following diagrams illustrate the main components to be included in the system. Additionally, a guide to the software decision process has been included to further describe the expected functionality.

A microcomputer will be used as the main controller for the MagicMirror. It will be network enabled and connect to the user's Wi-Fi to fetch the most recent information from online sources, where the information will be shown to the user on a display. Other supporting hardware such as sensors, LEDs, a power system, and camera will be used to create a personalized experience for the user.



The software running on the microcontroller will rely on the camera and sensor inputs to navigate through the following decision process. In short, the system will detect if a user is present, display general data, attempt to recognize the user using facial recognition, and then load personalized data.



5. Budget and Finances

The following itemized budget is to be used as a rough estimation for each component cost. Price estimations are based on research through online suppliers as well as previous senior design group estimations for similar hardware. Due to varying prices between manufacturers, an updated budget will be required once specific components are chosen as the semester progresses. An additional 20% margin was included to account for any unforeseen expenses.

BUDGET for Senior Design		MATERIALS		FIXED COST	BUDGET
PART DESCRIPTION	VENDOR	UNITS	$/UNIT		
Two-way Mirror		1	$ 150.00		$ 150.00
PCB		1	$ 150.00		$ 150.00
Microcomputer		1	$ 50.00		$ 50.00
LEDs		2	$ 30.00		$ 60.00
Camera Module		1	$ 50.00		$ 50.00
Display		1	$ 40.00		$ 40.00
Framing/Enclosure		1	$ 40.00		$ 40.00
Project Management Cost - 20%				$ 108.00	$ 108.00
					$ -
					$ -
					$ -
					$ -
TOTAL					$ 648.00

6. Milestones

No.	Task	Start	End	Status	Responsible
Senior Design I					
1	Ideas	8/22/2016	8/26/2016	Completed	Individual Group Members
2	Project Selection and Role Assignments	8/29/2016	9/9/2016	Completed	Group 8
	Project Report				
3	Initial document: Divide & Conquer	8/29/2016	9/30/2016	In Progress	Group 8
4	Table of Contents	8/29/2016	11/4/2016	In Progress	Group 8
5	First Draft	8/29/2016	1/11/2016	In Progress	Group 8
6	Final Document	11/1/2016	12/6/2016	In Progress	Group 8
	Research, Documentation, and Design				
7	Research appropriate chipsets for requirements	8/29/2016	9/12/2016	In Progress	Group 8
8	Design layout of mirror	8/29/2016	9/19/2016	Researching	Katlin
9	Microcontroller	9/15/2016	10/4/2016	Researching	Group 8
10	Display & Lighting	9/15/2016	10/4/2016	Researching	Daniel
11	Wifi	9/15/2016	10/4/2016	Researching	Austin
12	AC/DC converter	9/15/2016	10/6/2016	Researching	Austin
13	Design PCB Layout	9/15/2016	10/9/2016	Researching	Daniel
14	Facial Recognition	9/15/2016	10/17/2016	Researching	Reid
15	Social media feed	9/15/2016	10/25/2016	Researching	Katlin
16	Wake on user detection	9/15/2016	10/29/2016	Researching	Reid
17	Packaging	9/15/2016	11/30/2016	Researching	Daniel
18	Order and Test parts	9/15/2016	12/6/2016	Researching	Group 8
Senior Design II					
19	Build Prototype	12/6/2016	1/1/2017		Group 8
20	Testing and Redesign	TBD	TBD		Group 8
21	Finalize Prototype	TBD	TBD		Group 8
22	Peer Presentation	TBD	TBD		Group 8
23	Final Report	TBD	TBD		Group 8
24	Final Presentation	TBD	TBD		Group 8