Self-Adjust Mirror

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CS 122A Fall 2017

Phase I

Introduction

I am an artist at heart so I enjoy working on projects that have visually pleasing outputs. I want to work on something that is simple to use and solves a problem I have on a day to day basis. My room tends to get dark at times because the lighting in my apartment is really dim. When I get ready in the morning, I want to be able to see my own face.

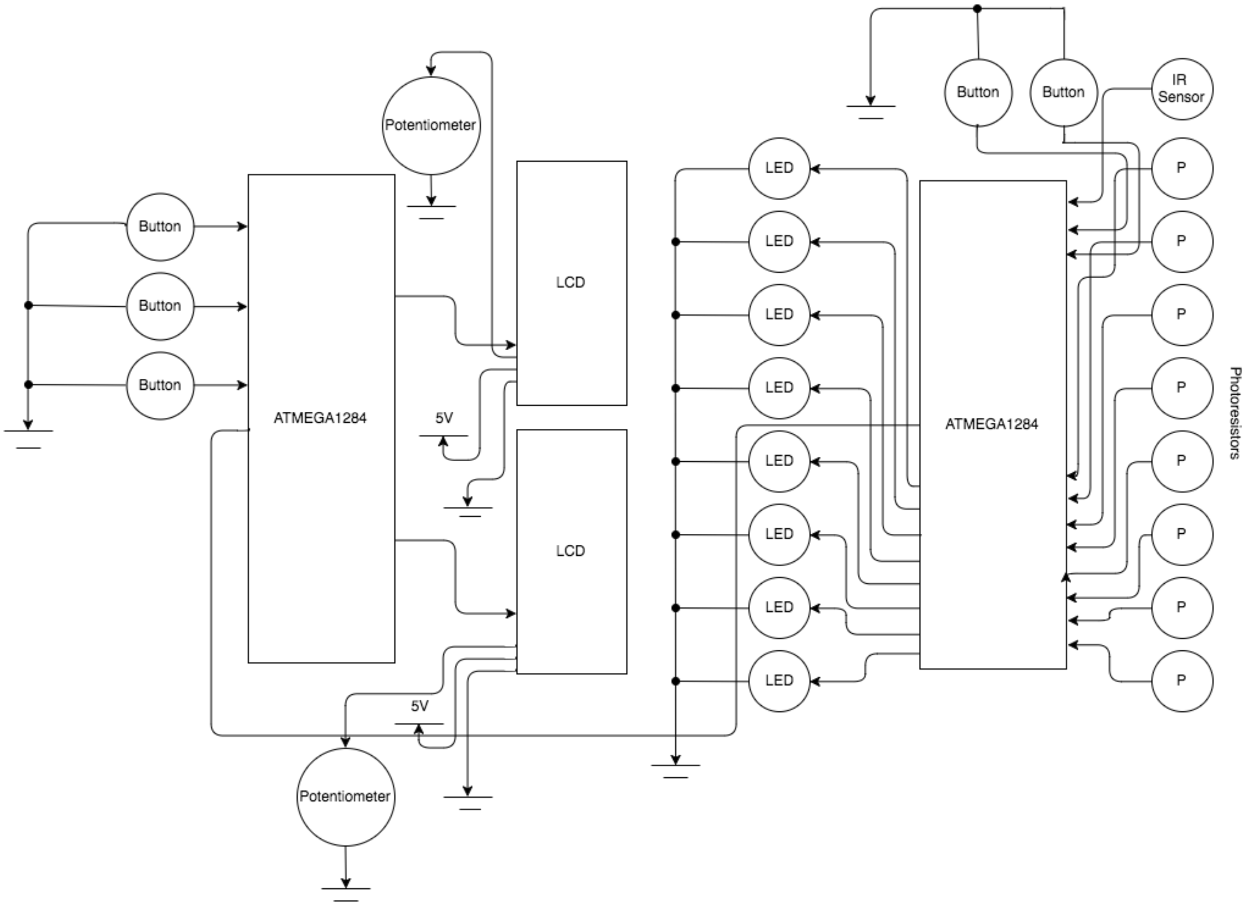
I have seen some high end vanities that have dimmable lights that cost over $100 but do not automatically adjust based on how bright it is in the room. I want to try to make my own for relatively much cheaper than if I were to just buy one.

Using photoresistors I am going to take in the input of the brightness of the room. Using that information, I am going to adjust the brightness of connected LEDs. I want to place the LEDs around a mirror to make a vanity that is responsive to the brightness from the room. There will be two modes, automatic and manual. I want the lights to respond automatically to changes in the room but also be able to change them manually. Using LCD screens, I am going to display the time and a welcome message.

Components (Pin-out)

- **Inputs**
  - Photoresistor x8
  - IR sensor
    - I have never used an IR sensor before so I still need to do much more research on how to implement one
  - Button x5-6
- **Outputs**
  - LED x8
  - LCD Screen x2
- **Internal components**
  - Potentiometer x2
- **Microcontrollers/Processors**
  - ATmega1284 x2

Block diagram on how all of the components will be connected.



70 - 80 points project

Features:

- Automatically adjusts lights
    - Takes in data for light input
        - Uses eight photosensors
    - Outputs appropriate light levels for brightness of the room
        - Dim lights with PWM
- Manually adjusts lights
    - Uses button to change light output
    - Five brightness settings (low, low-medium, medium, medium-high, high)
- Controls
    - On/Off - Button
    - Toggle between manual and automatic - Button
    - Manually adjust light brightness - Button
        - Have 5 brightness settings (cycle between 1, 2, … 5, 1, 2, …)
    - On/Off - Remote control (Night mode)
        - IR sensor to turn lights on/off (sleep mode)
        - Doubles as a night light that automatically turns off after 10 minutes
            - Turn it on from your bed at night
- Sleep Mode
    - After 10 minutes from last input, lights will turn off (sleep mode)

80 - 90 points project

Feature add ons:

- LCD Displays (connected on second microcontroller)
    - Display 1: Time (military time)
        - Set the time using buttons
    - Display 2: Welcome message based on time of day
        - 6:00AM - 11:59AM : “Good morning!” (06:00 - 11:59)
        - 12:00PM - 5:59 PM : “Good Afternoon!” (12:00 - 17:59)
        - 6:00PM - 9:59PM : “Good Evening!” (18:00 - 21:59)
        - 10:00PM - 5:59AM: “Good Night!” (22:00 - 5:59)
- Controls
    - Set Time - Buttons, change the hour and change the minute
    - On/Off - Remote control (Night mode)
        - IR sensor also turns LCD display on/off (sleep mode)
    - Sleep Mode
        - After 10 minutes from last input, displays will turn off (sleep mode)
        - Sleep mode preserves the set time on the LCD Screen

90 - 100 points project

Features add ons:

- Lights have more than one color setting
    - i.e warm light, white light, etc
        - When you get ready for the day, different types of lighting effect what you may look like
        - This would be implemented with an added button #6 (not displayed in above's block diagram)
    - More yellow/orange/red toned light setting for sleep mode
        - Redder tones tend not to disturb your brain's circadian rhythm as much
    - Blue and purple light setting with pattern display
        - Soothing light show for user to destress
        - Also controlled by button #6 by cycling through settings
            - i.e warm, white, blue, warm, …

Phase II

Milestone

What is your target milestone? **When** is your intended milestone date (non-binding).

I want to be done with converting the analog data of the photosensors to digital and using PWM to dim the lights on the LEDs according to the amount of light input that was read. Inputs from buttons will also turn lights on/off and change brightness.

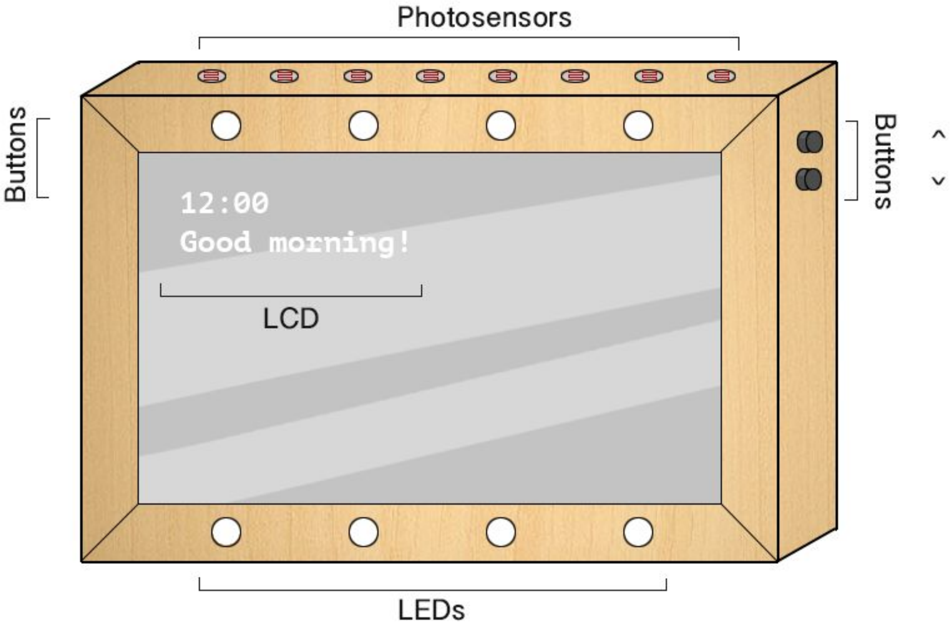
Testing and Verification

- 70 - 80 point project
    - Tested by my friend who has taken CS 120B
    - Tested by explaining project and allowing my friend to turn it on and adjust brightness settings
    - During week 6
        - after my Milestone check off
- 80 - 90 point project
    - Tested by my roommate who is a ME
    - Tested by explaining how to turn on and off but nothing else and allow him/her to figure out other functions
    - Middle of week 7
        - All outputs function properly

- 90 - 100 point project
    - Tested by friend who is not in school
    - Tested by not explaining my project and just letting him/her try to figure out how it works
    - Beginning of week 8
        - Finished creating and setting up UI elements (frame, mirror, etc)

Form Factor

I would use a piece of reflective glass and place it in a wooden frame. The LCD would be placed behind the reflective glass and only be seen when turned on. Behind the rest of the reflective glass I will be using black foam to make the surface as reflective as possible. The frame would have places where the LEDs would stick out and be held. The frame would also have holes in the top where the photoresistors would be placed spread evenly to take in the most accurate data. The frame will be thick enough to be able to hold the components and make the mirror be able to stand on its own.



Materials:

- Wood boards (1x3)
- Wood glue
- See through mirror
- Black foam board

Tools:

- Drill
- Saw

- Sandpaper