Intel “Mood Light” Project Proposal

Team 16
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Version 1.0

Description:

Using an Arduino Due, we must develop a system that can sense a person entering a room and adjust properties on that room based on that person's preset preferences. The system must have the ability to store and identify multiple distinct profiles which include sensor inputs and lighting outputs.

Initial design:

Interface the Arduino Due with a pressure sensor to detect the weight of the person entering the room (in order to identify them) and configure an LED strip’s output settings based on the person. The different profiles that the LED strip will be configured with will be input from some sort of user interface (initially a program script executed from the computer that will take in information from user entered command-line inputs and send that information to the arduino, however we hope to move to using a touchscreen or develop a simple phone application to set profiles). Initially, everything will be wired together, but as we get things working we hope to move to a wireless setup (most likely using bluetooth LE).

Requirement:

The MUST DO:

- The system must measure the weight of the person and send a signal through wired connection to the arduino
- The arduino must match the input to one of multiple pre programmed profiles saved within its memory.
- The arduino must control a circuit which will light the LED strip according to the specifications of the the particular profile.
    - Options include: brightness, color, pattern, and alternating sequence if desired

The SHOULD DO:

- The system should measure the temperature of the room and send the signal through a wired or wireless (BLE) connection to the arduino.
    - This information can also be tied to a person's profile in the future implementations of the system.
- The arduino should take inputs from multiple sensors to have a better chance of identifying a distinct person
    - Potential inputs include: fingerprint (or other biometrics), height, voice recognition
- The arduino should adjust its parameters and learn over time to account for changes in individuals
    - ie: adjusting profile weight gradually as a child grows up
- Sensors and main arduino board should eventually communicate wirelessly to avoid the need for wires and provide a greater freedom of movement

- Wireless sensors can eventually be powered wirelessly as well, either constantly or by the periotic wireless charging of a battery

Power Harvesting:

The ultimate goal of a system such as this one is to have all components communicate wirelessly but also be powered wirelessly. There are a variety of power harvesting methods that could be used to accomplish this task in the future iterations of this project.

1. Radio Frequency Harvesting - This method delivers the lowest amount of power but has the potential of powering a room full of sensors with just one transmitter. The frequency of operation is higher than the rest since it is a radiative method as opposed to non-radiative. As with all RF transmitters, safety must be considered and power output can not exceed government limitations, which will be the limiting factor. Since the sensors will most likely use little power, this could be the prefered method for this application.
2. Resonant Inductive Power Transfer - This method involves the use of two resonant circuits containing a capacitor and usually a planar coil which transfers power from the transmitter to the receiver via inductive coupling. Many cell phones currently employ this technology for contactless charging of their batteries. However, due to the range limitation of this method (usually less than one cm of separation between coils), this is most likely not the best method for our particular system.
3. Highly Resonant Inductive Power Transfer - This is a relatively new technology that is similar to Resonant Inductive Transfer but uses resonators with very high quality resonators in order to dramatically increase the power transfer distance. Large implementations of this system have been used to power TV's across rooms so it is feasible that a sensor network could be powered using this method as well.

Part	**Retailer**	**Price**
1- Arduino Due	amazon	$40.18
2- LED strip	amazon	$24.88
4- bluetooth module	amazon	$9.99
5- weight sensor	sparkfun	$9.95
Total Prototype Cost		$85

Design Steps:

Interfacing pressure sensor with arduino
Interfacing the LED strip with arduino
Method of getting user input profiles to arduino
Wireless connection from sensors to arduino
Wireless connection from user interface to arduino
Configuring user selectable LED color and brightness options
Connecting the system to power circuit

Timeline of the Project:

January 15 - Project proposal
January 17 - Look into body weight sensors
January 24 - Buy and test parts
January 31 - Interfacing LED strip with arduino
February 7 - Modify LED strip remote to be controlled using arduino
February 14 - Interface pressure sensor with arduino
February 21 - Modify weight sensor into a surface the user's body
February 28 - Code for user interface
March 6 - First draft of schematic and layout
March 7- Revision of the schematic
March 13 - Finals week

March 20 - Spring break
March 27 - Start prototyping
April 4 - Prototype testing and debugging
April 11 - Continue prototype testing and debug
April 18 - Extra features if time allows (extra sensors, bluetooth, nicer user interface, etc.)
April 25 - Extra features
May 1 - Extra features
May 8 - Final prototype testing
May 15 - Preparing for the presentation, preparing the posters.
May 22 - Finished and ready for Oral Presentation