

Smart Lamp

ECE153B Final Project Proposal

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Overview

We propose to design and implement a smart desktop lamp using the LPC4088 board. The lamp will have two main control modes of adjusting lightness: auto and manual. In the auto control mode, the lamp will accommodate the brightness of the LED light to the ambient light intensity. In the manual control mode, users can change the brightness of the lamp LED by rotating the trimpot on the LPC4088 devkit to change the ADC readout.

Peripherals

1. OPT3001 Digital ambient light sensor (ALS) with high-precision human-eye response which supports I2C. (<http://www.ti.com/lit/ds/symlink/opt3001.pdf>)
2. LEDs (On the LPC4088 devkit)
3. LED light bulb that is powered by USB port and brightness can be controlled by the voltage applied
4. Trimpot ADC controller (On the LPC4088 devkit)
5. Switch buttons. (On the LPC4088 devkit)

Software Design

The main smart lamp control program would exist inside of a while loop which only stops when the "Turn Off" interrupt is sent by the switch on the board. Then there will be a switch structure which chooses the control mode (automatic or manual) of the lamp by getting interrupts from the pushbuttons on the board. The readings from OPT3001 Digital ambient light sensor will be transmitted via I2C to the microprocessor and then analyzed. The ADC readouts from the trimpot will be processed to generate pulse width modulated signal as in lab1.

Goals

1. When the switch button on the LPC4088 devkit is pushed, the lamp is either turned on or off.
2. Another pushbutton on the LPC4088 devkit should handle the selection of control mode. (auto or manual).

3. In the auto control mode of the lamp, the brightness of the LED light bulb will change based on the readings from the ambient light sensor. The darker the intensity of environmental light, the dimmer the lamp will be.
4. In the manual control mode, the brightness of the LED light bulb can be toggled by manipulating the position of the trimpot on the LPC4088 board and therefore control the ADC value.
5. The current emitting light intensity level is also displayed by the LEDs on the LPC4088 board.

Group Responsibilities

Jiyu Zhou is in charge of the program logic while Ran Mo and Dom Jiang will handle the peripherals setup.