CAB202 Assignment:

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TinkerCAD Link (online students only):

Introduction

As someone who struggles to wake up in the morning finding the most effective way to wake up is an important part of a daily routine. Upon some research it is found that light specifically natural light from the sun is an effective way to wake the body. This is because our circadian rhythms have been preprogramed to do this over years of evolution. The difficult part, however, is timing an alarm everyday for sunrise and then needing to open the blinds first thing in the morning.

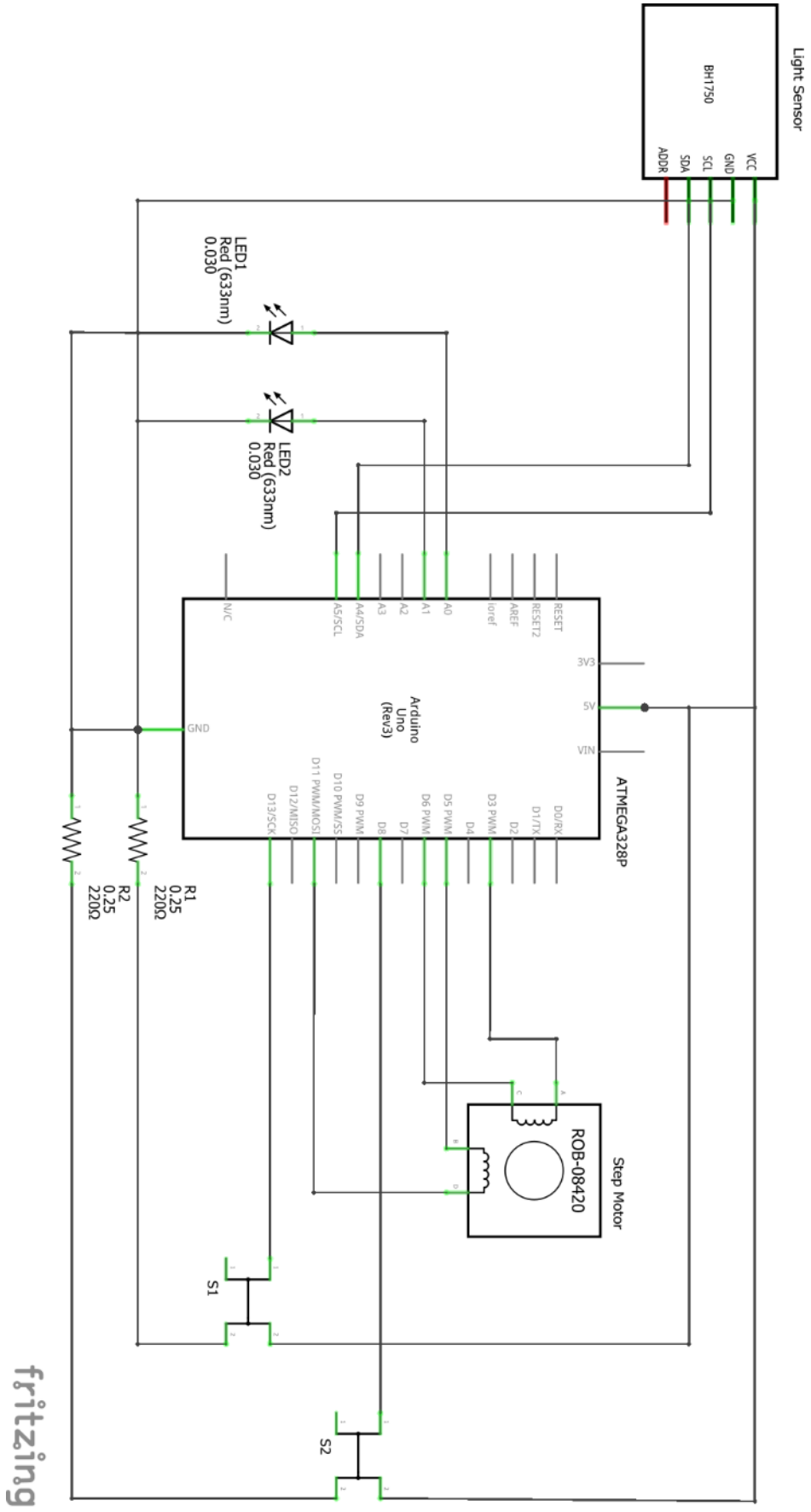
This is where the project created solves the issue. This project is an abstraction of an automatic blinds system which opens during a detected sunrise and closes during a detected sunset. This system uses an ATMEGA328P, light sensor and a step motor for the core functionality. This is however only an abstraction as nothing is connected to the step motor. In practice the step motor would be connected to a gear which would be binned to a rotational roll which would open and close the blinds. Meaning if the step motor turns clockwise the blinds close and if the step motor rotates anticlockwise the blinds open.

Additionally, the project can turn off and on using the left (S1) and right (S2) buttons, respectively. The system also utilises two LEDs to help signal whether the light sensor recognises daylight or night-time. The left LED (LED1) will turn on if the system is in daylight and the right LED (LED2) will turn on during night-time. As such the step motor will turn anticlockwise and clockwise in the respective conditions to fulfill the curtain opening and closing at sunrise and sunset.

Digital I/O - Switch	*2x Buttons, one which turns the project on and the other turns the protect off*
Digital I/O – Interrupt-based Debouncing	*Used for the button presses*
Digital I/O – LED	*2x LED's to signal whether its daylight or nightlight*
Analog Input – ADC	*Ambient Light Sensor, which gives us a lux reading to be used as a range for when the turn the motor clockwise and anticlockwise*
Analog Output – PWM	*Used to make the step motor rotate in both directions*
Timers (other than debouncing or PWM)	*Timers for each individual step motor phase.*

(Remove rows or fill in with "not implemented" on features that are not implemented)

Schematic


Light Sensor
BH1750
ADDR
SDA
SCL
GND
VCC
LED1
Red (633nm)
0.030
LED2
Red (633nm)
0.030
Arduino
Uno
(Rev3)
ATMEGA328P
R1
0.25
220Ω
R2
0.25
220Ω
S1
S2
Step Motor
ROB-08420
fritzing

Wiring Instructions

Connect Step Motor: Connect pin D3 from the Arduino Uno to IN1 on the step motor controller; Connect pin D5 from the Arduino Uno to IN2 on the step motor controller; Connect pin D6 from the Arduino Uno to IN3 on the step motor controller; Connect pin D11 from the Arduino Uno to IN4 on the step motor controller.

Connect Light Sensor: Connect pin D19/SCL from the Arduino Uno to the SCL pin on the light sensor; Connect pin D18/SDA from the Arduino Uno to the SDA pin on the light sensor; Connect pin +5V from the Arduino Uno to the VCC pin on the light sensor; Connect the GND pin from the Arduino Uno to the GND pin on the light sensor; Leave the ADDR pin disconnect to the Arduino Uno.

Connect Push Button 1 (S1): Place push button along the split of the breadboard with one pair of the pins on the E row and the other pair of pins on the F row; Connect pin D13 from the Arduino Uno to the left pin from the top set of pins along its respective column; Connect the bottom right pin of S1 to the positive terminal of the breadboard; Connect the bottom left pin of the button to Resistor 1 (R1) and then connect the other side of R1 to the negative terminal on the breadboard.

Connect Push Button 2 (S2): Place push button along the split of the breadboard with one pair of the pins on the E row and the other pair of pins on the F row; Connect pin D8 from the Arduino Uno to the left pin from the top set of pins along its respective column; Connect the bottom right pin of S2 to the positive terminal of the breadboard; Connect the bottom left pin of the button to Resistor 2 (R2) and then connect the other side of R2 to the negative terminal on the breadboard.

Connect LED1: Place the longer side of LED1 into row J of the breadboard and then connect the shorter side of LED1 to the negative terminal; Connect port A0 to the respective column of LED1 on the breadboard.

Connect LED2: Place the longer side of LED2 into row J of the breadboard and then connect the shorter side of LED2 to the negative terminal; Connect port A1 to the respective column of LED2 on the breadboard.

Connect the Breadboard: Connect the VIN port from the Arduino Uno to the positive terminal of the breadboard; Connect the GND port from the Arduino Uno to the negative terminal; Connect the top negative terminal with the bottom negative terminal.