

Brief Project Descriptions

Automatic Blinds

A printed circuit board uses sensor data to measure daylight conditions and/or other conditions (i.e. time of day) to control a set of blinds that are controlled via an actuator. This project would meet each of the requirements by having light sensors as inputs. We would use a microcontroller to control when the blinds open/close, to meet the processor requirement. The output would be a some motor system to control the blinds (stepper motor, servo).

Automated Room Lighting System

This project would be similar to the “Automatic Blinds” except we would control the lighting environment of a room. The PCB would control the lights based on what the system thinks the user wants to do. For example, if the person approaches/sits at their desk the desk lamp turns on, or if a person leaves the room or goes to bed and no motion is detected for some time, all the lights shut off. There would be various input sensors that the device would use to determine what outputs to send (lights on/off, or light brightness/color). A microprocessor would be used to control the entire system.

Door Alarm System

This project would be a PCB that uses a keypad, simple display, and sensors to detect if someone has entered a room or house and sound an alarm based on if the user can disable the alarm with a pin code. The inputs would be the keypad, and sensors to detect either motion or is a door is opened. The outputs would be the the alarm siren or speaker. The microcontroller would control the functionality of the entire system.

Plant Conditions Monitoring System

This project would be a device that uses various sensors to determine if an environment (i.e. mini green room) is meeting pre programmed ideal growing conditions. The inputs would be sensors that measure; sunlight, humidity, temperature, etc. The device would then attempt to adjust the conditions to return them to the optimal state, as well as warn the user that there is a violation. First it would be a simple wired waring (maybe light/sound). Then could possibly send out a signal wirelessly (if enough time). Other outputs would be fans that control temperature, some mechanism that could adjust how much light is entering the “environment”, and some mechanism that could control humidity.

Decision Matrix

	Fits our Skillset (10)	Personal Interest (8)	Doable (10)	Fits Budget of \$250 (6)	Fits Timeline (10)	TOTAL
Automated Blinds	8 80	8 64	7 70	5 30	9 90	334
Automated lighting system	8 80	6 48	8 80	6 36	8 80	324
Plant Health Monitor	7 70	5 40	7 70	6 36	8 80	296
Room Security Systems	8 80	6 48	8 80	5 50	7 70	328

Fits our Skillset: The group together has the skills and abilities required for completion of this project. The rationale behind this criteria is that we want a project for which we have skills for. This criteria has a weight of 10 because we need a project that we have the skills for.

Personal Interest: The project is interesting and will be a great experience. This criteria is important because the more interested we are in, the better job we will do. We gave this criteria a weight of 8 because it's important but at the same time we can do a project we are not personally interested in, it just would be more desirable if we were interested in it.

Doable: The project is within reach of our abilities and anything we don't know (that we need for the project) we can learn. This criteria is important because we need to have confidence in our ability to finish the project on time, whatever that means. We gave this criteria a weight of 10 because it's important we pick a doable project and not something too complex.

Fits Budget: The project will be within \$250.00 budget. This is an important criteria since we don't want to spend a large amount of money, but it's not the most important so this was weighed at 6.

Fits Timeline: The project will be completed by the due date. This is important because we have other priorities and we need to be able to do this project while still managing other responsibilities. This criteria has a weight of 10, because it is important we have time to do the project.

How each category is weighed: Each category is weighted based on its importance to this projects. The more important the category the higher the rating. After each evaluation, the given value is multiplied by the weighted value and all the categories are summed up. For each project category the group determined the most fit value related to the other project ideas. The project with the highest total points will be the practicum project.

ECE 411 Practicum Project Proposal

Project Name: Automated Blinds

Project Group:

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Proposal Statement:

This is a project proposal for the Practicum Project for the Fall 2016 ECE 411 course. Our final decision for a project is creating a printed circuit board that will automate a set of blinds based on daylight conditions and a remote control. The project would fit on a 2 layer board and would meet all of the project requirements.

Project Objective:

To obtain experience in designing, prototyping and building a microcontroller based printed circuit board device and to complete a full product design cycle. The final result of the project will be an automated blinds controller system on a PCB. A demo unit will be constructed that will demonstrate the device's features and functionality.

Device Functionality:

This will be a microcontroller unit (MCU) based 2-layer PCB project. The MCU will take in data from a light sensor that will determine if the sun is up or has set and open/close the blinds on a window. The default configuration that the project will have is that when the sun sets the blinds will close and vice versa. The user will also be able to manually override the open/close status of the blinds with local and remote controls. There will also be some safety features that are implemented, such as detecting if there is an obstacle in the way when the blinds are closing.

Requirements:

Processor

- A microcontroller will be used to control how the system behaves based on data acquired from the various sensors.

Inputs

- Light sensor to read data on outdoor daylight conditions
- IR sensor to read data from remote to control device remotely (possibly bluetooth module)
- Buttons on PCB for local manual control
- Power switch
- (Possibly) pressure sensor to detect if there are any obstacles in the way

Outputs

- Servo or stepper motor to open/close blinds
- Indicator LEDs

Preliminary Schedule:

Week 3:

- Project Proposal
- Determine “first pass” basic functions of device
- Pick IC that will meet our requirements
- Order IC Development kit/prototyping parts

Week 4:

- Start prototyping
- Write software for MCU
- Get basic prototype to work
- Add features if enough time

Week 5:

- Start designing final PCB
- Continue to verify prototype
- Build demo window/and blinds
- Prototype PCB (In capstone lab)

Week 6

- Order PCBs
- Assemble PCB
- Start testing PCBs
- Correct any mistakes

Week 8

- Prepare all documentation
- Prepare demo