TLA Lab Blinds Controller

DESIGN DOCUMENT

EE/CPRE/SE 491: sddec22-11

Mini Retrofit Blind Controller

Client: ECPE

Faculty Advisor: Lee Harker

Team Members:

- Daniel Andrews - TEAM LEAD
- Andrew Deick - Front-End Software LEAD
- Jacob Nett - Back-End Software LEAD
- Hieu Nguyen - Communication LEAD
- Logan Shada - Design editor, Hardware director, Team overlap connection
- Caleb Townsend - Hardware Lead and Maintenance Lead

Executive Summary

Development Standards & Practices Used

- "IEEE Standard for a Real-Time Operating System (RTOS) for Small-Scale Embedded Systems," in IEEE Std 2050-2018 , vol., no., pp.1-333, 24 Aug. 2018, doi: 10.1109/IEEESTD.2018.8445674.

These standards apply to our project due to the incorporation of a small scale embedded system. We will be operating this in real time in order to incorporate direct procedural interaction between the interface and the action of a physical motor that will, in turn, open or close the blinds.

- "Preprint Proposals for the 2022 Edition of the National Electrical Safety Code (NESC(R))," in Preprint Proposals for the 2022 Edition of the National Electrical Safety Code (NESC(R)) , vol., no., pp.1-867, 1 July 2019, doi: 10.1109/IEEESTD.2019.8753791.

The standard related to this has to do with how safety is handled in matters using electrical supplies. We need to follow this standard in our project in order to make sure we follow proper safety while building our circuit that will be connected to the dc motor.

- "IEEE Standard for Information Technology--Telecommunications and Information Exchange between Systems Local and Metropolitan Area Networks--Specific Requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 2: Enhanced Throughput for Operation in License-exempt Bands above 45 GHz," in *IEEE Std 802.11ay-2021 (Amendment to IEEE Std 802.11-2020 as amendment by IEEE Std 802.11ax-2021)* , vol., no., pp.1-768, 28 July 2021, doi: 10.1109/IEEESTD.2021.9502046.

This standard relates to our project because it is the standard for wireless network and information transfer. This is applicable because our blinds will ultimately be controlled across wifi. This standard will be used heavily.

Summary of Requirements

- Functional requirements: DC motor drive, Low voltage, proper shielding, wireless connectivity
- Resource Requirements: Less than or equal to $500 in supplies
- Qualitative Aesthetic Requirements: Unobstructive to the look of the TLA, Minimal damage to the area
- Economic/Market Requirements: Must be reproducible at minimum cost possible
- Environmental Requirements: By as few parts as needed to make the product, little waste overall
- UI Requirements: Easy to interpret, Nice look and feel to use, Minimal training needed to operate

Applicable Courses from Iowa State University Curriculum

- CS309 - Software Development Practices
- CS319 - Construction of User Interfaces
- CS363 - Introduction to Database Management Systems
- CPRE288 - Embedded Systems
- EE230 - Electronic Circuits and Systems

New Skills/Knowledge acquired that was not taught in courses

- Part ordering
- Connectivity of premade parts
- Motor control pin placements
- Use of batteries
- Using specialized software tools like Next-Auth
- PCB (Printed circuit board) design and ordering

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1 Team

1.1 Team Members

- Jacob Nett
- Daniel Andrews
- Andrew Dieck
- Caleb Townsend
- Logan Shada
- Hieu Nguyen

1.2 Required Skill Sets for Your Project

Some of the required skills are web design, server maintenance, microcontroller coding, circuit design, pcb design, and mechanical skill. In addition, soft skills including time management, flexibility, and problem solving are required.

1.3 Skill Sets covered by the Team

Web design - Andrew, Daniel, Server maintenance - Daniel, Jacob , Microcontroller coding - Jacob, Circuit Design - Logan, Hieu, and Caleb, and PCB design - Hieu. Everyone is in Possession of soft skills in various degrees of development.

1.4 Project Management Style Adopted by the team

Combination Waterfall and Agile -

Our team lead is Daniel who makes sure for the most part everything is on track. Otherwise, each member of our project has a major area of responsibility that other members can reference for work that can be done.

1.5 Initial Project Management Roles

- Daniel Andrews - TEAM LEAD
- Andrew Deick - Front-End Software Management
- Jacob Nett - Back-End Software Management
- Hieu Nguyen - Communication Management
- Logan Shada - Design Editing Management, Hardware Management
- Caleb Townsend- Hardware Lead and Maintenance Lead

2 Introduction

2.1 Problem Statement

The objective of our project is to build a system to control the blinds in the TLA in Coover on Iowa State Campus for anyone who uses the space to improve convenience and time-usage for the user of the blinds. This system will be accessible anytime of the day (morning, afternoon, or evening), user-friendly, and able to be easily maintained. We will use a motor and control system connected to a designed application to solve this problem. We will also implement a warning-fix program to the system by sending ECPE office computers the warning signs as to when the system breaks down, which unit/part needs to be fixed, and how to fix it.

2.2 Requirements & Constraints

- Functional requirements: DC motor drive, Low voltage, proper shielding, wireless connectivity
- Resource Requirements: Less than or equal to $500 in supplies
- Qualitative Aesthetic Requirements: Unobstructive to the look of the TLA, Minimal damage to the area
- Economic/Market Requirements: Must be reproducible at minimum cost possible
- Environmental Requirements: Purchase as few parts as needed to make the product, little waste overall
- UI Requirements: Easy to interpret, Nice look and feel to use, Minimal training needed to operate

2.3 Engineering Standards

- "IEEE Standard for a Real-Time Operating System (RTOS) for Small-Scale Embedded Systems," in IEEE Std 2050-2018 , vol., no., pp.1-333, 24 Aug. 2018, doi: 10.1109/IEEESTD.2018.8445674.

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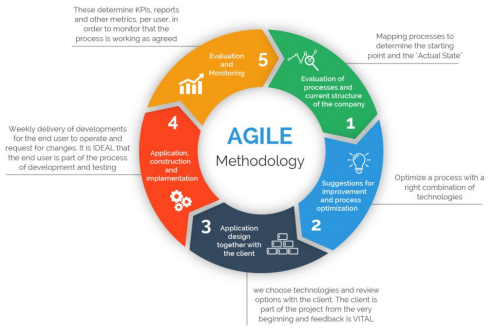
2.4 Intended Users and Uses

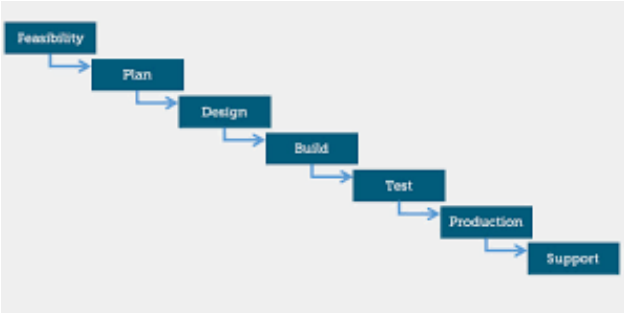
Iowa State University students and staff are the beneficiaries of our project. Specifically, students and staff who use the blinds at Iowa State in Coover Hall in the TLA (Transformative Learning Area). Functionality is fairly straight-forward in that our project's main and only function is to develop a retrofit control system for the blinds in the TLA which effectively controls the blinds increasing accessibility, maintaining functionality, and increasing ease-of-use.

The people who will benefit the most from our project are students using the TLA to get work done. More work will be done at a more efficient pace if glare is prevented on the screens of those who use the TLA. It will overall cause less distraction and help to ensure people will be able to work comfortably. People logged in through OKTA will be able to open our application, allowing them access to control of the blinds to ensure they are always comfortable.

3 Project Plan

3.1 Project Management/Tracking Procedures





Our team has made use of gitlab for long term task assignment and Microsoft teams for short term communication and planning. As well as have several people keep minutes during meeting to ensure we're all on the same page.
We will use a combination agile/waterfall approach as we have more than 200 days to complete our project because our goal is to complete a prototype this semester that works and finalize it next semester. This will be combined with sets of sprints to try to push for high productivity.

3.2 Task Decomposition

Our team has identified five main task within our original project

- Planning
- Design
- Development
- Testing
- Deployment

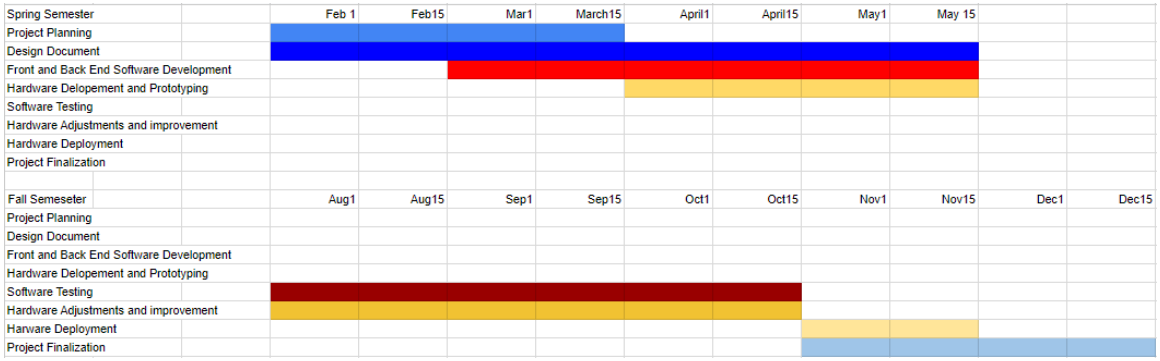
These are then further broken down between the two core jobs within our project hardware and software. Each of these has sets of subtasks for each group with software being layered into frontend,backend, and microcontroller programming while hardware is looking at mechanicals and electricals.

3.3 Project Proposed Milestones, Metrics, and Evaluation Criteria

Milestone - we measure the process by what we had done at the time it was complete.

- Design - 2 week
- part order should be ordered by the 4 week at maximum of time given, because it gave us more time to do research while waiting for part to arrive.
- Web application framework created week 4
- Server Setup with required software - week 5

3.4 Project Timeline/Schedule



3.5 Risks And Risk Management/Mitigation

RISK	Probability	Impact	Mitigation Plan
Motor control breaks blind	30%	4	SW override code that takes over and/or fix issue in design efforts
Battery overload when charge	10%	3	Replace battery and form process for replacing battery
Parts delayed	50%	3	- Access other approaches - go travel and get the part ourselves
Bad hardware part	40%	2	- Replace part or upgrade. - Find another part that will work.
Software Server Failure	10%	4	Use of ISU server, constant checks and testing to avoid errors.
Software Delays	70%	1	Weekly Meetings, try to use slight overestimations of required work.

3.6 Personnel Effort Requirements

Task	Estimated Effort Requirements	Explanation
Project Planning	20	"Brainstorming and theorizing about what ways our goal for the project can best be accomplished."
Design Document	10	"Designing all team, project, and specification documents"
Front and Back End Software Development	80	"Develop the code and architecture of the back and front ends"
Hardware Development and Prototyping	80	"building the device and minor testing in order to ensure functionality"
Software Testing	80	"Ensuring SW is safe, secrue, and has no loose ends that the user can break"
Hardware Adjustments and improvement	80	"Improving HW with cost and functionality in mind in sight of the user as well."
Hardware Deployment	40	"Put it all together, hardware with SW and ensure functionality"
Project Finalization	60	Testing, assessing test results, and presenting best effort

3.7 Other Resource Requirements

- cordless GII- 42 inch drop
- Qunqi L298N motor drive controller board module dual H bridge DC stepper for arduino
- ABX00021

- 12V cordless 3/8 In. Drill/Driver kit
- sorako cordless screwdriver 4V max electric screwdriver 6NM, rechargeable power screwdriver set with 10 accessory kit and usb charging cable
- Wonder Master cordless screwdriver 3.6V electric screwdriver rechargeable battery with screw bits set power screw gun forward/reverse switch for home DIY furniture installation drill
- 5/16 inch magnetic hex drivers, 3pack
- socket set HEX 1/4 "3pc
- precision electric screwdriver
- 4 v max cordless screwdriver with LED light "black +decker
- Flexible extension
- Universal socket tool for power drill, 1/4 " - 3/4")7mm - 19mm) Taseven professional socket tool with power drill socket adapter for reparigin
- ALEDECO PWM low voltage DC 1.8V 3V 5V6V12V2a Motor speed controller.
- Honbay L298N motor driver controller Board DC dual H-Bridge robot stepper motor control & drives module for arduino smart car power UNO MEGA R3 Mega2560 duemilanove Nano Robo
- Hose clamp 1/2 inch
- 5000mAh battery
- 3D print box (unknown design)

4 Design

4.1 Design Context

4.1.1 Broader Context

The problem we are solving is for the users of the transformative learning area (TLA.) This area is primarily used by engineering students and they are primarily using computers. The issue is there is not a good way to adjust the window blinds at the moment. Our project is to design a better way to control this so the light does bother the students while trying to use the computers.

List relevant considerations related to your project in each of the following areas:

Area	Description	Examples
Public health, safety, and welfare	Can help users by saving time and by not having to look into the sun.	Less time trying to adjust blinds. Lets users accomplish work quickly by not having light obscure screens. Users will not have to look into the sun if blinds are easily put down.
Global, cultural, and social	This project affects the workplace of the TLA.	Students and faculty will have an easier time studying and working in the TLA.
Environmental	The project is based around retrofitting the old blinds instead of getting new ones, therefore less waste.	If new blinds were purchased, old would be thrown out, adding plastic to a landfill somewhere.
Economic	Retrofit saves money by not having to purchase all new blinds.	Less new items to be purchased.

4.1.2 User Needs

Engineering students need a way to use the TLA lab without the sun, because the sun's rays create glare on screen.

Engineering faculty need a way to work in the TLA lab without the sun, because the sun's rays create glare on screen.

4.1.3 Prior Work/Solutions

Similar products currently available in the market would be remote controlled blinds. Example would be Select Blinds. Remote control controlled blinds for ~$150 (depending on model and special features.)

We did not think this was the best solution for the problem because it would be quite expensive, and add questions such as who should get control of the remotes.

"Select Blinds" https://www.selectblinds.com/roman-shades/classic-roman-shades.html

4.1.4 Technical Complexity

The design is complex from a subsystems perspective. The design includes a motor, microcontroller, and a web application that includes both a front end and back end server. Each of these components will take time to get to work appropriately and many tests to ensure this is the case. The components will also all need to be seamlessly integrated and thoroughly tested to make sure that there are no issues in those connections.

4.2 Design Exploration

4.2.1 Design Decisions

1. What to use for microcontroller - Arduino Uno Rev2 wifi
2. What to use for motor - SORAKO Cordless Screwdriver 4V Max or WONDER MASTER Cordless Screwdriver, 3.6V Electric Screwdriver
3. What kind of app to use - Internet application running off of js/html front end and Springboot MySQL backend

4.2.2 Ideation

For choosing the motor we will be working with to start, we found three various motor options tested each of them for speed to find a speed we would prefer as a max. We then looked into batteries and boards that would work well with the motor unit.

4.2.3 Decision-Making and Trade-Off

For the type of application we went through a few options. We considered a (1) java application downloaded onto the computers in the lab, but decided that having to download could be an issue, as well as they wouldn't be accessible from a mobile phone.. We also thought about doing either a (2) Native mobile application or (3)

hybrid mobile application so that the blinds could be controlled mobily, but decided against these options because they would require users to download before they could be useful. They would also create the opposite problem as before where they couldn't be used on a computer. In order to solve the problem of having to download software, we thought of a web application. We weren't sure if we wanted it to be (4) a web application designed for desktops, or (5) a web application designed for mobile devices. So we arrived at a final solution where we would make the design being a web application that was made to fit both computers and mobile devices.

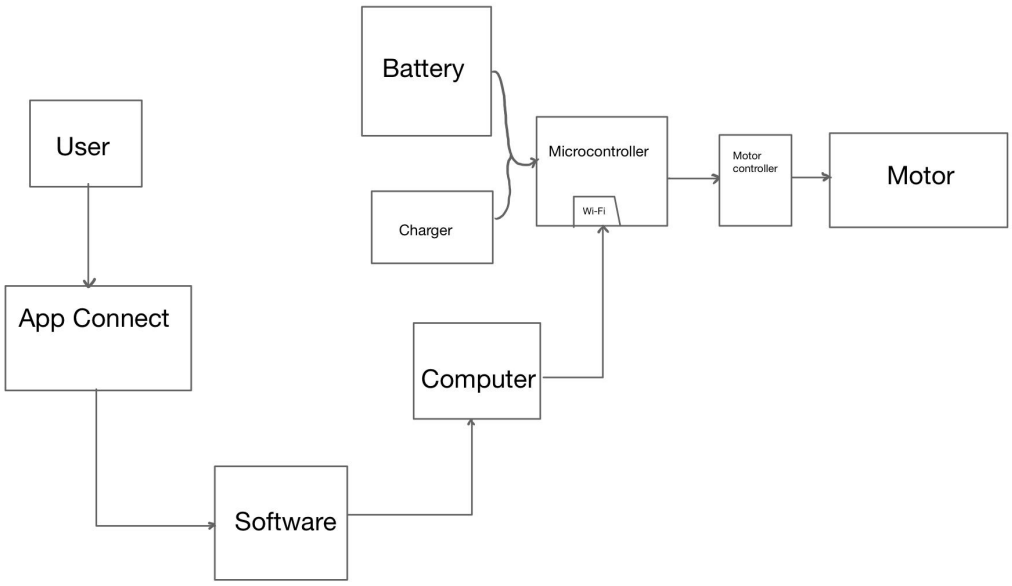
4.3 Proposed Design

Things tried- various ways to connect motor to blinds, different app layout styles

Things implemented- motor, testing speed controller, test blinds

Things tested- different motors, different speed controllers, different battery capacities

4.3.1 Design Visual and Description



4.3.2 Functionality

The design will function in the TLA lab by having the unit attached to the blinds, and connected to the online application. Anyone will be able to access the application and from there they can interact with the UI in order to send signals to the microcontroller. THe microcontroller will then send the corresponding signals to the motor which will turn the blinds.

The design meets the functional requirements as it allows wholly to control the blinds, while having ranges in which they can do so, preventing them from breaking the blinds. Nonfunctional requirements will be met by making sure the website is easy to use and easy to get to, so that users can have a pleasant experience with it.

4.3.3 Areas of Concern and Development

- Security of the device and application, potential to circumvent the application account hierarchy to mess the device due to the nature of wireless.
- Potential for the device to interact in destructive ways with the blinds causing them to become unusable and defeat the purpose of the initial retrofit.
- Potential for use outside of the intended application causing inconvenience to the users such as blinds being continuously activated from a remote location.

The use of strong network protocol should help mitigate some of the potential to access the device from outside the Official method of change. Use of a form of inexpensive lynch pin should help incase of brackage allow for safety of the device and blinds and should be easily fixed. A possible solution could be location based access to blinds from app or a report system allowing ETG to take away privileges to active blinds should abuse of the system occur.

4.4 Technology Considerations

We are limited to the prices we can spend on our components. The project is something that should be reproducible at a relatively low cost. This does mean, though, that we are only able to use particular motors, microcontrollers, and speed controllers in order to reduce the overall cost associated with the full unit.

4.5 Design Analysis

The proposed design will work with some slight alterations. We need to find out if we will need to change other items along the way.

The best idea for us is to change components in design piece by piece in order to weed out the options that will not work for us.

4.6 Design Play

The design was made to help students with the need to study better with lesson sunshine or reflection in their way due to sunlight. Students can adjust any of the blinds whenever or wherever they are in the area of a certain limit of the TLA. They can adjust with the use of the mobile app on their phone or tablet or on the computer. Students can adjust from Windows or Linux software. From the app or pc, it sends a wifi signal to the microcontroller that connects to the motor controller, that rotates the motor clockwise or counterclockwise. The Battery and charger will be connected to the microcontroller, so that it is always charged for whenever it is to be used.

5 Testing

5.1Unit Testing

Microcontroller - uploading code to see functionality and what can be integrated

Motor - testing different motor units to see which type would provide proper output

Software - Debugging and testing with circuit

Battery - Using different batteries and looking at circuit to determine proper battery output needed

5.2 Interface Testing

1 The connection part is being tested by hooking up different types of connections and seeing if they work well by turning the blinds or not.

2 Another part is the motor controller which must work and be able to turn the blinds at an appropriate speed without heating up. We found that one of our motors heats up too much and through testing we have already found problems that we will work towards fixing.

All in all, the interface of our design is a simple embedded system from SW to HW. Embedded is a system of wires and SW. We not only have one interface but multiple interfaces - Which makes it difficult to identify and define just one, but in this case I would say printed circuit boards.

5.3 Integration Testing

Frontend -

Communication for the surface of our project needs to be able to send HTTP requests to the server and receive a response. Test code will be written to guarantee that all of the http functionality implemented on the server can be accessed by the web application. This can be done using "some library" that node.js uses for testing.

Server -

Our server needs to be able to connect to both frontend by HTTP and to hardware over "UDP or Websocket" we're figuring it out. When checking for frontend connectivity we will note if they are integrating correctly should they not be though we can manually test for HTTP services using postman in order to help solve issues. As for UDP packets we can work to test connection by having hardware return a packet signaling success.

Hardware -

It just needs to be able to receive packets so have test code for it to signal reception and send a reply so that both ends know they work. It is also possible to manually test packet transfer by running it on an isolated network and using wireshark to sniff the packet transfer. This could help us see if it's being sent but hardware isn't received and could help with testing.

5.4 System Testing

Hardware:

- Battery connect to motor and microcontroller test
    - Making sure it runs properly.
    - Making sure to wire our solder neatly and safely.
    - Making sure the battery doesnt overload the motor or microcontroller
- Microcontroller with arduino test

        - Making sure the microcontroller is receiving the code from the arduino which lead to controlling the motor correctly
- PC board created
    - Design circuit for PC board, with the connection of arduino and microcontroller into it
        - Making it easier to replicate
        - Making it neat and condense smaller.
- Arduino connects to PC board.
    - Soldering it to already made PC board circuit
        - Connection is easier with less wire
            - Easier to solder

Software:

- Front-end correctly deployed to server
    - We are using Vercel to host our application, we need to ensure that this platform remains trustworthy.
    - Front-end does not contain glitches or too many dependencies that will crash the server
- Front-end correctly authenticates the user
    - We will use Okta to match a users login information with the Iowa State student database
- Communication between front and back end.
    - Using HTTP requests, the front-end will need to be able to communicate with the SQL database.
- Backend with the arduino
    - We need to ensure that the arduino is properly monitoring the back-end so that if the back-end changes, the arduino will be able to set the hardware in motion.

5.5 Regression Testing

Testing single component changes at a time helps reduce the chance of breaking in the old system. The most minor changes are made each time which creates less of a possibility of overloading the circuit. Overall, we have several “lynch pin” style break point which allow the system to break in a controlled manner if needed. The same minor update plan is also used through the software.

5.6 Acceptance Testing

The functional aspect for this will have a lot to do with the system and integration testing, as those tests are already about making sure the functional aspects of the project works, and double checking those results with the client’s expectations. The non functional

testing will have a lot more to do with the opinion of our client. Our client is also our advisor so we will continue to meet with him regularly and have him gather his reactions to the nonfunctional aspects of the design. The main nonfunctional we will seek out is ease of access, ease of use, and looks for the application. These will be opinion based tests so we will look to get feedback from the advisor and some ECPE students.

5.7 Security Testing (if applicable)

We need to authenticate users before they are able to control the blinds, which we will do through Okta. Iowa State should already have a database of students that we should be able to simply query to find out if the user is OK to adjust the blinds. Since we are using Okta, we have a dependency on them to ensure that a verification continues to be secure.

5.8 Results

- The result of each of the tests we did was what we expected except for the microcontroller. It heated up even with heat sink
    - Might need to replace or add additional heat sink.
- Have not yet tested the security of the system, but it will be somewhat simple to test once we are able to authenticate users. The second part of testing the security will involve that you cannot use any browser tricks to get around the authentication method.
- Testing also resulted in a conclusion that we might need to use a lower voltage battery and/or different size of motor to correspond better with the speed controller being used.

We would like to obtain better information in order to better solve our problems through the testing process.

6 Implementation

- For the next semester, our goal is to improve the hardware components and wiring by implementing a PC-board.
- For the next semester, our goal is to implementing the project itself onto the blind in TLA
- Improve and upgrade Coding for better service.
- Research and look for a case that can help project the hardware components.

7 Professionalism

Our areas of responsibility are based on the Nation Society of Professional Engineers standards. A table showing their standards can be found in the appendix. NSPE TABLE

Area of Responsibility	Using IEEE Code of Ethics	Own Words
Work Competence	Making honest and realistic claims; undertake only tasks you are qualified for	Being honest and taking on tasks for your suited skill is important to increase work competence
Financial Responsibility	Reject bribery	Rejecting bribery makes a person a faithful agent/trustee
Communication History	Make honest and realistic claims; offer honest criticism of technical work	These claims reflect how you should communicate honestly to the company and its stakeholders
Health, Safety, Well-Being	Accept responsibility for health, safety, and welfare; using appropriate application of technology; avoid injuring others, property, reputation, or employment	These items are all about reducing risk to people who may be affected by the final product
Property Ownership	Avoid injuring property	This is simply stated in the IEEE code
Sustainability	Accept responsibility for decisions on safety, health, and welfare of the public; disclose factors that might endanger the public or the environment	Protecting the environment is shown to be a priority as shown in these items; they want to make sure all aspects of an environment are safe
Social Responsibility	Produce products and services and benefit society and communities.	Social responsibility is covered the most from treating those you work beside with respect as well as respecting everyone in a population

Does Each Section Apply to Our Project? (respectively)

Work Competence: Yes, needed to assign tasks and create a path for the work that needs done **HIGH**
Financial Responsibility: No, we are working with a particular budget that would be difficult to take advantage of even if someone wanted to **N/A**
Communication History: Yes, we need to be able to constructively criticize each other's work to make progress **MEDIUM**
Health, Safety, Well-Being: Yes, we want to avoid hurting people in anyway possible during the construction and use of our final product **HIGH**
Property Ownership Yes, we want to leave minimal impact on the property to assure the product can be taken off if necessary **HIGH**
Sustainability No, there should be no environmental concerns with the project other than not producing much in the way of waste **N/A**
Social Responsibility Yes, we want to prevent discrimination amongst the group and make sure everyone feels welcome during the project **HIGH**

7.1 Areas of Responsibility

The NSPE Code of Ethics goes much more in depth into each aspect of the ethics necessary for engineering. These codes are overarching though, so they apply to all engineering fields. This means that they are more generalized, but also more specific in certain regards.

7.2 Project Specific Professional Responsibility Areas

No issues have arised with how the team is performing in these ethics related things. The only thing I think we could do better is criticizing work more often instead of just going ahead with what we are doing.

7.3Most Applicable Professional Responsibility Area

Our team has performed well in regards to work competence. We always try to justify our ideas and manage which ideas should be looked at deeper. We have done well with assigning tasks and pushing the flow of the project forward. We have also tried to perform with as much integrity as we can. An example of our work competence was in one meeting, we worked with a whiteboard to draw out each individual part and list possibilities below. Some ideas were not put on the board if the group determined they would be unnecessary.

8 Closing Material

8.1Discussion

While currently this project is only partially complete we are moving closer to having a fully operational system. After starting to get components together, we are now pretty sure this is a system that will accomplish our goal of having autonomous blinds to increase accessibility to a feature of the TLA

8.2Conclusion

- Goals/Limits: Have a prototype that functionally works both on software and hardware ends.
    - Start development of parts for final version
    - Develop plans for time management
- Work Done: Have a prototype of design with motor able to turn via software
    - Web application has been made
    - Developed a loose plan for work to be done next semester
- What Needs Done Differently: Using more design methods to develop processes
- Coordinate meeting times more effectively

8.3 References

List technical references and related work / market survey references.

Technologies Used:

[1]Facebook, “React – A JavaScript library for building user interfaces,” *Reactjs.org*. https://reactjs.org/

[2]“Next.js by Vercel - The React Framework,” *nextjs.org*. https://nextjs.org/

[3]“Chakra UI,” *Chakra UI: Simple, Modular and Accessible UI Components for your React Applications.* https://chakra-ui.com/

[4]“Redux - A predictable state container for JavaScript apps.,” *Js.org*, 2015. https://redux.js.org/

[5]“NextAuth.js,” *next-auth.js.org*. https://next-auth.js.org/ (accessed Apr. 22, 2022).

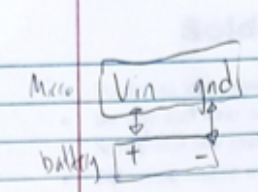
[6] “Select Blinds” https://www.selectblinds.com/roman-shades/classic-roman-shades.html

8.4 Appendices

Table 1. The seven areas of professional responsibility in the assessment instrument

Area of responsibility	Definition	NSPE Canon
Work Competence	Perform work of high quality, integrity, timeliness, and professional competence.	Perform services only in areas of their competence; Avoid deceptive acts.
Financial Responsibility	Deliver products and services of realizable value and at reasonable costs.	Act for each employer or client as faithful agents or trustees.
Communication Honesty	Report work truthfully, without deception, and understandable to stakeholders.	Issue public statements only in an objective and truthful manner; Avoid deceptive acts.
Health, Safety, Well-Being	Minimize risks to safety, health, and well-being of stakeholders.	Hold paramount the safety, health, and welfare of the public.
Property Ownership	Respect property, ideas, and information of clients and others.	Act for each employer or client as faithful agents or trustees.
Sustainability	Protect environment and natural resources locally and globally.	
Social Responsibility	Produce products and services that benefit society and communities.	Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

4/21/22 de-soldering - too much heat can be bad
600°F - 650°F is



battery 7.2 V
motor 4.0 screw 4.0 V ?
motor control 5-12 V
adjust (3.3 V - adj)
arduino micro control (Vin 4.5 - 21V)

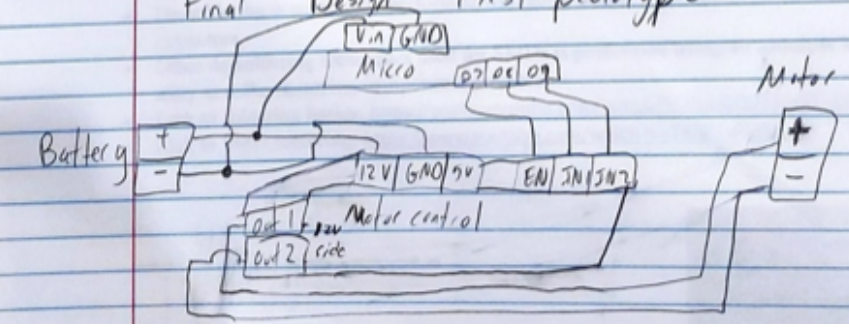
don't use 5 Volt side on motor control, use 12 Volt side
it's powered with 5, not 12

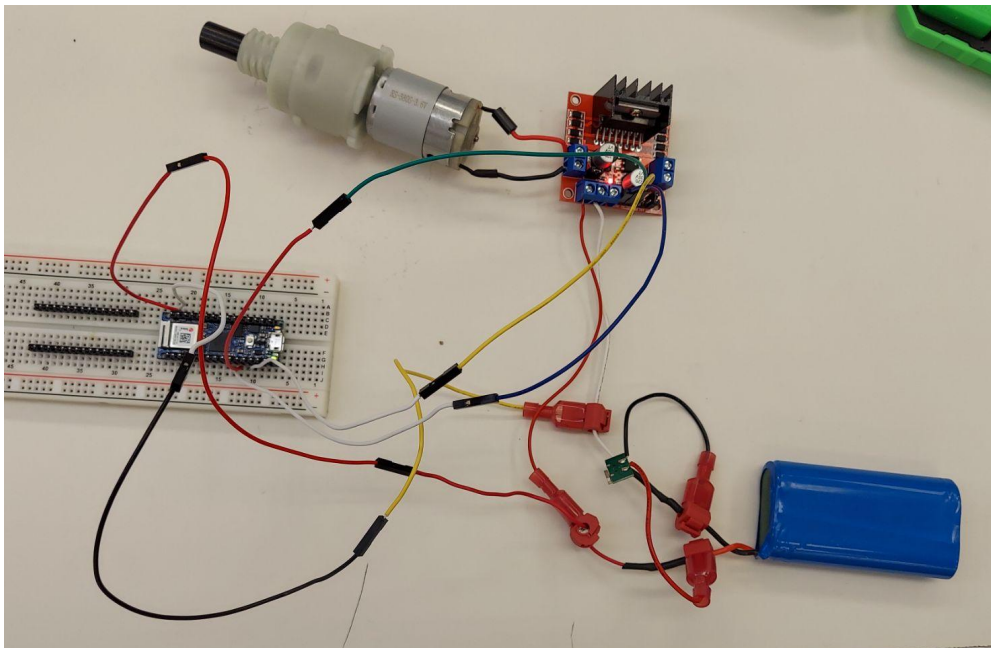
Working

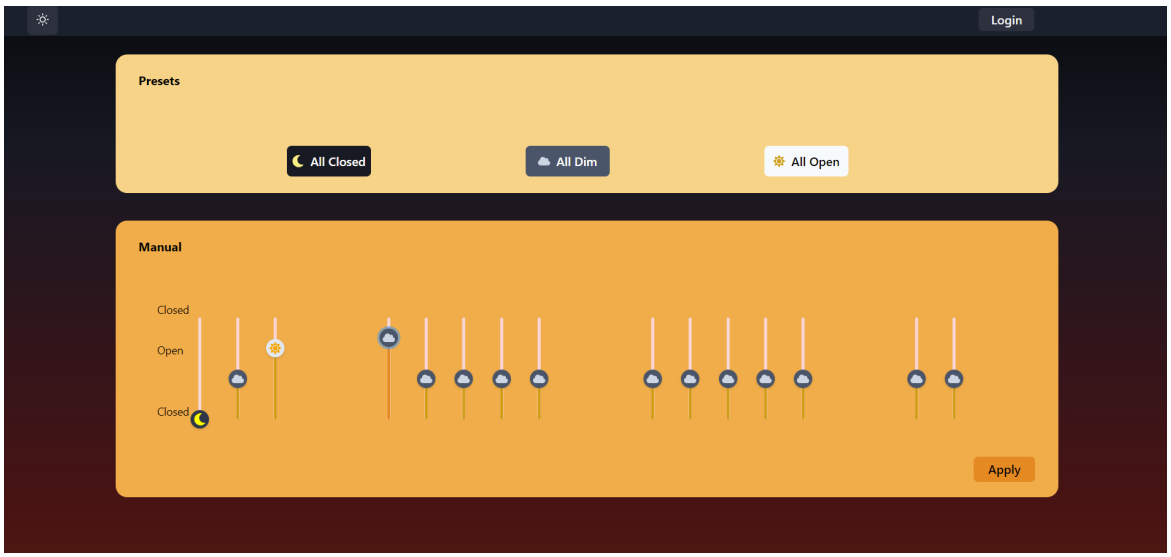
Micro reset

double tap	orange	paused
single tap	no orange	go

Final Design First prototype






Login
Presets
All Closed
All Dim
All Open
Manual
Closed
Open
Closed
Apply

8.4.1 Team Contract

Team Name___Group 11___

Team Procedures

1. Day, time, and location (face-to-face or virtual) for regular team meetings:

Monday: 9:55 - 10:55, Thursday: 2-3, Friday:9:55 -10:55

2. Preferred method of communication updates, reminders, issues, and scheduling (e.g., e-mail, phone, app, face-to-face):

Text based through whatsapp subject to change, as well as email to communicate Advisors and/or professors

3. Decision-making policy (e.g., consensus, majority vote):

Majority vote

4. Procedures for record keeping (i.e., who will keep meeting minutes, how will minutes be shared/archived):

Hieu Takes note on ipad, Daniel takes notes on paper, drawings and diagram as well as Potential parts put in google docs.

Participation Expectations

1. Expected individual attendance, punctuality, and participation at all team meetings:

Attend all meetings we have scheduled. Notification of other member required if attendance is not possible.

2. Expected level of responsibility for fulfilling team assignments, timelines, and deadlines:

Team mates should finish tasks on time or reach out to others if they are unable to.

3. Expected level of communication with other team members:

Respond to whatsapp within the day. Contact other members of smaller group (hardware/software) when making large changes.

4. Expected level of commitment to team decisions and tasks:

Treat like a class that all team members hope to succeed in.

Leadership

1. Leadership roles for each team member (e.g., team organization, client interaction, individual component design, testing, etc.):

Daniel is in charge of contacting advisor/client. Hieu is in charge of inter group communication. Andrew will be in charge of testing software.

2. Strategies for supporting and guiding the work of all team members:

Thrice weekly meetings to check up and check in, as well as whatsapp for anything in between.

3. Strategies for recognizing the contributions of all team members:

Collaboration and Inclusion

1. **Describe the skills, expertise, and unique perspectives each team member brings to the team.**

Andrew D- Experience with GitLab, JavaScript, and React/Next.js

Daniel A- Experience with Gitlab, in class for MySQL and client communication

Hieu N- Experience with mechanical set up and power wiring, and soldering.

Caleb T- Electrical Engineering background, soldering skills, work and team experience.

Logan S- Experience with Gitlab, software, electronics, schematics, and teamwork

Jacob N- Microcontrollers, software programming

2. Strategies for encouraging and support contributions and ideas from all team members:

Verbal encouragement, active listening, and open-ended discussion

3. Procedures for identifying and resolving collaboration or inclusion issues (e.g., how will a team member inform the team that the team environment is obstructing their opportunity or ability to contribute?)

Goal-Setting, Planning, and Execution

1. Team goals for this semester:

Create protoblind controls with simple control software that can be improved upon, and fits inside the agreed upon budget.

2. Strategies for planning and assigning individual and team work:

Every week we have a couple of meetings we put worth what we individually think we can do and what we need to have done as a team and and trying make sure every has something that they can focus and put effort on for the next week.

3. Strategies for keeping on task:

Consequences for Not Adhering to Team Contract

1. How will you handle infractions of any of the obligations of this team contract?

By openly addressing it as a group with the infractee.

2. What will your team do if the infractions continue?

Then it will be brought with someone who holds power over giving grades for this course.

Team Members:

1) _____Andrew Deick_____ 2) _____Caleb Townsend_____

3) _____Daniel Andrews_____ 4) _____Hieu Nguyen_____

5) _____Jacob Nett_____ 6) _____Logan Shada___