ENSC 305W/440W Grading Rubric for Project Proposal

Criteria	Details	Marks
Introduction/Background	Introduces basic purpose of the project. Includes clear background for the project.	**/05%**
Scope/Risks/Benefits	Clearly outlines project scope. Details both potential risks involved in project and potential benefits flowing from it.	**/15%**
Market/Competition/ Research Rationale	Describes the market for a commercial project and details the current competition. For a research project, the need for the system or device is outlined and current solutions are detailed.	**/10%**
Company Details	Team has devised a creative company name, product name, and a logo. Outlines relevant skills/expertise of team members.	**/05%**
Project Planning	Details major processes and milestones of the project. Includes Gantt, Milestone, and/or PERT charts as necessary (MS Project).	**/10%**
Cost Considerations	Includes a realistic estimate of project costs. Includes potential funding sources. Allows for contingencies.	**/05%**
Conclusion/References	Summarizes project and motivates readers. Includes references for information from other sources.	**/10%**
Rhetorical Issues	Document is persuasive and could convince a potential investor to consider funding the project. Clearly considers audience expertise and interests.	**/10%**
Presentation/Organization	Document looks like a professional proposal. Ideas follow in a logical manner. Layout and design is attractive.	**/10%**
Format Issues	Includes letter of transmittal, title page, executive summary, table of contents, list of figures and tables, glossary, and references. Pages are numbered, figures and tables are introduced, headings are numbered, etc. References and citations are properly formatted.	**/10%**
Correctness/Style	Correct spelling, grammar, and punctuation. Style is clear concise, and coherent.	**/10%**
Comments		

BikoTech
Automated Systems

Simon Fraser University
8888 University Dr.
Burnaby, BC Canada

September 23, 2013

Dr. Lakhsman One
School of Engineering Science
Simon Fraser University
Burnaby, BC, V5A 1S6

RE: ENSC 440 Project Proposal for Smart Blind System

Dear Dr. One,

The enclosed document, *Proposal for Smart Blind System*, contains information necessary to outline our capstone project. Our end goal is to design and construct a prototype for a system that allows users to automate the function of their blinds at home or at work.

The succeeding document contains a system overview that is described through a high-level design diagram. Among the other things we have included in this document include a cost breakdown, source of funding, and a master schedule that divides the project into a set of deliverables.

The BikoTech team consists of the following people, Jorden Bryer, Chaman Toor, Willy Wong, and Clark Zhao. Each one of us has valuable experience working in industry. From working with hardware to software we all bring various skills to make BikoTech a competitive and engaging company. In any case if you want to reach out to contact me about any questions or concerns you many have, I can be contacted either by phone at 778-861-5540 or by email via jordenb@sfu.ca
Sincerely,

Jorden Bryer
President and CEO
BikoTech Automated Systems

Enclosure: *Proposal for Smart Blind System*

BikoTech
Automated Systems

Project Proposal

Smart Blinds System

!

The BikoTech team consists of four members from various backgrounds. Considering the scope of this project we have unanimously decided to assign the following roles to each team member.

Jorden Bryer – Chief Executive Officer

Willy Wong – Chief Financial Officer

Chaman Toor – Chief Technology Officer

Clark Zhao – Chief Operating Officer

Executive Summary

Window blinds are devices that are found everywhere. From our homes, to our places of business, they are an ever-present solution to the need to regulate natural light. We use them daily, but put little thought into what they could be doing better. This is the outlook we had when we designed our Smart-Blinds System. We sought to improve a technology that we use everyday, and to allow more functions that others may find useful.

We found an interesting solution to a problem most just accept as a part of life. The need to manually operate your blinds; opening and closing them throughout the day in a constant effort to maintain a level of comfort in your environment. We see this as an opportunity for a more automated system, allowing for window blinds to help regulate natural light for you. The key pieces of technology we integrate into our window blinds systems are light sensors, timers, solar array, and a two motor control circuit that allows for opening and closing of the window blinds to be done automatically. Our system utilizes light sensors to determine based on user settings when the ideal moment is to open or close the blinds. We also equip our system with an alarm clock timer to allow users to input specific times when they'd like to toggle their blinds open or closed. Pulling these pieces of technology together will be a simple user interface that allows users to control all aspects of the automatic blinds systems. And with our solar array circuit we plan for our blinds to be able to operate indefinitely, independent of a wall socket or incessant battery changes.

With a moderate budget of approximately $475 we hope to achieve our goals this semester, and design a system that anyone would enjoy having in their home or place of business. We plan on acquiring a percentage of these funds from the Engineering Student Society Endowment Fund, and expect to cover any additional contingencies through the Wighton Fund.

In order to achieve our goals, we have proposed a schedule outlining the key milestones we need to meet in order to complete our project; as well as a framework of deadlines that suggest ideal times for completion, while still allowing some milestones to be given extra polish as required. Of course the most important factor in the success of any project is having the right people, and we believe we have a great team of engineering students backing up our goals. Jorden Bryer, Chaman Toor, Willy Wong, and Clark Zhao are motivated and excited to take on the challenges required to succeed in this project.

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BikoTech
Automated Systems

Introduction

For many students and workers, waking up in the morning can be one of the most difficult parts of their daily routine. Being able to start the day off on the right foot has been shown to be an important obstacle in tackling everyday life, but few solutions exist that don't include primarily blasting an alarm into your ear. As we all know from experience, this strategy of scaring yourself awake is neither natural nor ideal, and according to the National Sleep Foundation over 38% of adults feel unrefreshed waking up, and have difficulty getting out of bed.

Our product, Smart Blinds System, hopes to remedy this problem. Our system aims to allow its user to achieve a more peaceful and progressive wake up routine. By allowing natural light into your room, you can feel like your waking up to a sunrise everymorning. Accompanied with a gentle music alarm, you can wake up everyday feeling like you've been slowly caressed out of bed.

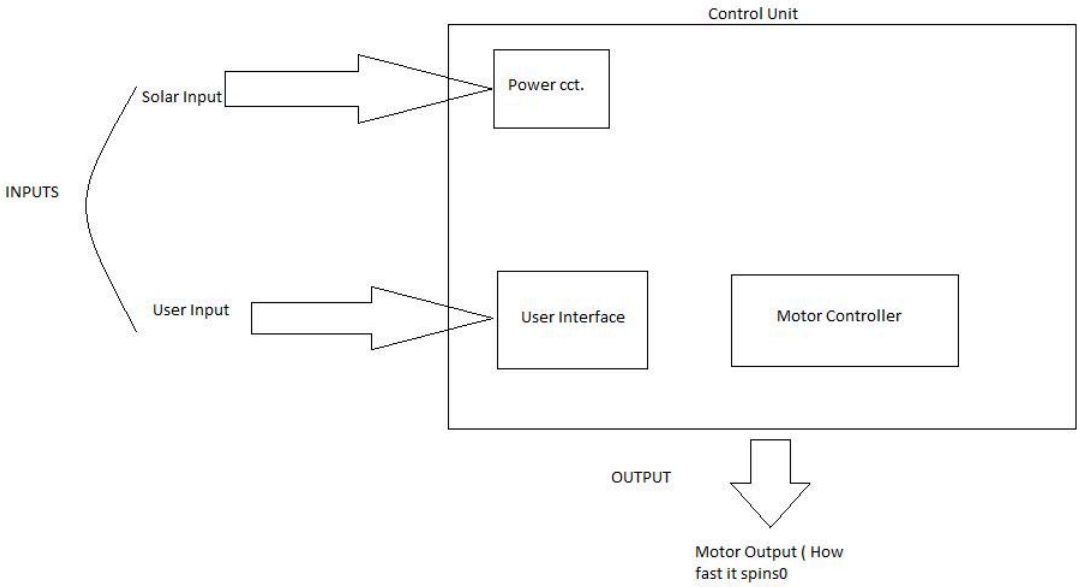
We also aim with our system to cater to businesses and building owners by providing an affordable blinds automation product. With our system business owners will be able to regulate natural light in their offices, and set times to automatically close and open blinds in the morning and in the evening. We believe this could help save companies significant man hours over the course of the year, all while creating a reliable system that never forgets to close the blinds after employees go home for the evening.

This proposal will provide an overview of our system, along with an estimate of the costs and a timeline of our development process. Other solutions will be taken into account to help demonstrate the efficiency of our own. We also give a brief overview of the members of our company to illustrate our wide range of skills and capabilities.

System Overview

The Smart Blind System uses an Arduino along with two motors and light sensors to give the user automatic control of the blinds at the ease of a fingertip. The user interface includes a physical control switch with options of open, close and tilts as well as setting buttons for the alarm beneath a LCD screen. Besides the convenience of controlling the blinds manually, the user could set the alarm, which could trigger the opening of the blind in the next morning. If the user favors a more natural way, the system could be set based on the feedback from the light sensors.

A high-level block diagram of the system is as below. When the system is on 'manual' state, the actions of the blinds only follow the instructions from the control unit. The light sensing option is disabled. When the system is on 'auto' state, the system also relies on the input from the light sensors.



Possible Design Approaches

1. **Dawn to Dusk electric curtain**

Advantage: works with 99% of pull cord systems either regular cord or beaded cord. Suitable for lightweight curtains and blinds up to 7kg using a glider style track and up to 10kg using wheeled track runners. Track spans up to 5 metres for centre draw curtains and 3 metres for single piece curtains and blinds. Will rotate or draw vertical blinds.

Disadvantage: This product has the advantage of covering wide range of blinds with cord systems and very easy to install since it is mounted on the wall and utilizes the cord or beaded cord directly. However, it needs a plug in timer module for daily scheduled operation.

2. **Electric Curtain Tracks (HT100)**

Advantage: This product family covers curtain sizes from 2m - 7m. The remote control can operate 8 sets of units without interference each other and could open and close the window curtain by remote control, control pad, wall switch, or timers

Disadvantage: The system provides its own curtain racks, therefore it couldn't adapt to existing curtain structure. The price mark is at $100, which is much higher than the previous product.

Proposed Design Solution

Our proposed solution is an Arduino based system with the utilization of light sensor and control panel with LCD screen. First, the system aims to provide automation for blinds system with cords, through which our system could interact by two motors controlling the rotating and opening and closing of the blinds. This saves the efforts of purchasing special curtain racks. Secondly, the control panel, which consisted of a LCD screen and several function buttons, provides a user-friendly interface. What's more, we aim to power the system through solar power with mounted solar grid.

Regarding where to user the motors to control the blinds, whether it is through the rotating part hiding inside the top cover or the outside the pulling beams, is still under discussion. The size of the curtain gives rise to the selection of the approach. The first approach should leave little traces of make-up for the curtain judging from outside since the majority of components will be hiding inside the cover, given that this is a system rather than a single product, aesthetically this would be the better approach. Moreover, direct interacting with the rotating beams inside could potentially reduce the amount of power used from the motors, which is critical based on the idea of powering the system with solar grid. However, some blinds system don't offer the privilege of wide space on the top cover, giving no opportunity of placing circuit boards and other components inside. The benefit of second approach arises as essential, even though temporarily the hanging wires and other components may look like a mess.

Budget and Funding

The projected costs to build a working prototype of our system are outlined in the following table.

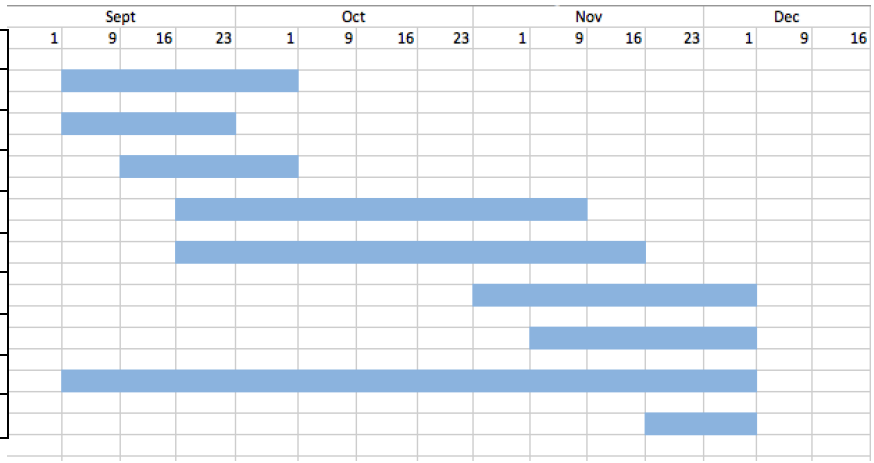
Parts	Cost
Arduino Mega 2560	$80
1 Inch Light filtering Blinds	$66
Medium Duty Solar Panel 5W, Battery, Controller	$42
PCB Etching Kit	$39
7A Bi-Directional Motor Controller	$38
Parallax Servo Motor x2	$35
Ardumoto – Motor Driver Shield	$28
Joystick Shield Kit for Arduino	$24
IIC/I2C Serial 2.6” LCD 1602 Module Display for Arduino	$21
Contingency Fund	$100
Total	**$473**

The majority of our costs come from the microcontroller we plan to use, and the blinds themselves. The blinds had to be a specific weight and height for our motors to be able to open and close them efficiently. Also our blinds needed to have a large enough top housing to fit our microcontroller and associated circuits. The solar panel set up is also a significant cost as it includes rechargeable batteries and the power controller. Our projected costs also include a small contingency fund to account for any unexpected costs such as faulty or damaged parts.

Schedule/Timeline

The following Gantt chart shows the planned timeline for our project. Individual tasks are dependent on the preceding steps, so the research stage is very crucial. Our main objective is to complete the prototype and work out all the bugs within the given timeframe. It is crucial to have a working product by the project completion date.

Research
Proposal
Functional Spec
Design Spec
Assembly of Modules
Integration/Testing
Debugging/Modification
Documentation
Process Report



Gantt Chart

Company Profile

Jorden Bryer - CEO

Jorden is a fifth year engineering student at Simon Fraser University currently focusing on the Electronics concentration. He has completed his previous work terms at Broadcom and Icron Technologies. During these coops he gained experience working with Arduino boards and is very fluent in C++, Perl, VHDL and MATLAB. Jorden has previous knowledge of working with electronic control and power systems. Among these things Jorden is an excellent communicator with very polished written and oral skills. He can be reached by e-mail at jordenb@sfu.ca.

Clark (Gaopeng) Zhao - COO

Clark is a fifth year engineering student at Simon Fraser University currently focusing on the Electronics concentration. He has completed two work terms, both at Broadcom. Clark is avid student who is outgoing and loves to engage others in constructive conversations. Of the many skills Clark has some of them include working with Linux systems, programming in C/C++, assembly language and many others. Clark can be reached through email at gzhao@sfu.ca.

Chaman Toor - CTO

Chaman is a fourth year engineering student at Simon Fraser University currently focusing on the Computer Engineering option. Chaman has completed two work terms both at Ericsson. Chaman has experience working with Network Protocols and automated software testing. Some of the skills that Chaman has acquired while at SFU and during the work terms are programming in C++, VHDL, assembly language, programming micro controllers, and working with FPGA's. Chaman can be reached through email at ctoor@sfu.ca.

Willy Wong - CFO

Willy is a fifth year engineering student at Simon Fraser University currently focusing on the Systems option. Willy has also completed his work terms at Broadcom and Icron Technologies. Willy has gained experience of circuit design, fine pitch soldering, PCB rework, AutoCAD, SolidWorks, and software integration. His background outside of school includes photography and design. Willy can be contacted through email at willyw@sfu.ca.

Conclusion

With our Smart Blinds System we are committed to create a product that people at all walks of life would like to use. Whether it be workers, students, the disabled, or business owners, we believe our system will find a place in many people's homes or offices. Our system will help our clients with a range of natural lighting issues, while still being an affordable and easy to use product.

We hope to maintain our budget and funding goals, and with our hardwork and experience in the field of engineering we will ensure a sufficient working prototype by our projects completion date.

References

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