

Major project proposal

by Sam Lamprey

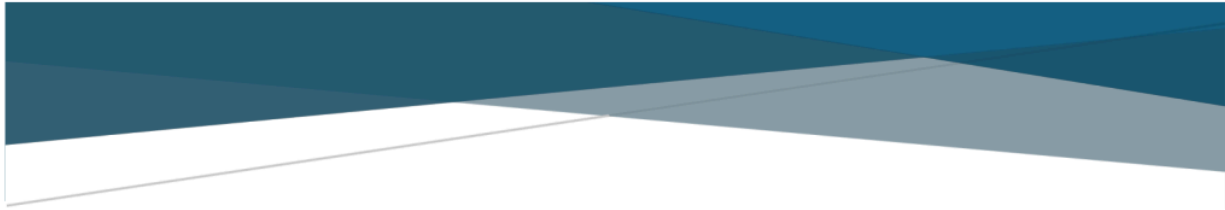
Submission date: 28-Oct-2024 01:34PM (UTC+0000)

Submission ID: 241181657

File name: 41425_Sam_Lamprey_Major_project_proposal_596864_2061413645.docx (113.88K)

Word count: 1995

Character count: 9652



PROJECT PROPOSAL

How effective is an automatic blinds system powered by a solar panel?

Sam Lamprey (2203378)
2203378@student.uwtsd.ac.uk
Electrical and electronic engineering

Major project proposal - How effective is an automatic blinds system powered by a solar panel?

Introduction

The area of interest for this project is electronics and more specifically [1]“smart home automation which has become increasingly popular in recent years due to an increase of research in the topic.” The idea for the project is an automatic blinds system which will automatically open and close the blinds depending on how bright the room is where the blinds are installed. Automatic blinds already exist and there have been papers published about them where it was found that [2]“ automatic blinds are effective at allowing in the desired amount of light “, but they don't factor in renewability. For example, automatic blinds would be a perfect way to incorporate a solar cell to power the circuit used in the blinds. This is because the blinds will be next to a window so there will always be some light coming in during the daytime which the solar cell could take advantage of. [3] “Solar panels are also becoming more popular as more people are realizing the importance of sustainable energy.”

Problem

The problem that the project aims to find an answer to is how viable is an automatic blinds system that is powered by a solar panel, and could it work as a smart home device? As [4]“smart homes use technology in home environments.” This problem could be split into different sections, each of which would focus on a different part of the system. This would include powering the circuit using the solar panel because[5] “solar panels can work in indoor and outdoor applications” making them perfect for this application , reading the value from a photo diode/sensor, processing that information and lowering and raising the blinds accordingly to allow the desired amount of sunlight into the room, as well as external controls to allow for the blinds to be operated manually if desired by the user.

The first task that will be completed during the project will be to conduct more thorough background research about the project to gain more information about what needs to be done and what already has been done in the same field.

To power the circuit there may not just be the solar panel as it is likely that as there is less sunlight at certain times of the day, so the solar panel may charge a battery or work with a battery to power the circuit. This will have to be decided by testing the circuit to find what works best for the system.

The blinds will be automated using a photosensor/diode which will be used to detect the level of sunlight coming into the room where the blinds are. When the [6] “photodiode detects light, it will act as a switch” which will output different values depending on the light level. This will then be read by the PIC microcontroller that will be used in the circuit which will process the information and output to the motors accordingly. The motors will then move a certain amount depending on the level of light in the room. The amount that the blinds move will be decided while testing to

make sure that the blinds are either raised or lowered to the correct height to allow the right amount of light into the room.

There will also be manual controls for the system in case the user does want to open or close the blinds manually. These controls will have buttons for up and down as well as a button to tell the system that you are going to control the blinds manually so that the blinds will not move again from the position that is set by the user until the system has been put back into the automatic mode.

Expected outcomes

The expected outcome for the project will be a working system that automatically opens and closes blinds without the input of a user. This will be achieved using a photodiode to detect the light level and then sending that information to a microcontroller to process and then output it to motors that will move the blinds. The system will also be powered by a solar panel which will either power the circuit entirely or will be used along with a battery depending on the power that the panel is able to output.

Project design

The overall aim of the project is to determine how affective automatic blinds are at blocking and allowing in light without the user having to lower or raise the blinds manually.

This will be achieved by using a photosensor/diode which will output different voltages depending on the level of light in the area where the blinds are. This information will then be processed using a pic microcontroller which will calculate using the information from the sensor how much the blinds should open or close and then using this value it will output a signal to the motors which will then lower or raise the blinds.

The system will also contain a small solar panel which will provide power for the circuit, but it is possible that a battery may also be needed due to the solar panel only being effective when it is light outside and the circuit may require more power than the panel can output.

The system will also have manual controls in case the user does want to open or close the blinds manually. These controls will have buttons for up and down as well as a button to tell the system that you are going to control the blinds manually which will make sure that the blinds will not move again from the position that is set by the user. This will be indicated by a small LED next to the button.

The concept of automatic blinds isn't new as there are multiple variations that already exist and can be purchased. But most of these are not fully automatic as they used a controller to open and close the blinds. What makes this

system different is that it will be more environmentally friendly as it will have a built-in solar panel which will be used to generate the power for the circuit inside of the blinds. They will also be fully automatic and will not require an external controller for them to open and close. There will also be no external wires for the system due to it being powered by a solar panel and battery, meaning that it could be fitted at any window even if there isn't a plug socket nearby.

Analysis

Throughout the project the main data that will be collected is light levels and how the sensor reads them. This data will be collected by measuring the voltage and current that the sensor outputs when different intensity light is pointed at it. This data will then be used to help write the program so that the microcontroller will be able to move the motors the correct amount. Data on how much the blinds should open and close will also have to be collected to be able to calculate the optimal amount that the blinds should open or close for the level of the light that is detected by the photosensor. This will be done by editing the program to spin the motors for different durations of time to find out what those values need to be set to, to move the blinds to the correct height for the light level. To get the data a prototype of the circuit will be built and tested, which is when the program for the circuit will also be tested and modified to be able to have the system working as optimally as possible. The data collected will be analyzed to find out what values of components will be needed to have all of the components in the circuit working together as intended.

Resources

Throughout the project multiple different resources will need to be used for each section of the project to ensure its success. The first resource that will be needed is access to existing information on the topic area such as published articles and journals. To read these documents, access to the UWTSD library page will be needed as well as other databases of articles and journals such as proquest or sciencedirect. These will be necessary for the project as without background research the project could overlap with existing work and research. Researching the topic area will also help narrow down the topic area.

When creating the circuit for the project different software will be required. The first piece of software that will be used for the project is proteus, which is a circuit simulation software which will be used to create the initial circuit design before the first prototype.

The program that will be used by the microcontroller will be written in the embedded C programming language which will also require software. The software used to write the program will be CCS for pic which easily integrates into the proteus software. Also the MPLab software will be needed as the pic programmer that will be used works with this software.

Microsoft excel will also be needed for the project as it will be used in two different ways. The first use of excel is to create a Gantt chart that will be used to make sure that the project is on track. The second application of the excel software will be to store all of the data that will be collected when completing testing for the project.

The project will also require physical resources to be completed. This will include components that will be used to make the circuit. Other equipment such as the pic microcontroller programmer will also be needed to program the pic used in the design.

Project plan

Title	Start date	End date	completed
Research	26/09/2024	29/04/2025	NO
Project proposal	26/09/2024	28/10/2024	Yes
Lab notebook	11/11/2024	20/04/2025	NO
Initial circuit design	11/11/2024	25/11/2024	NO
Initial circuit testing	11/11/2024	25/11/2024	NO
Initial program	18/11/2024	25/11/2024	NO
Further circuit design	25/11/2024	20/04/2025	NO
Further circuit testing	25/11/2024	20/04/2025	NO
Further program testing/ design	25/11/2024	20/04/2025	NO
Interim viva	16/01/2025	17/01/2025	NO
Final report	11/11/2024	29/04/2025	NO
Project poster	17/01/2025	05/05/2025	NO
Final viva	06/05/2025	07/05/2025	NO

Project questionnaire	09/05/2025	09/05/2025	NO

Figure 1

References

- [1] A. J. Brush, J. Albrecht and R. Miller. A. J. Brush, J. Albrecht and R. Miller. Smart homes. Smart homes. *IEEE Pervasive Computing IEEE Pervasive Computing* 1919(2), pp. 69–73. pp. 69–73. 2020. . DOI: 10.1109/MPRV.2020.2977739.
- [2] V. Mettanant and P. Chaiwiwatworakul. V. Mettanant and P. Chaiwiwatworakul. Automated vertical blinds for daylighting in tropical region. Automated vertical blinds for daylighting in tropical region. 2014, . DOI: 10.1016/j.egypro.2014.07.079.
- [3] J. Palm. J. Palm. Household installation of solar panels – motives and barriers in a 10-year perspective. Household installation of solar panels – motives and barriers in a 10-year perspective. *Energy Policy Energy Policy* 113113pp. 1–8. pp. 1–8. 2018. . DOI: 10.1016/j.enpol.2017.10.047.
- [4] M. R. Alam, M. B. I. Reaz and M. A. M. Ali. M. R. Alam, M. B. I. Reaz and M. A. M. Ali. A review of smart homes-past, present, and future. A review of smart homes-past, present, and future. *Tsmcc Tsmcc* 4242(6), pp. 1190–1203. pp. 1190–1203. 2012. . DOI: 10.1109/TSMCC.2012.2189204.
- [5] T. V. Tran and W. Chung. T. V. Tran and W. Chung. High-efficient energy harvester with flexible solar panel for a wearable sensor device. High-efficient energy harvester with flexible solar panel for a wearable sensor device. *Jsen Jsen* 1616(24), pp. 9021–9028. pp. 9021–9028. 2016. . DOI: 10.1109/JSEN.2016.2616114.
- [6] A. Dere, M. Soylu and F. Yakuphanoglu. A. Dere, M. Soylu and F. Yakuphanoglu. Solar light sensitive photodiode produced using a coumarin doped bismuth oxide composite. Solar light sensitive photodiode produced using a coumarin doped bismuth oxide composite. *Materials Science in Semiconductor Processing Materials Science in Semiconductor Processing* 9090pp. 129–142. pp. 129–142. 2019. . DOI: 10.1016/j.mssp.2018.10.009.

Major project proposal

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

56/100

Intro / A&O (400 words)		
A fairly straightforward introduction, but could have had more detail and thought put into the justifications.	20	55
Background to the Project / Literature Review (400 words)		
A fairly simplistic writeup. No real detail of existing units, or what actuators might be used etc. Some of the statements or aims are perhaps questionable without further explanation. The whole writeup is very vague and needs more specificity.	20	50
Project Design (500 words)		
Clear statement of which development methods are to be used and why they are appropriate; Clear statement of which tools are to be used and why	30	58

they are appropriate; Clear description of how data collected will be analysed Some description of what tools to be used, but scant detail on data collection for testing other than ascertaining sensor parameters.		
Resources / Planning (200 words)		
List of any deliverables; Clear diagram showing both timing and resource use; Completed ethics form; Limited and relevant appendices A project plan is there – but why no gantt chart at this stage?	15	55
Document Presentation		

Correct spelling, grammar and punctuation; Flow of narrative/fluency; Coherence; Word processed ; Correct use of referencing with bibliography; Strict word limit		
Some citations inserted, but the style of implementation is a bit 'clunky'	15	60
TOTAL	100	56%

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6
