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Automatic Adjusting Blinds

I. Problem Statement

When it comes to energy, sunlight is one of the most cost effective and environmental methods of heating and lighting a space. Sunlight additionally has the benefit of improving the comfort and satisfaction of a building's inhabitants, improving mood and work performance [1]. However, depending on the time of day and location of the window, the angle of the sun can result in a glare that is discomforting or even disabling [2]. This glare can limit a person's ability to function, even more so when the work involves viewing other sources of light such as a computer monitor.

II. Existing Solutions

1. Applied film, or window tint, can be used as a permanent form of light control, with both professional and do-it-yourself options available. Applied film cannot be adjusted for various light levels once installed, possibly requiring more artificial light. The reduced light can also result in higher heating costs, particularly in cooler climates [3].
2. Manual Controlled blinds are commonly installed in homes and businesses for light control. By pulling a chain or twisting a wand, the blinds can be raised, lowered, or angled to control light depending on the model. Being manual however, these blinds cannot be changed once set once a person leaves for the day, with 75% of residential window covering remaining in the same position every day [4]. This does not for adjustments for temperature throughout the day.
3. Remote operated blinds provide more convenience than the manual. With the ability to adjust blinds from a distance, it allows for blinds to be in less convenient locations such as higher window locations. Some even allow for scheduling via an app or through smart home devices [5] [6]. While convenient, this may not account for temperature changes within the building.

III. Proposed Solution

To adjust the blinds without the need for human interactions, the blinds must detect a rise in indoor temperatures and determine the amount of light currently entering the building. A light sensor could detect if the sun has risen along with the current amount of light entering the window. This information could enable a user to set the desired brightness before the blinds close, and allow a desired amount of natural light [7]. To prevent temperatures from getting too high, an internal sensor can be used to determine a rise in ambient temperature [8]. Each sensor will have a set high and low activation level, which will activate one of two blinds. The first blind will be a thinner fabric that provides some shade, but still allows most light to pass through. The second one will be a thicker material that blocks most or all the light. Should the user desire the blinds to be up or down outside of the usual activation, a remote will be available that can change both the temperature and light level activation settings, as well as an override.

IV. References

- [1] J. Y. Shin, G. Y. Yun, and J. T. Kim, "View types and luminance effects on discomfort glare assessment from windows," *Energy and Buildings*, vol. 46, pp. 139–145, Mar. 2012, doi: <https://doi.org/10.1016/j.enbuild.2011.10.036>.
- [2] W. K. E. Osterhaus, "Discomfort glare assessment and prevention for daylight applications in office environments," *Solar Energy*, vol. 79, no. 2, pp. 140–158, Aug. 2005, doi: <https://doi.org/10.1016/j.solener.2004.11.011>.
- [3] "Applied Film | Efficient Window Coverings," efficientwindowcoverings.org. <https://efficientwindowcoverings.org/understanding-window-coverings/applied-film> (accessed Sep. 06, 2023).
- [4] "Energy Efficient Window Coverings," [Energy.gov](https://www.energy.gov/energysaver/energy-efficient-window-coverings). <https://www.energy.gov/energysaver/energy-efficient-window-coverings> (accessed Sep. 06, 2023).
- [5] "Automate Pulse 2 Hub," Blinds To Go. <https://www.blindstogo.com/en/pulse2hub> (accessed Sep. 06, 2023).
- [6] "Motorized Blinds & Shades," Hunter Douglas. <https://www.hunterdouglas.com/motorization> (accessed Sep. 06, 2023).
- [7] "Ambient Light Sensors," [ams](https://ams.com/en/ambient-light-sensors). <https://ams.com/en/ambient-light-sensors> (accessed Sep. 11, 2023).

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[1] A. Dewy, B. Cheetham, and C. Howe, "Capability limitations of GISMO," Journal of Latest Things, vol. 27, no. 3, September 2017.

[2] B. Honeydew and A. Beaker, "Potential performance gains in 'Smart Processing,'" MIT Technology Review, December 25, 2017.

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