

# SOLAR TRACKING AND LIGHT FILTRATION SYSTEM: SMART UMBRELLA

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## 1. Introduction

Nowadays people are more exposed to Sunlight for professional purposes, sports, or holiday. Increased exposure to Sunlight causes adverse events such as skin diseases. These negativities caused by the Sun are dependent on the types of rays present at the time of exposure to the Sun rays and the intensity of the rays depending on the angle with which the Sun rays come. How to reduce the negative effects of the Sun is one of the most researched topics today. With the rapid growth of population and industrialization, the energy crisis and the effects of global warming are now an increasing concern. In order to solve the energy problem it is necessary to create an automatic system that can acquire high efficiency from the solar panels and rotate continuously. In addition, the negative effects of global warming on creatures push people into different pursuits. The solar tracking system is one of the most suitable technologies developed to get rid of the negative effects of global warming and energy need (Khan, 2005; Chong, 2010). In this project, it is aimed to construct a solar tracking system prototype that can be used in Sunny weather, can be followed by a closed loop type without any user intervention and can follow the solar with two axis characteristics and also can automatically adjust the amount of light passing through two polarizers by using microcontroller.

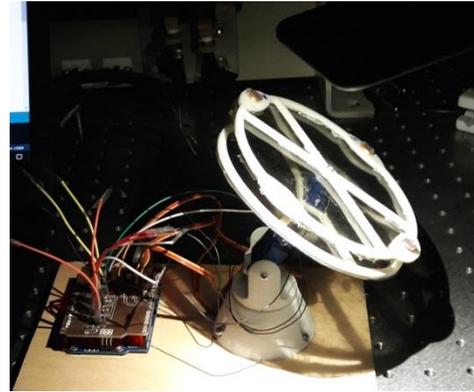
## 2. Method

In accordance with the purpose; servo motor and light sensors (LDR) were calibrated by taking measurements on a microcontroller card. Then the appropriate designs were acquired for the two axis movement of the umbrella, and it was produced with a 3D printer (Figure 1).



**Figure 1.** Printed parts and servo motors

Electronic and mechanical parts are mounted together with polarizers to complete the mechanical part of the solar tracking system (Figure 2). Algorithm that can perform the light tracking and filtering functions of the system was searched and the arrangements were made to ensure that it moves optimally.



**Figure 2.** Completed smart umbrella

## 3. Results

The developed system has the feature that autonomously moves the system; in such a way that the light is evenly and perpendicularly comes to the entire surface by perception of the light intensity difference falling on the LDR. Polarizers on the top of the system polarize the light, reducing the amount of light intensity. Moreover, by changing the angle between two different polarizers, it is possible to filter in the range of zero light intensity and half of the intensity of incoming light.

## 4. Conclusion

The system that we have developed creates more shadows and also filters the light by automatically tracking the Sunlight at the time people are exposed to Sunlight. Thus provides more comfortable and healthy living conditions.

## 5. References

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2. Chong, K. K.,& Wong, C. W. (2010). General Formula for on-Axis Sun-tracking system. In *Solar Collectors and Panels, Theoryand Applications.* InTech.