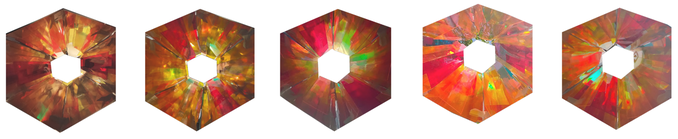
Kaleidoscopic Dune

LAGI 2022 Mannheim / Conceiving an interactive and ever-changing

Mankind has been living on the earth for a long time. It can't be denied that in order to live, humans need many elements from nature, 'Light' is one of the main elements that we need for living. We have been using light for many activities, such as hunting, cooking, celebrating, or even for a funeral. It can be seen that we can't live without 'light'. Therefore, in this project, we would like to design a project that aims to celebrate the relationship between humans and light, we would like to present another beautiful aspect of light and we also would like to present the idea of how can we use the combination between technology, art, and light to generate electricity in order to provide and inspire an idea of how we could produce the clean energy and support the sustainable goal of the world.

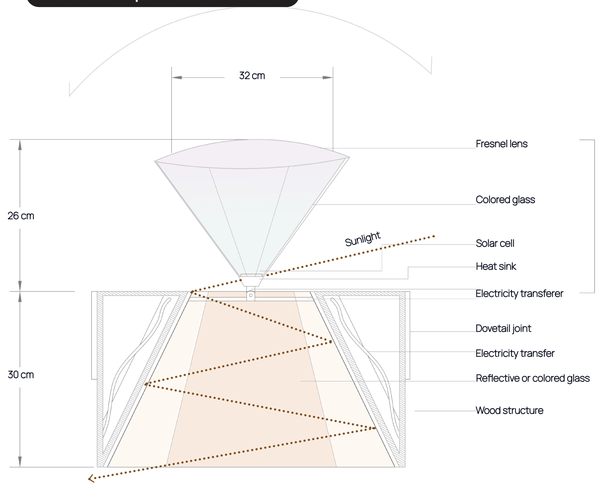
The idea of this project is to design a modular structure system that can be adjusted to several designs and can be connected to each other in order to create a bigger pavilion. One modular system consists of more than 70 hexagonal kaleidoscope solar cell module. Inside Each hexagonal module has a color glass and reflective glass which will reflect the light and it will create a kaleidoscope effect in the pavilion where users could experience another aesthetic or light during the daytime and nighttime. On the top of hexagonal modules, we design an automatically rotatable solar system that will harvest the sun's energy in order to be used for activities in the pavilion and to be used in Manheim city.

Light effects using the same physical model:



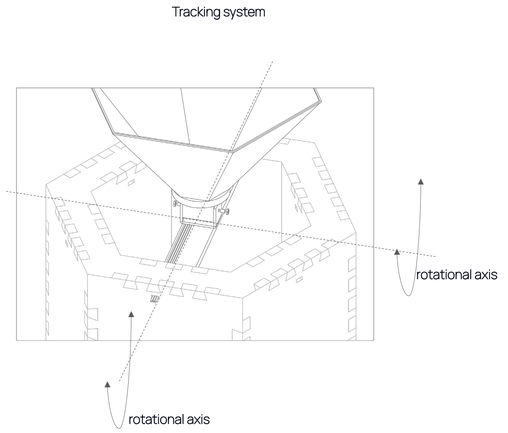
10 : 00 am | 12:00 am | 14:00 pm | 16:00 pm | 18:00 pm

Kaleidoscope Module Section



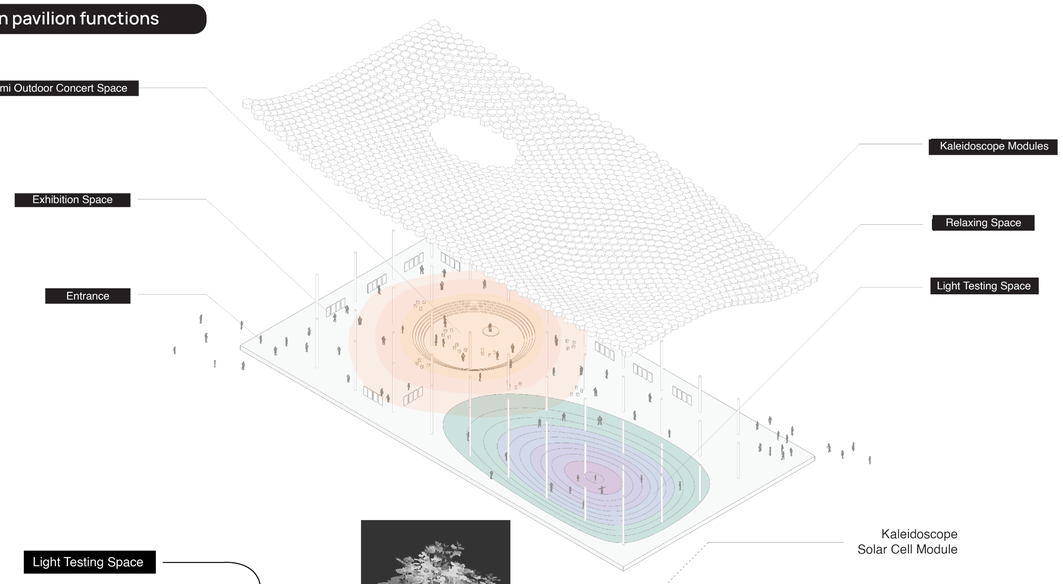
The system we are using combine both Integrated Concentrating Solar Facade (ICSF) with a kaleidoscope. The individual pyramid-shaped suspended glass modules can capture sunlight by moving around a pin, rotating around the horizontal and vertical axis to respond to the path of the sun and maximize the natural lighting. The structure of the pyramidal glass is particularly complex because it is characterized by a primary (POE) and secondary optical element (SOE), a highly efficient concentrator photovoltaic cell (CPV), and a water heat exchanger (HX). The light is then reflected consecutively on the colored glass, (both on the ICFS system and the kaleidoscope system) which create this unique effect.

Tracking system



The tracking system used is a bi-axis tracker which optimises the position based on the altitude and azimuth of the sun at that point of time for a particular location. The GPS sensor tracks the position of the sun and provides the input to the altitude and azimuth positioning controller. They influence the motor drivers and stepper motors to change the position accordingly. Then the information is passed to an azimuth or altitude value encoder which provides feedback to the azimuth or altitude positioning controller in a loop.

Main pavilion functions



Main pavilion cross section