Design and construction of a solar simulator to finding new maximum power point tracking (MPPT)

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Silicon solar panels convert sunlight directly into electricity using crystalline silicon solar panels. The important characteristic of light absorbers, including crystalline silicon, is the wavelength range of light that these materials absorb, which ranges from 400 to 1200 nm in crystalline silicon. In an industrial scale, solar cells are mainly produced from crystalline silicon with dimensions of 6 inches (156 x 156 mm square). To test solar cells in laboratory conditions, it is necessary to use light sources that produce white light (AM1.5) with a specific spectrum, spatial distribution and specific time stability specified by the standard (IEC60904-9). Device that produces such light is called a solar simulator and it is used to characterize and control the quality of solar cells.
In this research, design and construction of a solar simulator has been discussed. This device produces light with a specific spectrum, spatial distribution and thermal stability specified by the standard (IEC-60904-9) and it is used to characterize and control the quality of solar cells. In an industrial scale, solar cells are mainly produced from crystalline silicon with dimensions of 6 inches and the built-in solar simulator provides suitable light for testing such cells. This device has a special light source that is a combination of halogen and LED lamps and its selection of lamps and LEDs is done with simulations that have a good compliance with the spectrum provided by the standard. After passing through an optical homogenizer, the light of these sources is combined and provides a uniform spatial distribution in the dimensions of 16 cm x 16 cm, which conforms to the relevant standard.

Figure 1. solar simulator at opticniroo company

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