# DESIGN AND DEVELOPMENT OF SOLAR POSITION DETERMINATION AND TRACKING SYSTEM BASED ON GEO-CENTRIC MODEL

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## Abstract

A system for solar position determination and tracking is presented in this paper. The model is developed based on the geo-centric analysis of motion of sun around the Earth. The system has variety of applications such as: Solar tracking; solar position determination; Sunrise, Sunset time determination; visualization aid to the study of solar movement around the earth. The model has been designed keeping in view economy and it can be fabricated easily with locally available materials. The diurnal system dynamics requirements from the driving mechanism are simplified because of the configuration which closely generates the path required for tracking (which is obtained by two axis rotation in a two axis tracking systems) from a single axis diurnal rotation and weekly axial motion. The model has been tested by incorporating an intermittent driving mechanism with falling weight controlled by electronic time tuned actuator coupled with a viscous damper. The maximum percentage departure in radiation intercepted resulting due to misalignment is limited to 2.5%. A computational model based on analytical and empirical relations is also developed and used to generate data. Thus generated data has been used to compare and validate the model. A performance test has been done on the system which showed that the cosine losses are minimized to nearly that in a full flagged two axis tracking system.

*Key-words:* Geo-centric model, Earth-surface model, Diurnal gain, Single-axis motion, PRD.

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