

Abstract

A method of tracking the Sun and an apparatus implementing the same.

A method of tracking the Sun's apparent position in the sky utilizes location and time data provided by GPS, magnetic field data provided by a three-axis magnetometer and compared to a value computed for said location and time, based on stored global model data, and data from an optical alignment sensor. Apparatus orientation is determined by comparing the calculated and the measured magnetic field vectors, while the current apparent position of the Sun is calculated in horizontal coordinates and both results are used to move the payload to a position within the range of the optical alignment sensor, which is then used for fine tuning and precise positioning. Self-organizing map structure provides for non-linearity and system self-calibration, to achieve high accuracy when dead reckoning.

There is also disclosed an apparatus implementing said method, where a microcontroller is used to perform data collection, movement, storage and evaluation in order to determine the magnitude of the control signals to be sent to an external dual-axis positioner which carries the payload, selected from the group consisting of reflector, concentrator, flat panel collector, PV collector, antenna, telescope; to move said payload in the desired orientation relative to the visible Sun. Further disclosed is an optical alignment sensor where incident sunlight is projected onto a properly aligned two-dimensional sensor array, and the four quadrant signals from said array are compared and processed by said microcontroller.