SOLAR MATE
INTELLIGENT SOLAR TRACKING AND ELECTRICITY GENERATION SYSTEM

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Solar power offers many advantages in the generation of electricity. It has zero raw fuel cost, limitless supply and no environmental issues such as storage, transport or pollution. Solar power is available from everywhere, even on the moon. However, in order to get the most out of a solar panel it must be pointed or "orientated" directly at the suns radiant energy as the more surface area that is exposed to direct sunlight, the more production the photovoltaic panel will generate, but here lays the problem.

While the photovoltaic (PV) solar panel may be perfectly aligned to collect the solar energy, it is a stationary object that is fixed to either a roof or mounted directly onto a frame. However the sun is not in a fixed position and is constantly changing its position in the sky relative to the earth during the day making the exact solar panel orientation difficult. So the challenge in getting the maximum benefit of free solar power is to ensure that a photovoltaic solar panel or a complete PV array is properly orientated and placed considering the direct sunlight coming from the sun at all times of the day.

This report presents the hardware and software design and implementation of a system that ensures a perpendicular profile of the solar panel with the sun in order to extract maximum energy. This system is a huge step up over other solar tracking systems that adjust position based on light detection techniques. The system uses a sun tracking algorithm to calculate the position of the sun based on the parameters received from the GPS. This algorithm is purely based on mathematical calculations on astronomical references. Then based on the results of the tracking algorithm the system will automatically orient the solar panel for maximum efficiency, charge batteries and record data.