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Automatic Movable Solar Lamp for Continuous Charging

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Abstract: In today's climate of growing energy needs and increasing environmental concern, alternatives to the use of non-renewable and polluting fossil fuels have to be investigated. One such alternative is solar energy. Solar panels consists of photovoltaic cells, converts the solar energy into electrical energy and this electrical energy is stored into a battery. The system designed here is very useful for gardens, where huge trees exist. In such places availability of solar energy may be difficult due to the shadow of trees; therefore solar lamp posts may not function properly. To overcome this problem, here in this project work, an automatic movable solar lamp post is designed that tracks the sun automatically during day time and shuts down during night. It also activates the lamp automatically during night and switches off during day time. The proposed project work is designed to detect the presence of the sun and can position the solar panel towards sun's direction automatically, i.e., the system rotates the panel automatically according to the sun position, so that maximum solar power can be utilized. Provision is made in this system, so that during daytime, if the sky is clouded and the panel is not receiving any sunlight, then the system itself will be switched off automatically, by which precious energy of the sun, which is stored in the rechargeable battery can be saved. When the clouds are cleared, system energizes automatically and drives the panel towards the direction of sun.

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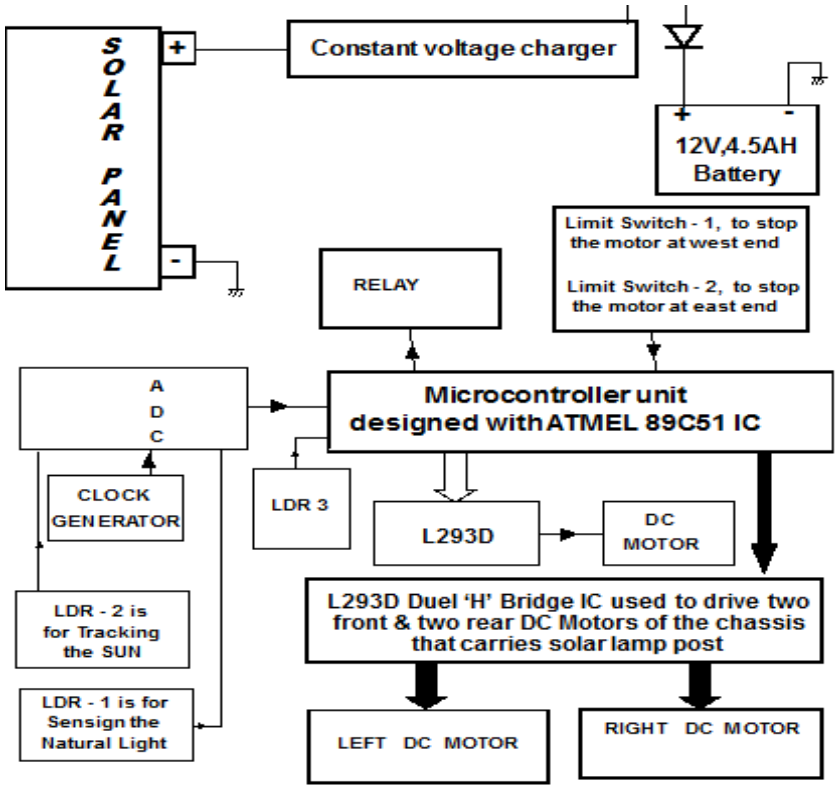
Introduction: This is a solar tracking system which can be used as a power generating method from sunlight. This method of power generation is simple and is taken from natural resource. This needs only maximum sunlight to generate power. This project helps for power generation by setting the equipment to get maximum sunlight automatically. This system is tracking for maximum intensity of light. When there is decrease in intensity of light, this system automatically changes its direction to get maximum intensity of light.

Trackers are used to increase the daily output of PV modules by keeping them faced as directly as possible towards the sun. The sun sees a wider surface, and the increased reflectivity that occurs at low angles of incidence is avoided. During the long days of summer when the sun is rising north of east and setting north of west, a tracker can increase the daily output of modules by 25 to 40 percent. During the winter when the sun takes a low, short arc above the horizon, the tracker will contribute much less, perhaps 10 to 15 percent.

The output of a tracker remains much more constant throughout the year in tropical climates. We generally recommend trackers for spring, summer and fall applications, such as water pumping for livestock summer pasture or small-scale irrigation. For home power systems, we often do not recommend them because a household's power requirements are generally greatest

in the winter just when the efficiency of the tracker is least. It often is a better choice to use a less expensive static mount and put the money into extra modules. In tropical and subtropical regions with less seasonal variation of sun and loads a tracker can make sense for a home system.

1) Block Diagram& Working:



2) In this paper two LDR's are used, the first LDR is used for detecting the intensity of sun light, for energizing the system and the second LDR is used for detecting the position, to drive the panel towards the sun direction.

3) The outputs of the both LDR's are fed to ADC According to the digital information received from ADC; the microcontroller energizes the DC motor and rotates the solar panel from west to east and vice versa, for tracking the sun. When the panel is positioned towards the sun, the microcontroller de-energizes the motors automatically. This is how the sun is tracked and positioned using microcontroller.

*4) **Result**: Detecting whether day or night and detects the sunlight based on the Intensity of light for energizing the system and tracking the position, to drive the panel towards the sun direction.*

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Advantages:

- ✓It can generate more electricity than their stationary counter parts due to increased direct exposure to solar rays. This increase can be as much as 10 to 25% depending on the geographic location of the tracking system.
- ✓It is eco-friendly and hence helps in reducing the carbon footprint.
- ✓It can automatically detect the climate conditions and move towards the sunlight if it is unclouded.

Disadvantages:

- Requires higher initial investment in comparison to conventional light. Generation of energy entirely depends upon the climate conditions.
- Snow, dust or moisture can accumulate of PV panels which can hinder energy production.

Conclusion: The total system is designed to operate at 12V DC, for this purpose 12V, 1.2 Ah lead acid batteries is used and this battery is charged using the same solar panel. In our module an additional equipment for charging the using mains is also proved i.e., through single-phase supply as well. For further development, this proto-type module can be integrated with PC so that can trace out the voltage levels at each point and can be recorded or stored for estimation of the efficiency of the panel.

References

The sites which were used while doing this project:

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Books referred:

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1.