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ENERGY OPTIMIZATION OF WALL-MOUNTED PHOTOVOLTAICS USING A MOTORIZIED CONTROL SYSTEM

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Abstract

An alternative to mounting of photovoltaics on wall mounts with moveable capability has been investigated in this research. Existing mounting practice of photovoltaics for small and medium scale consumer's power demands require an inclination to the horizontal axis of rooftops for maximum power harness. Experimental results from this work prove that appreciable and sustainable power supply is optimizable from wall mounting of photovoltaics with plausibility of doubling generated real-time power by the deployment of motorized automatic control system allowing for a 90° azimuth bidirectional angular movement. The resulting automatic control system for mounting photovoltaics allowed for an optimized solar energy harness for consumer terminals from the seemingly nonlinearity of solar irradiance hitting tall rise buildings as the sun daily migrates conventionally from east to west. This was achieved from harnessing of both the diffused and direct irradiance components produce by sun's intensity of radiation. The developed automatic control system was equipped with safety and motion controls to secure the wall-mounted photovoltaics to be able to withstand adverse environmental situations such as winds from hazardous outcomes. This was achieved with a spring locking mechanism and guided metal rails of high tensile strength. The system was self-powered by a 12 volts battery source pre-charged by the participatory photovoltaic. Angular movement control has been based on an electronic switching circuitry that senses optimal conditions for transition to occur using an IoT scheme. This work is suitable for harnessing more solar energy from photovoltaics on wall mounts due to inaccessible or restricted rooftops and economic return on investing on wall mounts.

Key words: efficient solar power, motorized wallmounts, solar energy optimization, wall mounted photovoltaics, wall mounts control systems

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