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FACULTY OF ENGINEERING, ARCHITECTURE & BUILT ENVIRONMENT

SOLAR THERMAL WATER HEATING SYSTEM

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Abstract

This project is the design and fabrication of an active solar thermal water heating system. In essence, its total functionality depends on one source, the solar system itself. Here, the major mechanical part is broken down into two major component parts; the solar collector, and the insulated dual-walled water tank. The electrical part comprised of the solar power generation system using a PVC solar panel, as well as the differential controller, and the DC centrifugal water pump.

The designed utilized the closed-loop design, with distilled water as the circulation fluid, which performs the function of a heat transfer medium through the copper heat absorber in the collector, and the heat exchanger within the insulated tank. The differential controller compares temperatures at selected fixed points, and relates the result to a reference temperature; it thus controls the hot water pump, which enables circulation within the system.

The power generation system simply acquires energy from the sun, to recharge a back-up battery, as well as power the control system and pump. Hence, the entire system solely depends on the solar system, thereby resulting into a zero utility energy bill.