

Industrial Power Control by Integral Cycle Switching Without Generating Harmonics

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Abstract: *This project is intended to attain vital cycle switching – a technique to get rid of the complete cycle, cycles, or fractions of cycles of an AC signal. It is a renowned and aged technique of managing AC power, principally across linear loads for instance heaters brought into play in electric oven. However, the concept of achieving the cycle stealing of voltage waveform by the use of Arduino can be very precise as per the program written in Arduino C language so that the actual time-average voltage or currently experienced at the load is proportionately lower than the whole signal if applied to the load. In this project, we are using a comparator for zero crossing detection which is fed as an interrupt to the Arduino Here, delivers the output based on the interrupt received as the reference for generating triggering pulses. Using these pulses, we drive the Opto-isolators for triggering the TRIAC to achieve integral cycle control as per the input switches interfaced to the microcontroller. In place of a linear load to be used in the output, a series motor or lamp can be used to verify the output. One side effect of utilizing this scheme is an imbalance in the input current or voltage waveform as the cycles are switched on and off across the load. A lamp is provided in this project in place of a motor for demonstration purpose. The project output with a lamp appears to be a simple project of lamp flickering but the real objective is to verify in a CRO/DSO, whether at the random switching also the load switches on at zero cross of the waveform or not. The power supply consists of a step-down transformer 230/12V, which steps down the voltage to 12V AC. This is converted to a DC using a Bridge rectifier. The ripples are removed using a capacitive filter, and it is then regulated to +5V using a voltage regulator 7805, which is required for the operation of the microcontroller and other components. Furthermore, this project can be enriched by using a feedback mechanism to automatically maintain the desired output to the load by appropriate cycle stealing*

Keywords: Arduino, Arduino Power Control without Generating Harmonics

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