



# Improvement of Power Quality Smart Households Using a Multilevel transformerless Hybrid series active filter with PR Controller

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## ABSTRACT

*In this paper a multilevel transformer less hybrid series active filter is proposed to enhance the power quality of a single-phase residential household. The proposed topology reflects new trends of consumers toward electronic polluting loads and integration of renewable sources which in fact may lead to the scope of a reliable and sustainable supply. This project contributes to improvement of power quality for a modern single-phase system and emphasis integration of a compensator with energy storage capacity to ensure a sustainable supply.*

*A proportional resonant (P+R) regulator is implemented in the controller to prevent current harmonic distortions of various non-linear loads to flow into the utility. The main significant features of the proposed topology include the great capability to correct the power factor as well as cleaning the grid simultaneously, while protecting consumers from voltage disturbances, sags, and swells during a grid perturbation. It investigates aspects of harmonic compensation and assesses the influence of the controller's choice and time delay during a real-time implementation. Results should be obtained in MATLAB/SIMULINK environment.*

**KEY WORDS:** Power Quality, Multilevel Inverter, Active Power Filter, PR Controller and Smart appliances.

## 1. INTRODUCTION:

Basically, the microgrid system is a combination of loads and different micro sources operating as a single system providing power. The structure of a microgrid system consists of different parts such as interface

control, control and protection devices for each micro sources as well as microgrid voltage control, power flow controlling devices, load sharing during islanding conditions, protection and stability [1]. The ability of the Microgrid to operate when connected to the grid,