

4th Year Project

Topic	: Design and Development of a Novel Lightning Protected UPS
Group Members	: Duleepa Jayanath Thrimawithana (ID: 9778679 EEE dep.) Thusitha Dananjaya De Silva Mabotuwana (9790416 CSE dep.)
Supervisor	: Mr. Nihal Kularatna

Project Abstract

As two students from a tropical country we have learnt that most of the modern electronic equipment in these tropical countries is damaged by lightning surges very frequently. Amount of money and time spent on fixing these equipment along with the damage caused to the daily industrial workflow are simply immeasurable. Most of the uninterrupted power supplies (UPS) developed to-date are designed and produced in Western countries that have a well controlled mains supply. Also most of their power lines run underground which greatly reduces transient voltage spikes due to lightning. So these UPS systems lack the ability to protect the equipment from heavy surges such as those that happen in tropical regions where old power distribution systems are still in place. Most low cost, low power off-line UPS units do not have sufficient isolation [1] for the dangerous common mode transient surges.

As a solution to this we plan to design a novel lightning protected UPS that can protect modern electronic equipments from a severe lightning surge of class B standard (IEEE C62.41). Demand for UPS systems has increased dramatically while the size and cost of the units have decreased over the past few years. Also single phase UPS modules with ratings of upto about 30KVA, and very low power modules used to run household electronic equipment such as commutators etc. (300VA to 3 KVA) have become increasingly popular in the US market over the last few years [1]. This explains the importance of searching for new very low power single-phase UPS technologies.

For this project we will be looking at the possibility of a fully isolated inverter using energy storage devices such as super capacitors etc. This will stop extremely fast common mode and differential mode transient surges passing through to the devices hence resulting better lightning protection. The microcontroller or logic device, which will be decided during the course of the project, will be used to control these energy storage devices and to monitor the input and output rails to achieve a well regulated lightning protected UPS.

This research consists of both electronic design and embedded design. So it will be carried out by two EEE and CSE students. EEE student will be designing the hardware system while the CSE student will concentrate on microcontroller programming.

Reference

1. Kularatna N., (1998) *Power Electronics Design Hand Book : low-power components and applications*, Boston : Newnes.