



HOME TECHNOLOGY EMAGAZINE ARTICLE

Hometoys Interview - Dr. Deepak Divan of Innovolt Power Protection and Management



Dr. Divan is an internationally renowned researcher, educator and an entrepreneur who has successfully demonstrated a distinct ability to identify and leverage the synergies between the academic, research and business fields for advancement of the field of Power Electronics.

Currently, he is an officer with the IEEE Power Electronics Society as well as a faculty member at the School of Electrical and Computer Engineering at Georgia Institute of Technology, Atlanta GA since 2004. Earlier, he was a Professor of Electrical and Computer Engineering at the University of Wisconsin at Madison from 1985-95.

Dr. Divan founded [Innovolt, Inc.](http://www.innovolt.com) to develop and commercialize next generation products to provide complete power protection and quality based on his patent-pending CVSS technology (Current-inrush and Voltage Surge Suppression). Dr. Divan holds 32 patents, has published approximately 200 technical papers, including 12 prize winning papers, and has given many invited presentations at both technical and business oriented meetings.

1. What are three myths about the power protection industry that you think are important to dispel?

a) Most people think that existing power protection devices protect their expensive electronics equipment from all power disturbances. They don't. Most available TVSS devices protect against less than 1% of the power disturbances. Yet none of the current power protection providers mentions any of this. (b) Most people think that power protection devices come with \$100,000 or more in warranties for connected equipment. It is almost impossible to prove that the equipment failed because of the failure of the protection device— which is why warranties for increasingly higher amounts are being seen (c) Most people are confused about voltage, current and power surges. Lot of smoke and mirrors are used to explain power disturbances. Yet no one provides customers any feedback on the type of disturbances that are actually being measured – even for power protection devices that cost thousands of dollars. In today's information rich world, this is unacceptable.

2. What are the different power disturbances that can affect expensive electronics and are these disturbances being protected from by traditional and current products on the market?

Most common power disturbances: (a) voltage surges caused by lightning strikes in the immediate vicinity of the equipment (3-6,000 volts 10 microseconds), (b) voltage surges caused by grid faults (150 volts – 300 volts up to 100 milliseconds), (c) voltage swells (150 – 240 volts, 0.1 – 2 seconds), (d) overvoltage (150 – 240 volts 2 seconds – 2 hours), (e) voltage sags resulting in current surges (0 – 100 volts, 10 milliseconds – 2 seconds), (f) under-voltage (50 – 100 volts, 2 seconds to several hours), (g) power outage. Existing power protectors only protect against type (a) disturbances. Innovolt's products are designed to protect from all of these occurrences.

3. Much is being said about a new Smart Grid. How will that affect the disturbances we experience in the future?

A 'smart grid' implemented with a higher level of automation and a grid architecture that is more robust can offer significantly higher levels of reliability. It is expected that the number of outages can significantly decrease in the future. A more important focus for the smart grid is to enable access to low-carbon resources, such as wind and solar, and to provide end-users with more control over their energy rates and energy consumption.

4 If I were to add a solar system to my home are there special considerations I need to take into account to protect my equipment?

Typical grid-connected solar systems for home use will have minimal impact on the electronics equipment connected to the grid in terms of safety. More important will be the ability of the solar-powered system to support the home in an off-grid mode. Many typical home appliances, such as washers, dryers and microwaves, can draw high inrush currents on start-up, and can provide poor waveform quality. This may require over-rated solar inverters, raising the cost. For off-grid operation, it would also be important to use batteries for energy storage. Battery life continues to be an issue, particularly if low cost is also an objective.

5. Why does electronic equipment (home theater etc.) need more protection than everyday appliances?

Electronics devices operate from an internal dc voltage that is derived from the incoming ac voltage using a rectifier and energy storage capacitor. Disturbances on the power line can reflect into dc voltage anomalies that can damage this power input stage. Electronic devices also use sensitive digital electronics that can be damaged or put into 'phantom' states by power disturbances.

6. Why don't manufacturers build power protection into their products so we don't need external devices? Manufacturers design equipment for 'nominal' industry-standard line voltages – 120 volts +/- 10%. Designing for a wider range is expensive and puts them at a competitive disadvantage. Also, designing fail-safe power protection adds cost that puts them at a competitive disadvantage. Finally, power protection is designed to be sacrificial in case of a worst case hit. If the power protection is inside the equipment, one would still have failed equipment.

7. What sets Innovolt's technology apart from the rest? What is CVSS?

Innovolt approached the power protection issue by understanding the customer's expectation – that they were buying a device to protect their equipment from all types of power disturbances, not just 1% of the disturbances as explained in the fine print. Significant research and data were used to understand the protection level needed and to trade that off against cost. The 'current and voltage surge suppression' or CVSS technology from Innovolt provides complete power protection – no explanations or smoke and mirrors necessary. We are also the only power protection company to provide full diagnostics in every device that we make – from the smallest plug-in protector to the rack-mount units targeting high-end home theater applications. The CVSS devices have been proven by independent third party testing done by the Electric Power Research Institute, the research arm for the US utility industry.

8. How will Innovolt's products help consumers save energy and money?

Innovolt's range of power protection products meets the customer's expectation of complete power protection. Innovolt is also introducing a new range of energy efficient LED lighting products that promise brilliant lighting with only 20% of the energy consumption of incandescent and halogen lamps. Replacing a 100 watt incandescent lamp with an LED lamp can save \$500 over its 10 year life in energy costs. For a small business or home, this can translate into lower lighting and air conditioning costs, resulting in savings of thousands of dollars every year.