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Floating-Non Contact Wireless Voltage Sensor For High-Voltage Transmission Lines

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BRIEF DESCRIPTION

The present invention relates to a new voltage sensor that would allow for an economical way to achieve distributed monitoring of the nation's power line infrastructure without posing a hazard to field operators.

FULL DESCRIPTION

With energy consumption already at record levels and projected to be on the rise, it is increasingly important to have the ability to dynamically monitor the voltage levels present on transmission lines and the flow of power through the interconnected power grids within both the United States and abroad. According to the U.S. Department of Energy, electric energy consumption within the United States during 2009 was estimated at 3,745 terawatt-hours with a projection of steadily rising to 4880 terawatt-hours by the year 2035. Although other methods exist to measure the voltage levels on transmission lines, human safety, the usage of cumbersome voltage isolation equipment, and cost involved are all formidable concerns that still need to be addressed.

University researchers have designed an electrically "floating", non-contact voltage sensor evolved from the necessity to develop a device to fulfill serious deficiencies in state of the art transmission line voltage measurement schemes, with the added ability to power itself and function independently of human operators after installation. It accomplishes the voltage line level determination by first measuring the complex-valued potential difference between the device's structural mount and the transmission line itself. Subsequently, this information is wirelessly transmitted to a base station at earth level, where the information is retrieved, filtered (if needed), operated on by a pre-determined transfer function based on the transmission system's physical geometry, and visually displayed to the human operator. This method can be adapted to a multi-conductor system through the placement of multiple devices of this type and appropriately modifying/expanding the transfer function relating the measured potential differences to the line voltages.

SUGGESTED USES

Voltage measurements along the power line grid.

ADVANTAGES

Low cost. Light weight. Small size. Ease of installation. Safe operation.

STATE OF DEVELOPMENT

Prototypes have been assembled and tested.

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OTHER INFORMATION

KEYWORDS

Voltage measurement, Power grid, Distributed capacitance, High power transmission lines, Coupling-capacitor voltage transformer, Potential transformers

CATEGORIZED AS

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- » Transmission
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