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# PV STRING FAULT DETECTION

## HARDWARE, CIRCUITS, & SENSORS

Method for the detection of ground faults in PV strings using spread spectrum time domain reflectometry.

### TECHNOLOGY TYPE

Signal Processing  
Solar Power

### STAGE OF DEVELOPMENT

- Concept verified in experiments.
- Prototype in development.

### IP PROTECTION

**U.S. Utility Patent Issued**  
Systems and Methods for  
Fault Detection  
US10038401B2

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Reference Number: U-5686

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### TECHNOLOGY SUMMARY

Ground faults and other wiring issues that compromise optimal panel performance are common, but often remain undetected posing safety and fire risks. Most methods for detecting ground faults require time-consuming voltage and current measurements, as well as visual assessment of solar panel integrity.

U of U researchers have developed a novel spread spectrum time domain reflectometry (SSTDTR) method for the detection of photovoltaic (PV) string faults. This SSTDTR method compares autocorrelation differences generated by the PV string before and after detection of the fault. It does not require current or voltage measurements, saves time, and prevents malfunctions caused by undetected string faults.

### FEATURES AND BENEFITS

- Locates ground faults in any size PV string.
- Operates successfully in or out of sunlight.
- Eliminates need for current or voltage measurement.
- Decreases maintenance time and cost.

### RECENT PUBLICATIONS

Roy, S., Alam, M. K., Khan, F., Johnson, J., & Flicker, J. (2018). An irradiance-independent, robust ground-fault detection scheme for PV arrays based on spread spectrum time-domain reflectometry (SSTDTR). *IEEE Transactions on Power Electronics*, 33(8), 7046-7057. doi:  
[10.1109/tpel.2017.2755592](https://doi.org/10.1109/tpel.2017.2755592)

### INVENTOR PROFILE

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