

Low-Current Arcing Detection and Location for Wildfire Mitigation

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Office of Electricity

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Fires caused by electric equipment



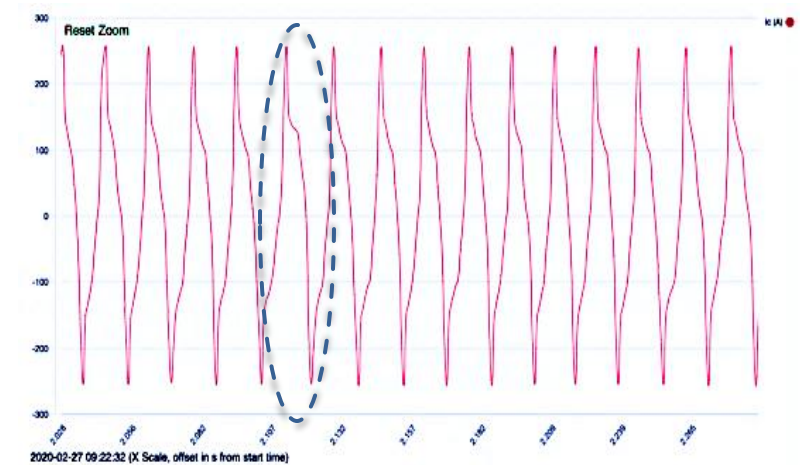
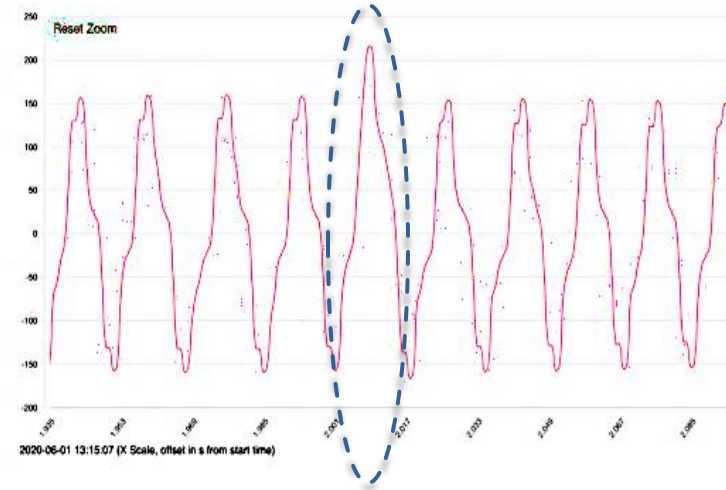
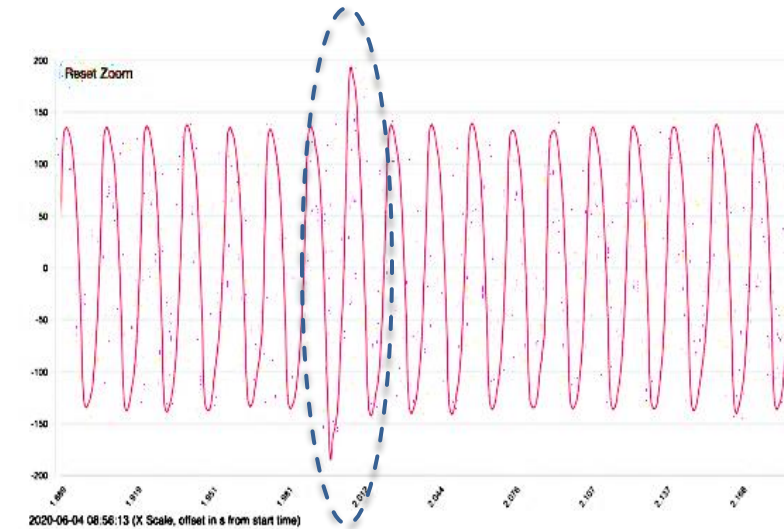
Dixie Fire, 2021

- **Impacts** can be catastrophic
- **Causes**
 - Foreign object (e.g., vegetation) contact
 - Conductor slapping
 - Broken conductor
 - Equipment failure
- **Challenges**
 - Traditional fault detection and protection scheme
 - Complex distribution systems
- **Mitigations**
 - Vegetation maintenance
 - Fire monitoring
 - Covered conductors/undergrounding
 - **Novel fault detection strategies**

Detect early signs of failure (arcing) with high-resolution measurements



Digital fault recorder at a distribution substation
Photo courtesy of Southern California Edison



Data source: DOE Grid Event Signature Library (GESL)
<https://gesl.ornl.gov>

Collaborative effort

- DOE National Laboratories
- Utility
- Vendors



Lead

Power engineering and data analytics



Lab partner

Signal processing and analytics



An *EDISON INTERNATIONAL*® Company

Utility partner

Data analytics and field expertise



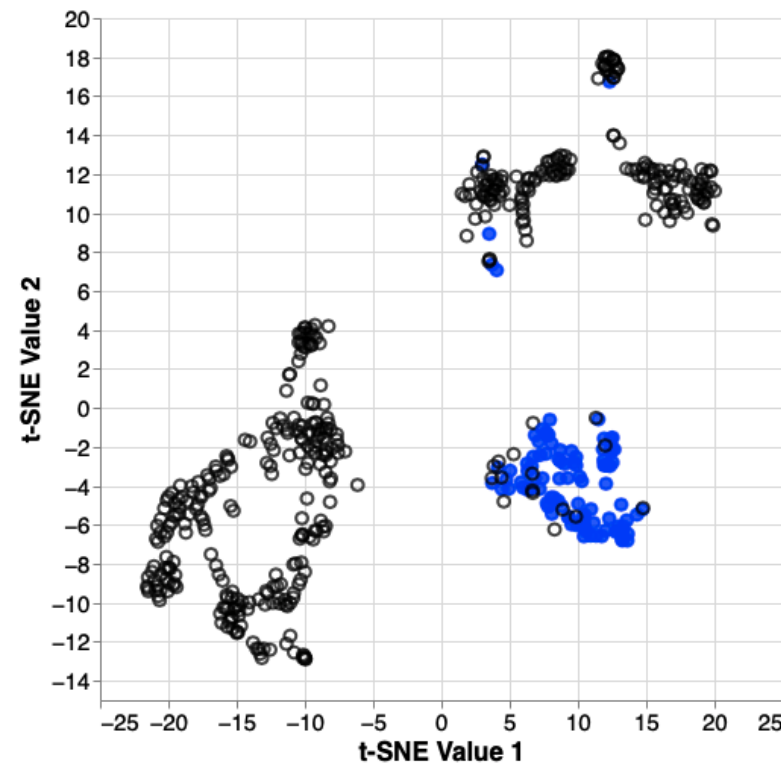
Vendors

Simulations; Advisory

Classification of arcing segments

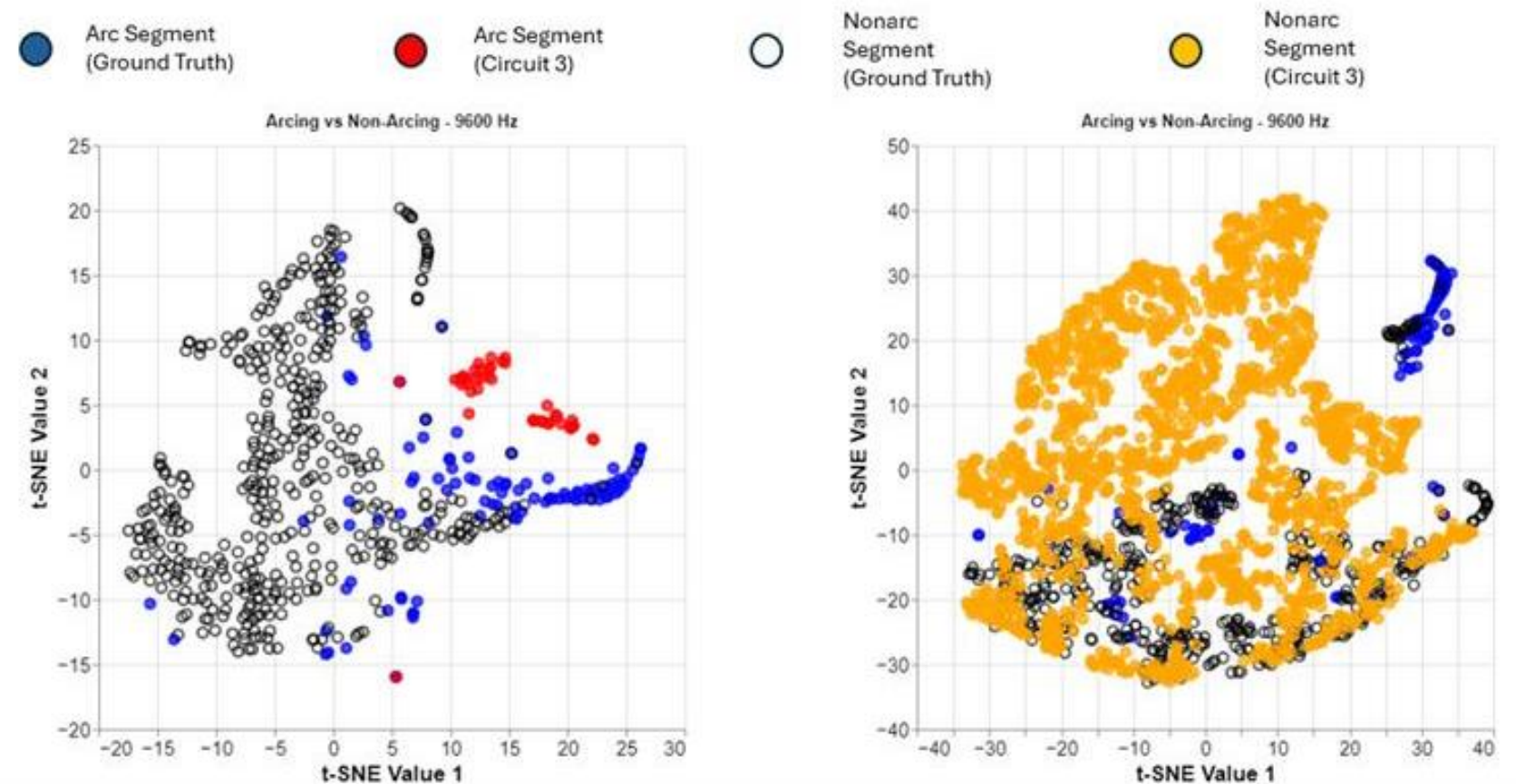
~90% accuracy tested with ground-truth datasets

- Training datasets from GESL



t-SNE plot of the feature vectors
(GESL data, **15,360 Hz** samples)

- Application to utility data



t-SNE plots of the feature vectors
(SCE data, **9,600 Hz** samples)

Thank you



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