



# ALSET Lab

A Laboratory for the Digital Power Grid of the Future

LEAD

**Professor Luigi Vanfretti**

Renewable energy sources can be used safely by transforming the electric power grid into a “smart” grid system. The ALSETLab is working on the different ways and means renewables can be integrated to make the grid “smarter.” ALSET has both the hardware and software platforms to build the tools to run simulations through a set of very sophisticated virtual power system grids required to make new ideas a new reality. ALSETLab is making steady progress in this area by expanding its mathematics and computing capabilities and building specialized tools for the appropriate platforms with the aim of modernizing and revolutionizing the electric power grid. The ALSETLab is a collaborative environment where the best minds in electrical power engineering come to think big and change the world.



Why do we need renewable energy sources?

- They provide energy security making small scale and localized energy collection possible.
- They are cost efficient solutions to expensive and traditional sources like fossil fuels.
- They are cleaner with little to no CO2 emitted in collection or use.



What are the benefits of renewable energy sources?

- They help minimize dangerous variations in the parameters of the electric grid.
- They are reliable, efficient, effective and less expensive.
- They leave a smaller carbon footprint per person.



How is ALSETLab contributing to the creation of a “smarter” grid?

- Using inter-networking measurement data – a key component of the Smart grid ecosystem.
- Implementing a synchrophasor/PMU-based monitoring tools capable of detecting sub-synchronous control interactions.
- Development of a highly efficient C++ software library that allows real-time capture and re-use of data from synchrophasors/PMU called STRONgrid.
- Creation of the Smart grid Synchrophasor Software Development Toolkit (S3DK), which allows fast prototyping of new PMU/ synchrophasor applications.
- Designing applications with real-time simulators in the loop with PMUs in power grid models.



## CONTACT

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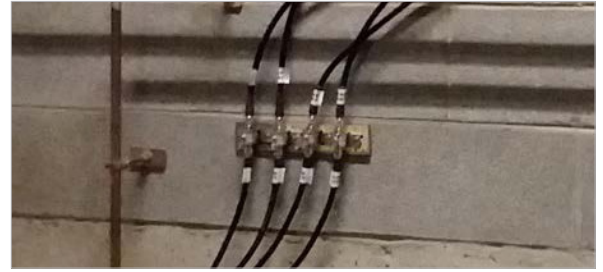
For more information on how to support ALSET Lab and examples of previous donations, please visit:  
<https://alsetlab.github.io/donate/>

For further information, please visit us online at: [www.alsetlab.com](http://www.alsetlab.com)

# WHAT IS **ALSET** MADE OF?



The four antennas mounted on top of the building provide signals from GPS satellites.



GPS signals from the antennas pass through surge protectors before entering the lab.



1 Phasor Data Concentrator from SEL.

3 GPS signals coming from the surge protectors are fed to the substation clocks and GPS splitter.

4 A 48-port HP managed switch is the backbone of the communication layer.

5 SEL RTAC and protection relays that perform monitoring, control, and protection functions.

6 UPS feeding critical equipment such as the server.

7 Main server with synchronized timing.

8 Four OPAL-RT simulators each having 32 cores of parallel processing.

2 SEL substation clocks and GPS splitter from GPSSource.



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