

Thematic Areas of Research

The Smart Controller Laboratory (SCLab) would also work towards achieving following goals during its operation:

- Design and Development of different Smart and Distributed Power Solutions;
- Research and Development (R&D) of various Intelligent Load and Resource Management using Smart Controllers.
- Simulation and modelling of renewable energy based smart-mini/ micro-grid system and its component.

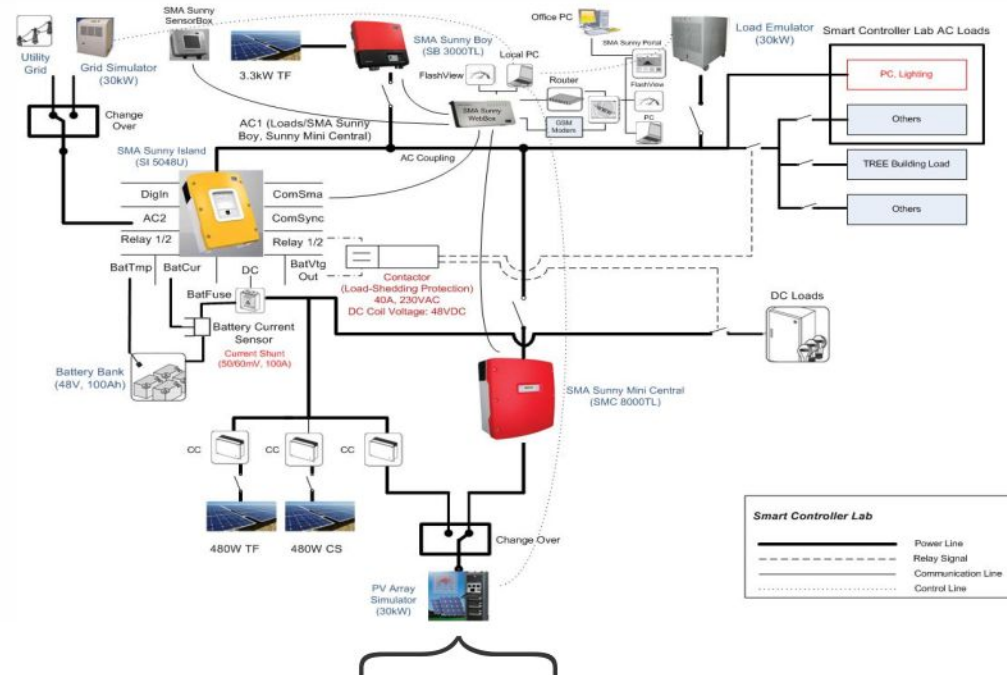


Figure:
Single Line Diagram (SLD)
and Operation Schematics
for Smart Controller Laboratory

Outreach :

- Technical Briefs
- Journal Publications
- Conference Proceedings

Training and Capacity Building:

- Both Technical and Management Training: Through short-term courses like Management Development Programs (MDP) on Smart Grid, GIS and Virtual Lab cum Hands-on facilities for the researchers;
- Workshops/Conferences on Smart Controllers, Smart Grid, Smart Mini Grid (SMG) and GIS;
- Technology for academic community as well as field professionals;
- Specialized training courses on installation, operation and maintenance for the Off-Grid Solar PV Plants.

About TERI

The Energy and Resources Institute (TERI) is a strong, dynamic, and flexible organization with a global vision and a local focus. TERI is committed to every aspect of sustainable development providing environment-friendly solutions to rural energy problems; finding solutions to growing issues of urban transport and air pollution; promoting energy efficiency in Indian industries and much more. The emphasis has always been on finding innovative solutions for making the world a better place to live. All activities in TERI revolve around formulating local- and national-level strategies and suggesting global solutions to critical energy and environment-related issues.

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SMART CONTROLLER LABORATORY (SCLAB)

TREE Building, TERI Gram Gwal Pahari,
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Supported By:

TERI Norwegian Framework Agreement





VISION

Design and develop innovative, cost-effective smart and sustainable distributed power solutions for various applications in vertical domains.





MISSION

- Established as an independent state-of-the-art Testing, Evaluation, and Research laboratory for Distributed Power Systems and Smart Controllers
- Performance assessment of different Distributed Power Systems
- Design and development of customized Smart Solutions and Packages for various applications
- Acting as knowledge expert to several Distributed Generation-based Programme and Policies
- Develop qualified and field proven professionals through specialized technical training courses and knowledge transfer

SERVICES OFFERED

- Testing and long-term performance assessment of different photovoltaic (PV) technologies both in standard lab (indoor) conditions and field (outdoor) environments;
- Testing and long-term performance assessment of different battery technologies;
- Testing and performance assessment of different inverters;
- Testing and assessment of renewable energy based hybrid systems (including Smart Micro/Mini-Grids) under different operating conditions.
- Planning, design, lab-scale emulation & testing and actual demonstration of smart-mini/ micro-grid system for different applications, using smart sensing & measurement units, advanced power electronics and secure communication infrastructure
- Study of policy, regulatory and financial aspects of smart-mini/ micro-grid system
- Resources forecasting simulation
- Specialized training course on installation, operation and maintenance for the Off-Grid solar PV plants
- Testing and performance assessment of the solar PV charge controller
- Short course on the smart controller design and GIS

INFRASTRUCTURAL FACILITIES AVAILABLE IN SMART CONTROLLER LABORATORY

List of Equipment	Specifications	Purpose
Solar PV Array Simulator 	<ul style="list-style-type: none"> • Manufacturer: Elgar™ by Ametek • Model: 570236601 • Input: 380/400AC, 3 - Phase Delta connection, 70 Amps • Output: 0-600VDC, 0-25A • Power: 30 kw • Software: Terra SASTM, Version 1.6.0.2 	<ul style="list-style-type: none"> • Emulate the real solar arrays within the lab; • Comparison between simulated and real PV technology; • Testing of different rated loads with Solar Array Simulator (SAS); • Simulate the different physical conditions and estimate the real module performance in the lab.
Grid Simulator 	<ul style="list-style-type: none"> • Manufacturer: California Instrument™ by Ametek • Model: MX30-3P-400-LF-SNK • Input: 400VAC, 50-60Hz, 36kVA • Output: 150/300VAC, 16-500Hz • Power: 30kVA • Software: MX Series MXGUITM, Version 1.18 	<ul style="list-style-type: none"> • It can create grid of various combination such different frequency, voltage and harmonics • Can act as a source as well as sink (able to feed power back into the grid) • Effect of a fluctuating grid can be analyzed within the lab and its effects on different equipment and solution to the issues experienced will be developed and implemented in the field with a cost effective manner with novel technology applied to it.
Load Emulator 	<ul style="list-style-type: none"> • Manufacturer : Quinling Energy Resources • Model: ACLT-3803H • Power :30kW • 10kW Resistive load • 10kVar Capacitive load • 10kVar Inductive load • Software: ACLT - 3803H Device Manager 	<ul style="list-style-type: none"> • Emulate different loads in terms of the power ratings; • Analyze the load parameter while loading; • Analyze the voltage and current characteristics in simulated model of a real load; • Performance assessment and comparison of various renewable energy technologies with varying parameters of load on loaded condition; • Quick generation of load characteristic report for future analysis; • To create scenario to test anti-islanding of grid connected inverters.
Embedded System and Controller 	National Instruments (NI)™ Hardware Platform: Controller: NI Compact-RIO (cRIO) 9074 with 8-Slots Chassis C-Series Modules: Voltage, Current, Relay and Digital I/O modules Software: NI LabVIEW Developer Suite, Version 2012; NI LabVIEW Electrical Power Suite (EPS); NI LabVIEW Data-Logging and Supervisory Control (DSC) Module	<ul style="list-style-type: none"> • To customize different Smart Solutions and Packages for Intelligent Load Management and Control; • Design and Development of integrated Resource Management platform for various Distributed Energy Resources (DERs); • Research on optimized system design; • To develop different Hands-on demonstrations and Training Tool-kit.