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## Customer

A group of eminent technologists and researchers, who work with global network of research institutions and inventors to map the world's most pressing problems, leverage inventions from leading research institutions, design and build attractive, affordable, robust products, and scale with established home-grown organizations.

## Problem Statement/Requirements

The customer wanted a design with a low-cost, low maintenance, dependable solution for monitoring and controlling solar micro-grids for remote villages in developing countries. The rugged design should be deployable in remote locations with limited service access and also remotely operable for prolonged out-door use in dynamic weather conditions with low maintenance. There should also be redundant communication connectivity and the final product should be IP-owned by the customer with no dependence on third parties for product revisions or modifications. The scope consisted of design, development, integration and system testing of multi-channel smart energy meters, RF communication network, headend software, AMI software and billing solution

## Solution Methodology

The SFO team designed and manufactured a customized multi-channel Smart Energy meter at low-cost and low maintenance for controlling and monitoring solar micro grids remotely for distant and inaccessible villages in developing countries based on readily available COTS components.

The product had the following features:

- Custom energy metering and control nodes designed and developed considering dynamically changing weather conditions and service accessibility
- Multi-channel meter design that allowed for connection and control for up to 6 subscribers per node
- Custom grid monitoring and control software developed for quick acclimatization and ease of use by semi-skilled workforce available in deployed locations
- The grid software accessible and managed remotely from a central location in case of a need of administration/ intervention by skilled technicians
- Billing software solution
- Data Analytics for predictability of generation, consumption and diagnostics
- RF communications between nodes to take care of possible hard line communication disruptions during heavy thunderstorms or other rough weather conditions
- Nodes networked in a mesh form to ensure redundant communication paths in case of node-to-node communication disruptions
- Ownership of the system IP allowing zero dependency with specific vendors
- Customized accounting module to manage user subscriptions and services
- Single phase energy metering for multi consumer applications (Up-to 6 independent channels)
- Class 1 accuracy
- Calibration indicators/ LEDs
- In-built Remote Disconnect relay
- Real Time Clock with battery back-up
- Voltage, Current, PF, KW, KWh measurements
- LPR connectivity (Sub-1 GHz/ 2.4 GHz)
- Data transmission to DCU in every 15 minutes (Configurable)
- Load profile for historical analysis
- Tamper logging
- External Pole Mountable design

## Brief description of product:

### a) Hardware

- MCU (Microcontroller Unit) - CC1310
- ADE7816- Metering Chip

### b) Software

- Java1.8
- My SQL 5.7x
- Tomcat 8.0
- Eclipse Neon
- OS : Linux

### c) Firmware

- OS : Contiki 3.0
- Virtual Machine instant contiki – Ubuntu
- Flash Programmer 2.0
- Smart RF Studio 7
- Programming Language : C

### d) Compliance

- CMMI ML5
- ISO 9001 : 2015
- ISO 27001 : 2013

## Impact

- a) Grid commissioning turn-around period reduced by 20%
- b) New subscriber installation cost reduced by 30%
- c) Reduction in grid service and maintenance cost by 30%
- d) Communications disruptions during rough weather came down drastically
- e) Reduced the need to deploy highly skilled resources on-site
- f) Performance optimization by analysis of data sets from multiple sites

## About SFO

SFO Technologies Pvt Ltd, the flagship arm of the diversified conglomerate, the NeST Group provides end-to-end design-engineering-software-manufacturing solutions to clients across geographies such as the USA, Canada, Europe, Middle East, South East Asia, Japan, Australia, and India. SFO has invested in building competence, scale and standards compliant process framework, in PCBA, fibre optics, Cable & wire Harness, Magnetics, High Level Assembly, VLSI design, embedded software development, etc. SFO's capabilities transcend the plain vanilla "Build-to-Spec or Build-to-Print" EMS and our ODM+ solutions are rapidly re-defining standards for the OEMs across Aerospace & Defence, Communications, Transportation, Healthcare and Energy & Industrial domains. .



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