



**Enlightening minds through customised
solar training programs**



“The Stone Age did not end for lack of stone and the Oil Age will end long before the world runs out of oil.”

- Sheikh Zaki Yamani, Oil Minister, Saudi Arabia

“India is not rich in conventional fuels like oil, gas and nuclear. Our dependence on import of these fuels and ever increasing prices makes the electricity unreliable and expensive. There is need to demonstrate and practice alternative electricity solutions which are environment friendly, and, more importantly, cost-effective. With advancement in solar Photovoltaic technologies and significant reduction in the prices, solar electricity, even today in many sectors, is an economically viable alternative to grid electricity.

Sunlight is distributed source of energy & our requirements of energy are also distributed. In order to meet the large solar installation targets of India, there is a huge need of skilled manpower in the solar sector in distributed manner. This would make solar as prime employment sector.”



Dr. Chetan Singh Solanki
Prof IIT Bombay

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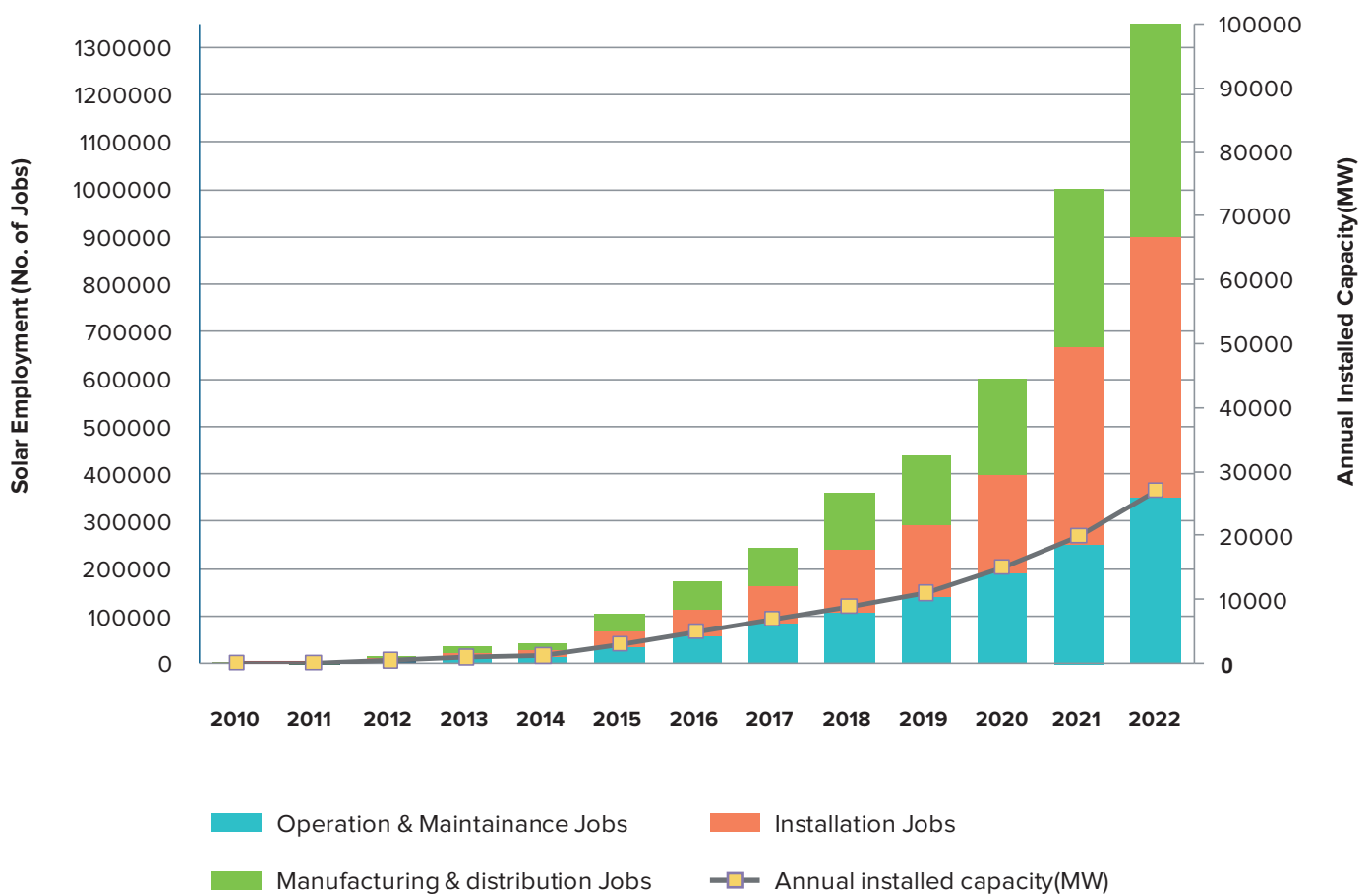
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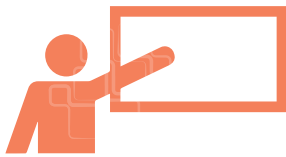


SOLAR & EMPLOYMENT

Solar Jobs comprises of jobs in the manufacturing, designing, installation, operation & maintenance of Solar PV Systems and Solar Power Plants.

- India has ambitious target of installing large amount of solar power. The current Indian government significantly expanded its solar plans, targeting US\$100 billion of investment and 100,000 MW of solar capacity by 2022.
- Typically 30-50 jobs for every MW of installation creating 1.3 million job opportunities by 2022 in India [IRENA RE Jobs Annual Review 2015]





ABOUT S-SPARQ

kSPL is dedicated to train thousands of Engineers in the Solar energy field to meet the requirement of the Nation Solar Mission. kSPL with zeal of “Making People Solar Smart” initiated “Solar SparQ” – Solar Smart Certification Programs by training students and professionals in solar fundamentals, manufacturing, designing, installation and O&M of solar PV systems and solar Power Plants

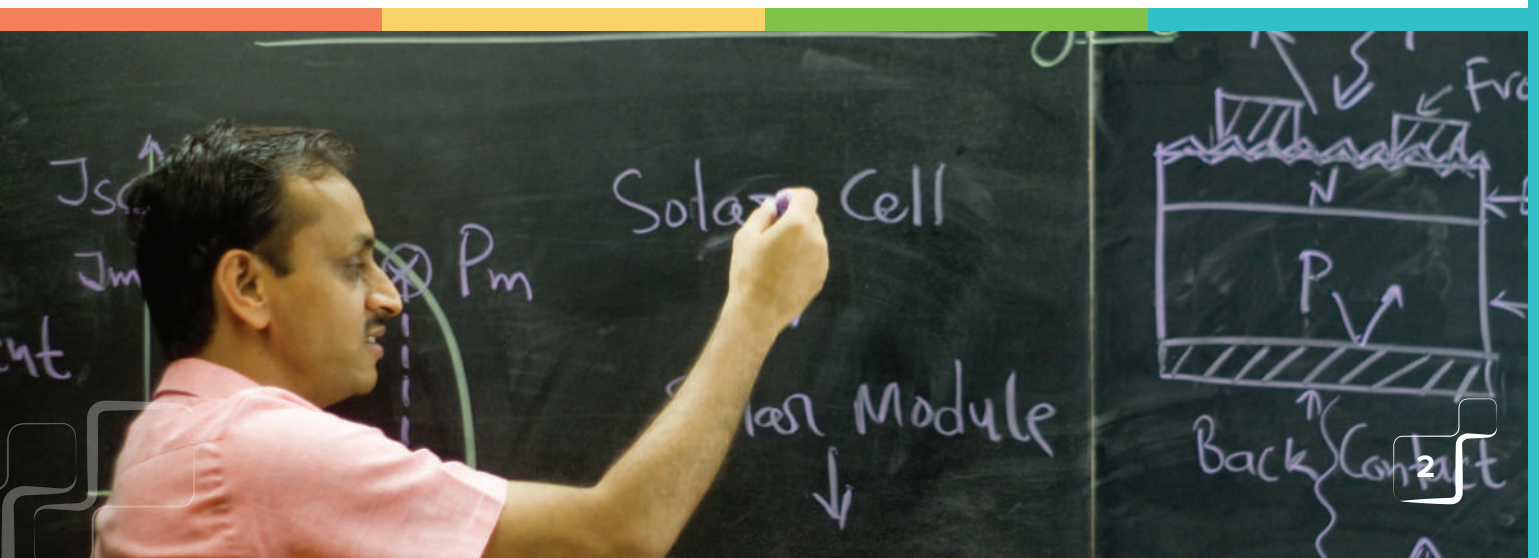
PROGRAMS OFFERED IN S-SPARQ

STUDENTS AND FACULTY PROGRAMS

Certified Training Programs	Engineering Projects	Industrial Visits
Basic Course (2 Days)	Major Projects	Solar Industries
Advanced course (3-5 Days)		Solar Power Plants
Corporate Internships	Mini Projects	Solar Rooftop Systems

PROFESSIONAL PROGRAMS

Solar Professional Course
Stand Alone PV System: from basics to installation with hands on experience
Grid connected PV system: from basics to installation with hands on experience
Operation & Maintenance of PV power plant





S-Sparq offers skill development in the field of solar energy and aims to:

- Impart fundamental as well as practical knowledge in solar
- Nurture creativity and Innovation
- Develop skill sets as per industry requirements
- Provide an insight into emerging sectors



After going through S-SparQ program/s participants will have ability to :

- Use Industry Based Simulation Software
- Develop Industry Oriented Innovative Gadgets/Products
- Develop Technology & Entrepreneurial Skills
- Work on Industry Designed Projects (IDPs)
- Think Out-of Box Ideas



BASIC TRAINING PROGRAM (2 days)

This course is a 2 days training program which is designed with a objective of empowering students in Solar.

- With this program, students will be able to design a Solar Power Plant for any House/ College/Industry/ Hospitals
- Students will also get the practical knowledge and skills to develop solar products which will boost their Entrepreneur skills
- Students attending this training program will have the benefit of getting the opportunity to attend the Advanced Certified Training Programs where they will be given corporate internship on eligibility basis in the solar energy field



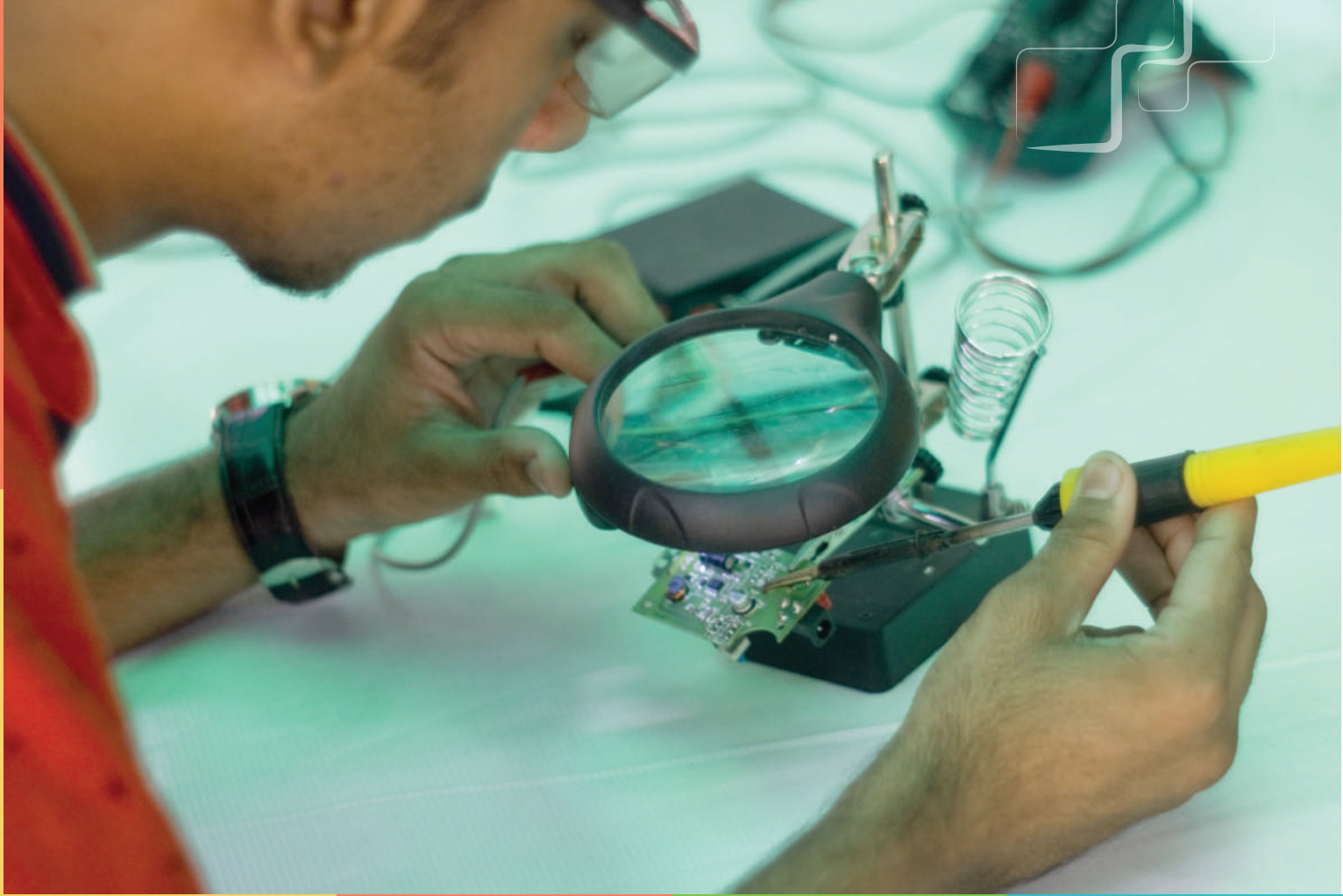
Day 1

Part 1 (Overview)

- Solar Energy Scenario in India & Job Opportunities
- Basics of Solar PhotoVoltaic Technology (PV)

Part 2 (Simulation & PV System Design)

- Basics of simulation tool: PV system components and sizing exercise with analysis
- Understand the system design using simulation tool
- Design a Solar Power Plant to light/power any house/college/industry/ hospital
- Understand the Variables that determine PV system size based on international model
- Estimation of monthly power generation and financial savings



Day 2

Part 3 (Hands on Session using solar products)

Solar Powered Mobile Charger

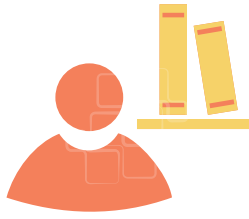
- A device which uses sunlight to charge your mobile

- Design and build your own Solar Mobile Charger
- Get practical insight into basic and advanced features

Light seeking bot

- A robot that follows light

- Understanding the concept of its functionality
- Design and build your own Vision 180
- Get practical insight into basic and advanced features

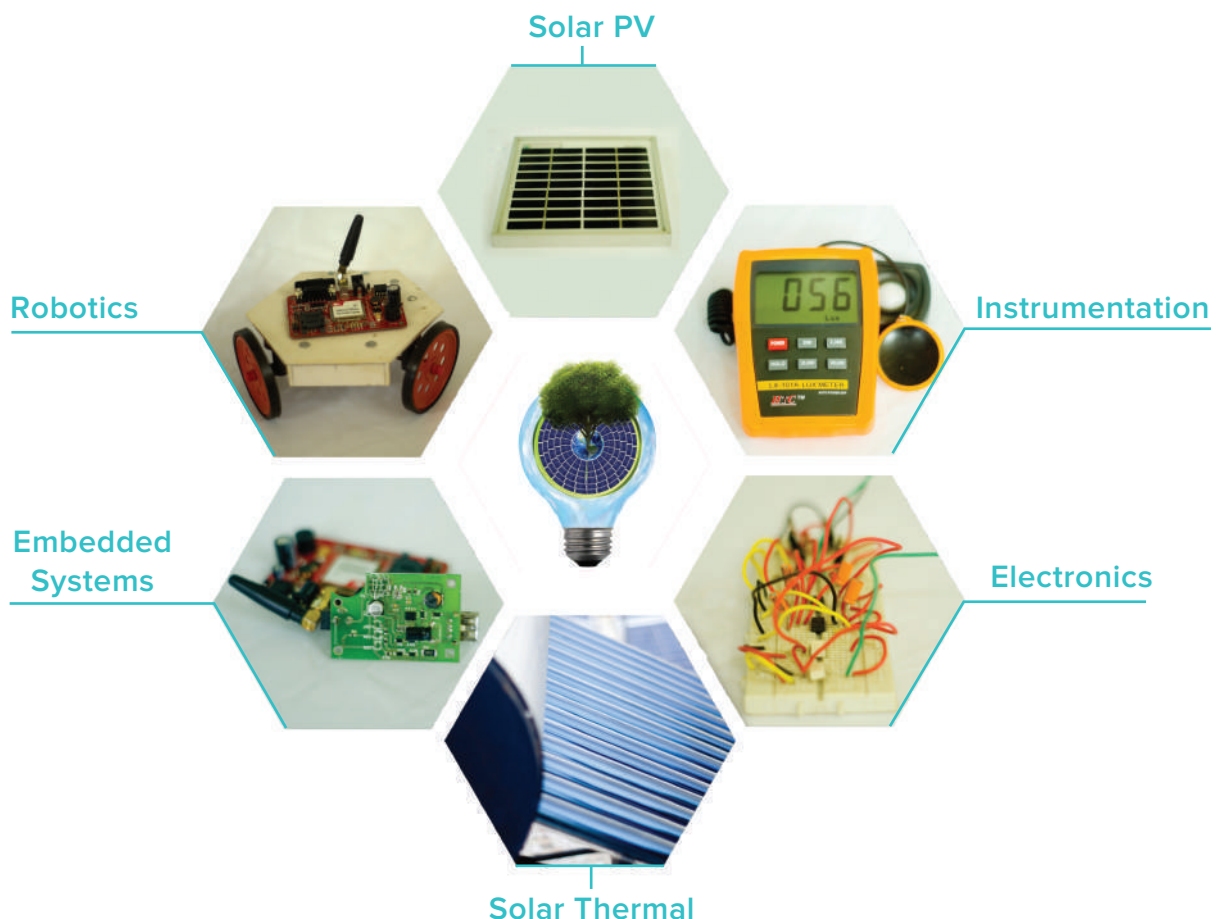


ADVANCED SOLAR TRAINING PROGRAM (4 to 6 days)

This training (6 Hours a day) is for the students/faculties which will cover the topics customized for given learning objective

- These courses are designed for engineering students and faculties from all discipline, particularly suitable for Electrical and Electronics Engineering, Electronics and Telecommunication Engineering, Information Technology, Mechanical Engineering
- Selected students attending this training program will be given a corporate internship and job opportunity in the solar energy sector

This course majorly describes content from following fields:

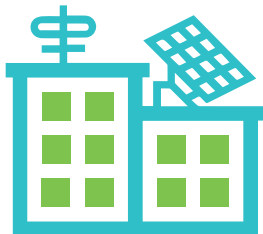
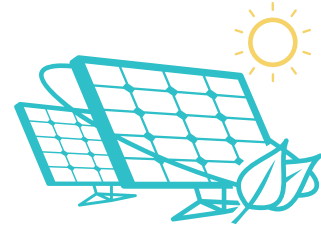


Topics for Advanced Program:

1. Solar Photovoltaic Technology Basics

(Duration: 6 hours) Course Highlights:

- The Indian power sector and the role of renewable energy in it
- The concept of conversion of light energy to electricity IV curve, Losses & efficiency of the solar panel



2. Design a Solar Power Plant to power your own house/college

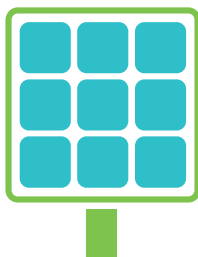
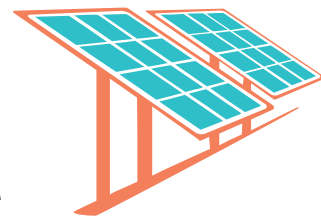
(Duration: 12 hours) Course Highlights:

- Different angles and calculate the optimum tilt of the solar panel
- Demonstrate solar tracker and observing types of radiations

3. Electronics for OFF-grid Photovoltaic Systems

(Duration: 6 hours) Course Highlights:

- Study the charge controller & Inverter in solar energy systems
- Observe the output waveform of MPPT & PWM charge controller



4. Electronics for Photovoltaic for grid-tied system

(Duration: 6 hours) Course Highlights:

- Study the grid-tied inverter with block diagrams grid tie inverter,
- String inverter, solar inverter etc.
- Implement the inverter circuit practically

5. PVSyst Simulation Software for Solar System design

(Duration: 12 hours) Course Highlights:

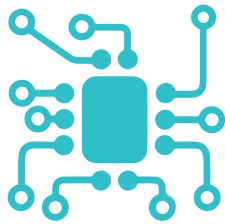
- The Indian power sector and conversion of light energy to electricity
- Simulate and analyze the pvsyst report



6. MATLAB Simulation Software for optimizing Solar circuits

(Duration: 6 hours) Course Highlights:

- Fundamentals of MATLAB
- Simulation of power electronic circuits and power systems



7. PCB Designing Software for Solar products

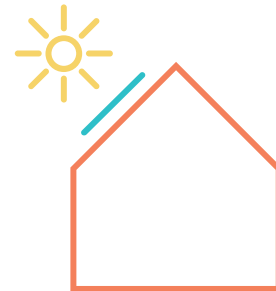
(Duration: 6 hours) Course Highlights:

- Hands-on experience on designing the circuit layout
- Clarity on creating the gerber files of the layout

8. Solar Cell designing & simulation Software (PC1D)

(Duration: 6 hours) Course Highlights:

- Study the structure of a solar cell and analyse its performance
- Observe various graphs including current-voltage, (IQE and EQE)



9. Solar Instruments

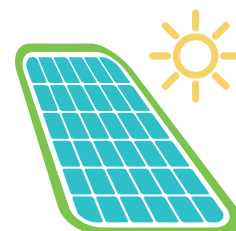
(Duration: 6 hours) Course Highlights:

- Understand the working of solar radiation meter
- Experiencing hands on session on solar energy meter

10. Solar Tracking and Concentration

(Duration: 12 hours) Course Highlights:

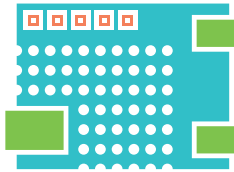
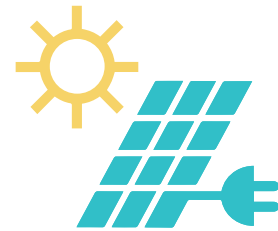
- Demonstrating solar tracker and observing types of radiations
- Analyze the difference between static and tracking solar system



11. Solar Mobile Charger and type of batteries

(Duration: 6 hours) Course Highlights:

- Understand the parameters of batteries
- Experiencing hands on session on solar mobile charger



12. Autonomous Solar Products using Arduino

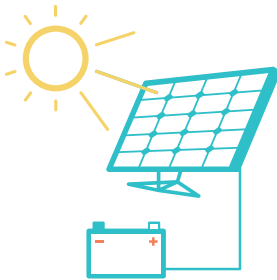
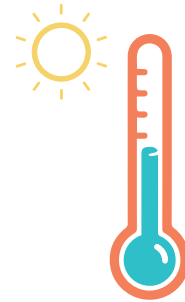
(Duration: 6 hours) Course Highlights:

- To study basics of UART and microcontroller
- Practically Interfacing Arduino with LCD

13. Hands on experience on Solar Products (any 2)

(Duration: 6 hours) Course Highlights:

- Understand circuit diagram of a solar street light
- Understand circuit diagram of a temperature sensor



14. Solar cell manufacturing

(Duration: 6 hours) Course Highlights:

- Understand the parameters involved in designing an efficient solar cell
- Observe and analyze the procedure of manufacturing a solar cell
- Experiencing a practical hands on session on manufacturing a solar cell

15. Controlling of Solar PV System using Wireless Technologies

(Duration: 6 hours) Course Highlights:

- Analyzing the working of a transmitter and a receiver
- Demonstrating the wireless transmission between two GSM modules
- Practical session on zigbee module





SOLAR PROFESSIONAL COURSE

The professional course specially designed for ITI's and technicians who aspire to work in the field of solar energy.

Professional courses in solar PV are designed to help the participants to learn the appropriate system designing by learning diversity of aspects and system selection under various conditions.

The professional course specially designed for engineers, ITI's and technicians who aspire to work in the field of solar energy.

The course offers understanding of basics of solar energy and the different systems in the solar energy system. The courses are also designed to get hands on experience in installation, operation and maintenance by allowing the participants to spend maximum time on field.

Following are the courses being offered:



- ▶ Stand Alone PV System: from basics to installation with hands-on experience (5 Days)



- ▶ Grid connected PV system: from basics to installation with hands on experience (5 Days)



- ▶ Operation & Maintenance of PV power plant (3 Days)

Stand Alone PV System: from basics to installation with hands on Experience

This course exposes you to the solar era by introducing to the Fundamentals of Solar, behavior of solar panel under different conditions, Indian energy scenario, Govt. Policies, design & installation of a standalone system together with real-life hands on experience on the field.



Grid connected PV system: from basics to installation with hands on experience

A grid-connected solar PV power system is an array of photovoltaic modules connected via an inverter to provide AC power for your home, with excess production feeding into the mains AC utility grid during the day.

The course offers the learning of a grid connected system design explaining the concepts of net metering, solar inverters and frequency synchronization. The course gives hands on experience with the installation and operation of the grid connected PV system.

Operation & Maintenance of PV power plant

Despite its high degree of sunshine, India experiences ruthless weather conditions ranging from hot sunny days to monsoons and extreme winters. Solar panels have to hold up in all of these intensive environments, which can affect the overall maintenance and operations, especially the electricity yield.

The course offers understanding of the services including maintenance of the PV array, finding faults, ordering replacements, periodic cleaning of arrays, infrared checking for hot spots, checking for junction box or combiner box overheating, remote monitoring of power generated and matching with past performance to uncover abnormalities, seasonal power output monitoring versus predicted power, etc.





Suryamitra Skill Development Program

kWatt Solutions Pvt. Ltd. (kSPL) has been given the privilege to conduct the "Suryamitra Training Program" initiated by Ministry of New and Renewable Energy (MNRE).

kSPL is authorized by National Institute of Solar Energy (NISE), MNRE, Govt. of India to conduct the skill development program to create and nurture skilled "Suryamitras" in installation, commissioning and O&M in the field of Solar Energy.

Ministry of New and Renewable Energy (MNRE) has initiated this program with the intent to create 50,000 "Suryamitras" across the country, skilled in installation, commissioning and O&M in the field of renewable energy with the special focus on solar.

Each training program consists of 30 participants and the total duration of the training will be 3 months (600 hours) including a one month internship in solar energy related industry. The training program will be strictly residential with a clear daily time table which includes early morning physical exercise such as Yoga/PT etc.

Selection of the participants:

The candidate with the essential qualification will be eligible, however preference will be given to the candidates as indicated below:

Essential Qualification: The candidate should be 10+2 pass and not below 18 years

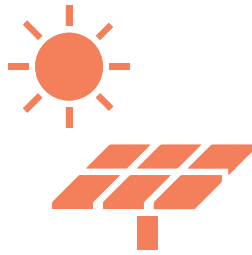
Preferable: It is also preferred that trainee should have certificate of ITI or diploma in engineering branches Electrical/Mechanical/Electronics; experience in certified electrician is also preferred. During the selection of trainees, special emphasis will be given to the persons coming from rural background, unemployed, women, SC/ST candidates.

Facilities

For this 3 months workshop participants need not to pay anything, all infrastructure, accommodation & food related arrangement during the training period will be taken care by kSPL & MNRE (NISE).

kSPL has started with the first batch of Suryamitras in Bhikangaon, MP





kSPL mentors students who want to showcase their interests by implementing solar engineering techniques

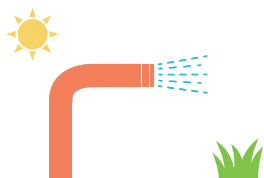
ENGINEERING PROJECTS (Major and Minor Projects)

- The kSPL team nurtures this interest of students by guiding them to build solar projects, come up with their ideas and provide them industrial support and make their understanding of fundamentals strong
- Projects covering all aspects of solar technology and related electronics are offered

Following are examples of few solar projects:

- Solar Tracker with 3D movement

A dual axis solar tracking mechanism with a 3D movement which provides the flexibility to the tracker to track the motion of the sun



- Solar Irrigation System

The project is designed to auto control the water pumping for the plants based on the moisture level in the soil with an auto controlled white light used for the green-house effect

- Solar Home Lighting System

The project comprises of a system design with an inbuilt power bank sufficient enough to charge the daily home appliances such as small fan, led lighting and mobile charging



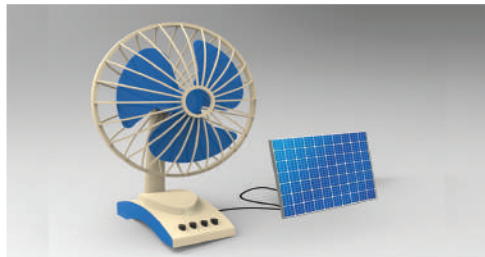
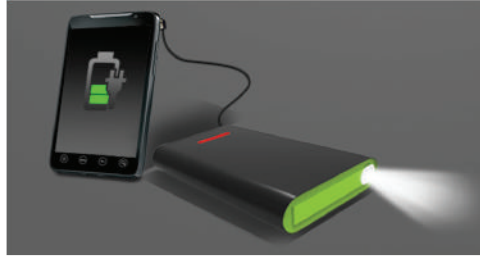
- Prototype of Solar Grid Connected system

The project is based on the grid tied solar system design. The projects will have an auto switching of load between a solar supply and a grid supply whichever is in excess

- Solar Bicycle

It is design to drive a hub motor of high wattage running on a high capacity battery charged by solar panel on the roof of the bicycle





And many more.....

- Solar energy measurement system

Sensing the current produced from solar panel and the voltage generated this project will implement an energy meter which will use this voltage and current to run a load over a period of time



- Solar powered wireless car

This project includes design of a wirelessly controlled car using zigbee module to transmit and receive wireless commands. This wireless car used a li-ion battery to get power which is charged a solar panel

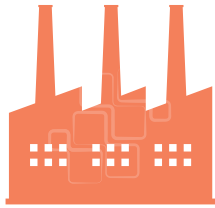
- MPPT Charge Controller

Tracking the maximum power point at which the solar panel is operating. This project will develop a MPPT charge controller of 10W to charge a battery at a faster rate



Many more projects.....

In addition to above projects, we also offer mentoring on any other topics depend- ing on the choice and interest of students.



INDUSTRIAL VISITS

Students and faculty members will now have a real life experience of solar manufacturing as well as an opportunity to see the operations of grid-connected rooftop and large scale solar power plants with the industrial visits organised by kSPL.

Solar Rooftop/Power Plant Visit

This visit will have the following learning objectives

- Understand the system design and concept
- Analyze the plant structure and Foundation
- Understand the electronics such as Inverter and Charge controllers
- Analyze the concept of Panel connection and Distribution box
- Understand the grid connection concept

Solar Manufacturing Industry Visit

This visit will have the following learning objectives

- Understand the complexity involved in solar manufacturing
- Understand manufacturing process of given industry e.g solar cell manufacturing, solar PV module manufacturing
- Estimation of yield of production, defect rates





ABOUT US

IIT Bombay professor Dr. Chetan Singh Solanki founded the company kWatt Solutions Pvt Ltd (kSPL), currently incubated in Society for Innovation and Entrepreneurship(SINE) at Indian Institute of Technology (IIT) Bombay.

kSPL is operational in the renewable energy space focusing on energy optimization and technology customization to endow with economic renewable energy solutions by creating and nurturing network of entrepreneurs; and by doing so, kSPL is working towards “economizing renewables.”

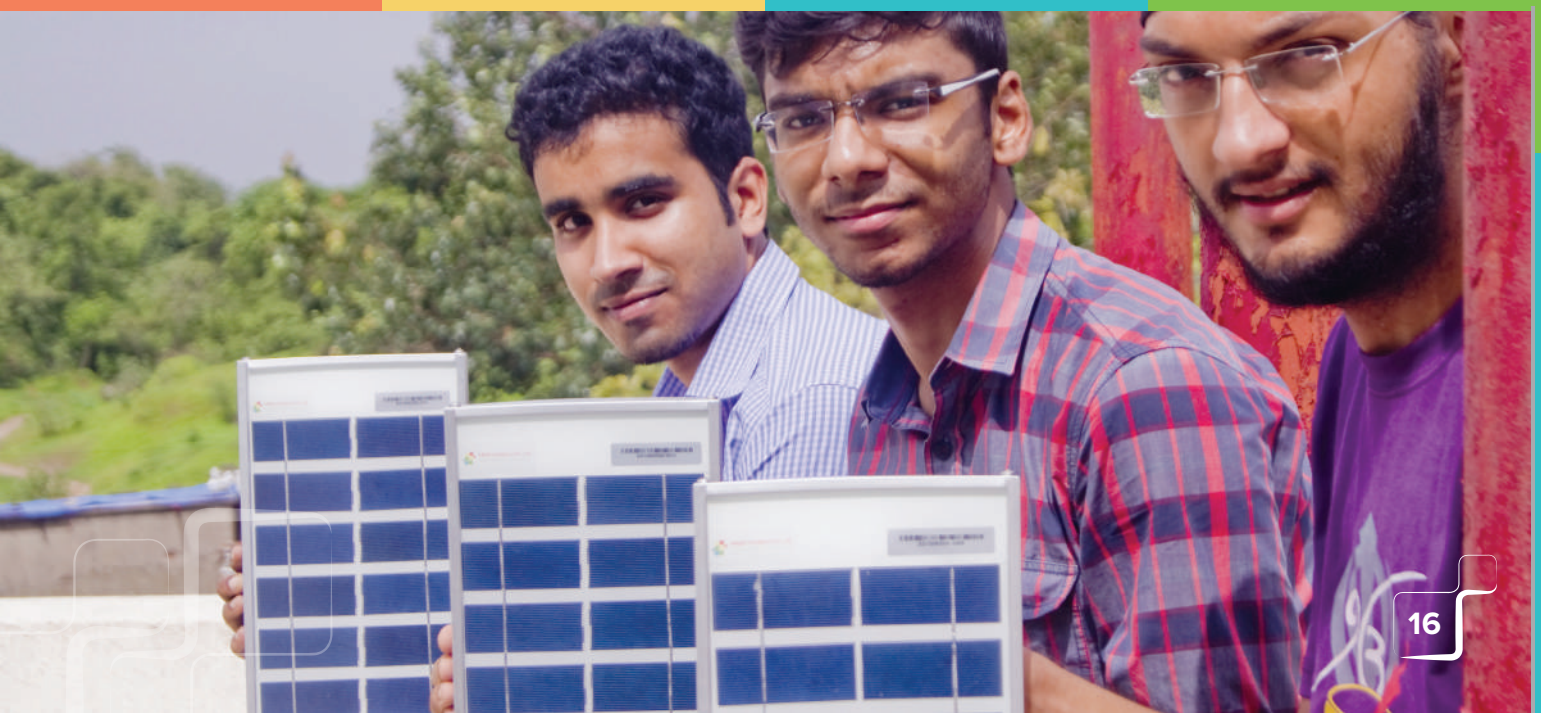
kSPL activities are divided in two categories:

- Empowering people with Solar
- Scaling Up Solar

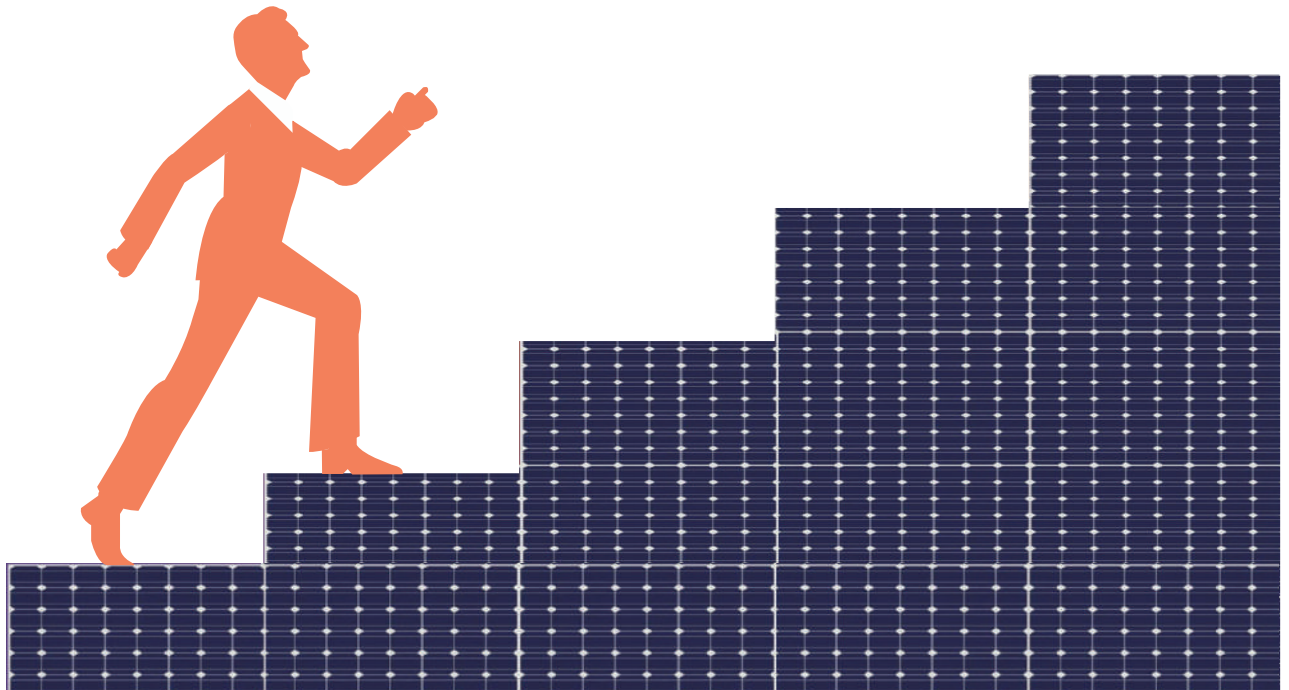


VISION AND MISSION

“kSPL is a technology driven company focusing on energy optimization and technology customization to provide economic renewable energy solutions by developing and nurturing a network of entrepreneurs.”



Join us and become “SOLAR SMART”



For S-SparQ registration, check

www.kwattsolutions.com/ssparq/reg.html

✉ training.sparq@kwattsolutions.com



Corporate Office: M- 08, 3rd floor, CSRE Building, SINE, IIT Bombay, Powai, Mumbai - 400076.

✉ info@kwattsolutions.com

☎ +9122 25728065

🌐 www.kwattsolutions.com

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