



Cairo University
Faculty of Engineering
Credit Hours System



Electrical Energy Engineering Program

EEE



Scope



EEE
Graduates



EEE
Applications

2023



Graduation
Projects



Decision

Electrical Energy Engineers

1



What we do?

01 Develop, design or update specifications of electrical systems and equipment

02 Design methods to generate, distribute and manage electricity

03 Design automated and computerised methods to control industrial processes

04 Manage and calculate the cost of projects, and materials needed

05 Supervise the installation and maintenance of systems and equipment



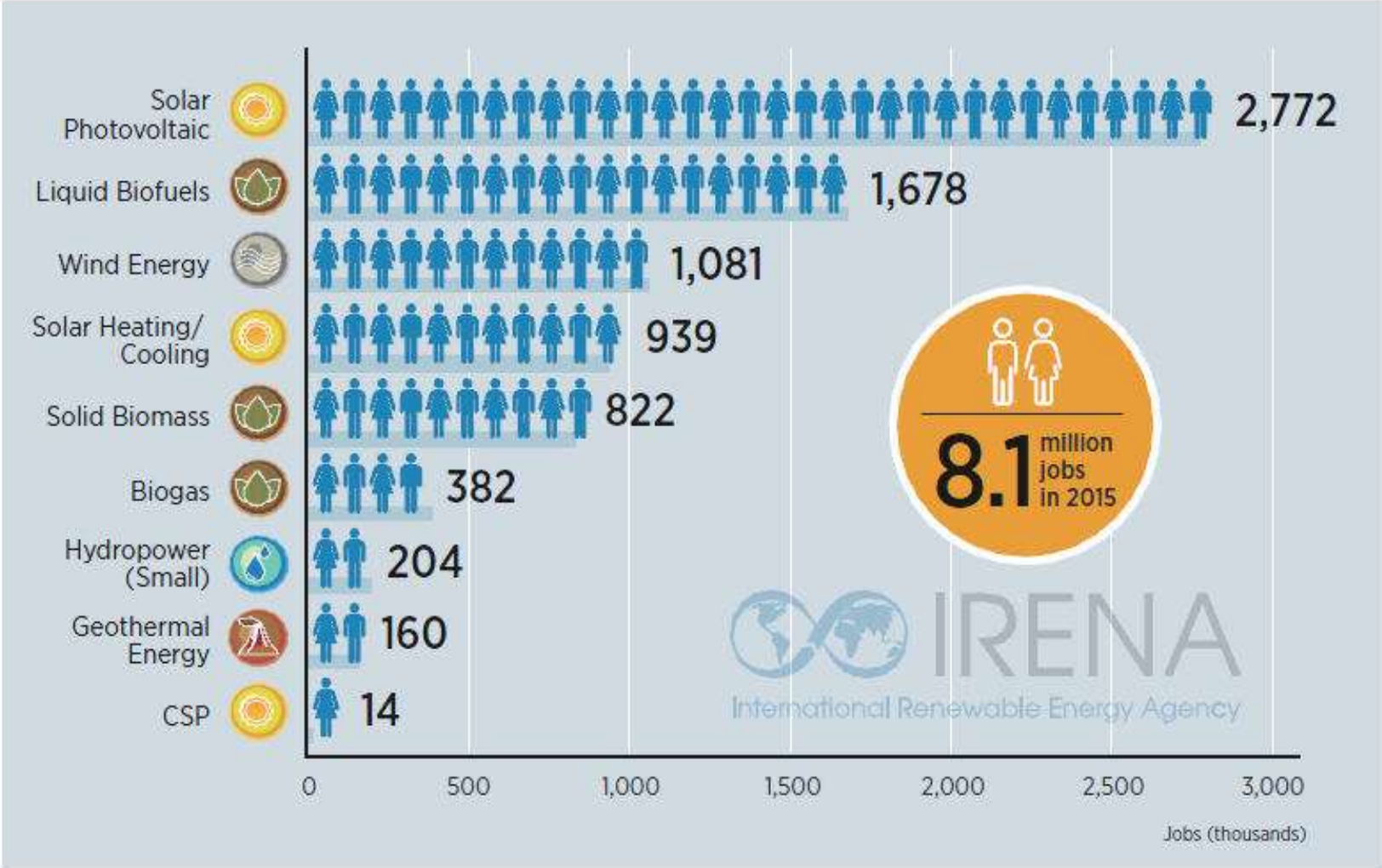
Electrical Energy Engineering



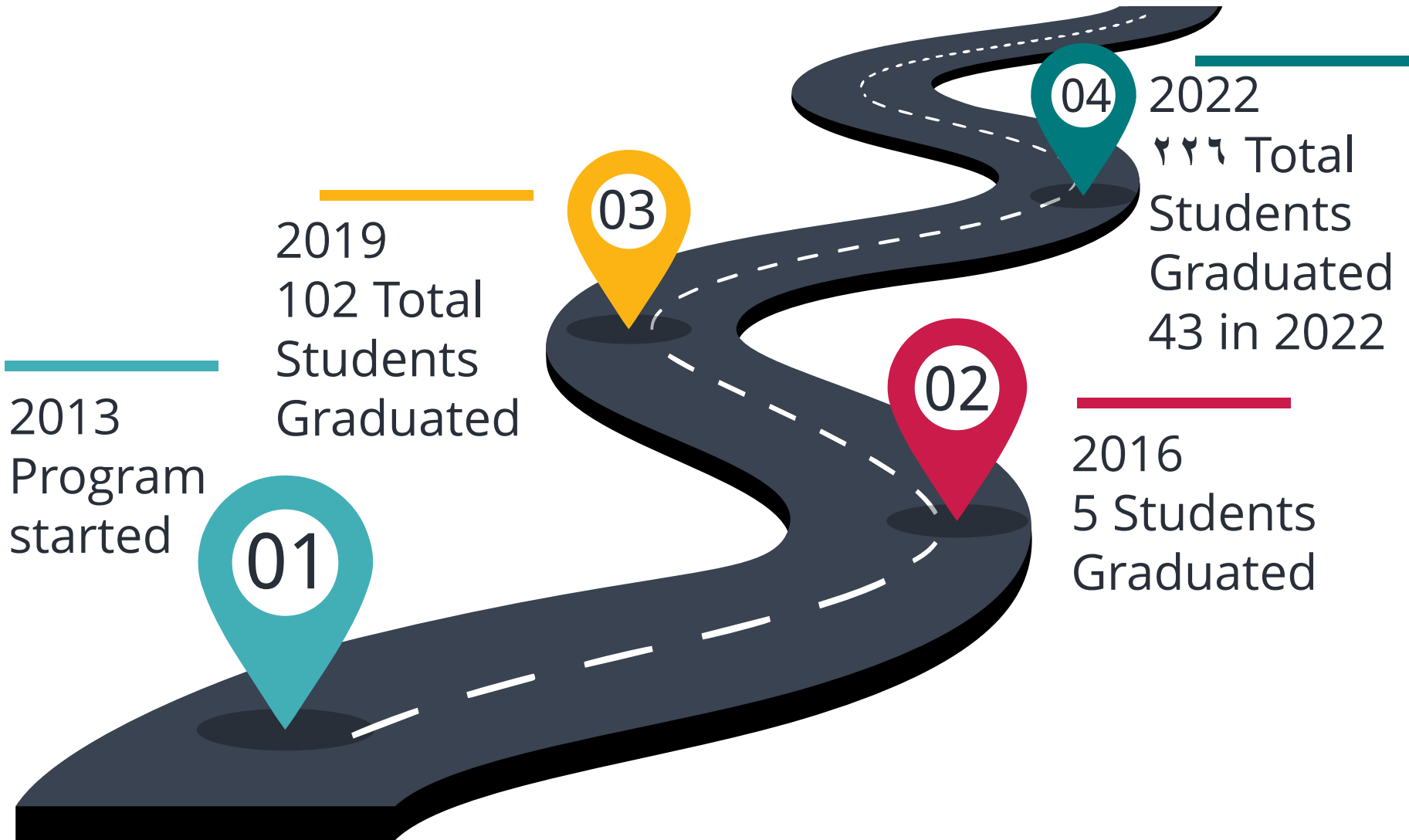
- Global transition into renewable and sustainable forms of energy.
- Worldwide trend for electrical applications for more energy saving and green economy.
- Constant growth of the local market for renewable energy and industrial automation.

Electrical Energy Engineering

FIGURE 1: RENEWABLE ENERGY EMPLOYMENT BY TECHNOLOGY

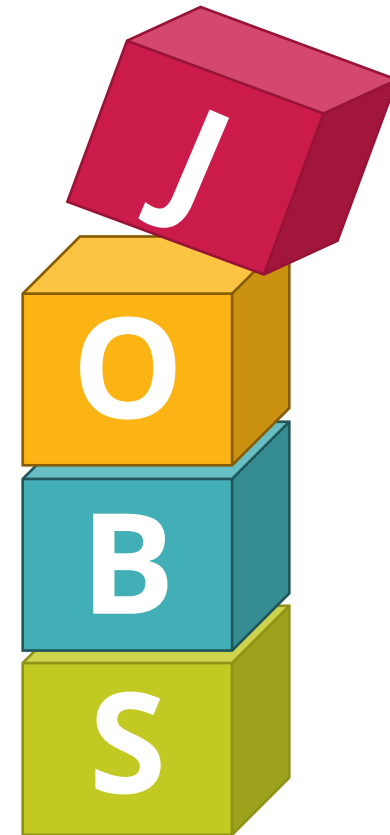
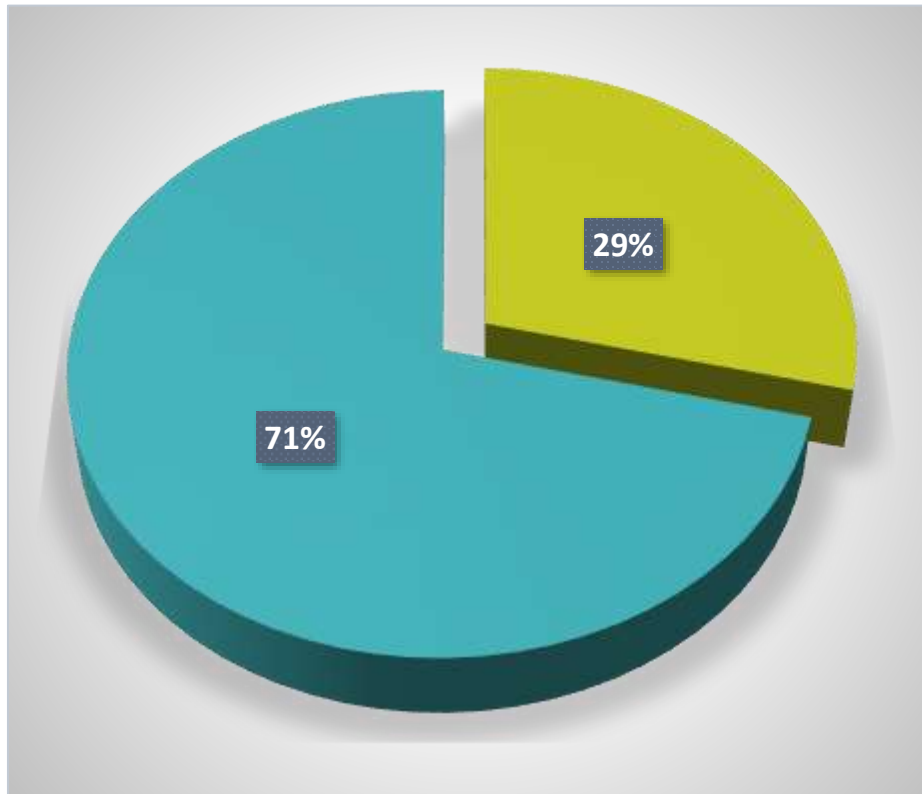


EEE Milestones



EEE Graduates

1-3 Months 3-6 Months

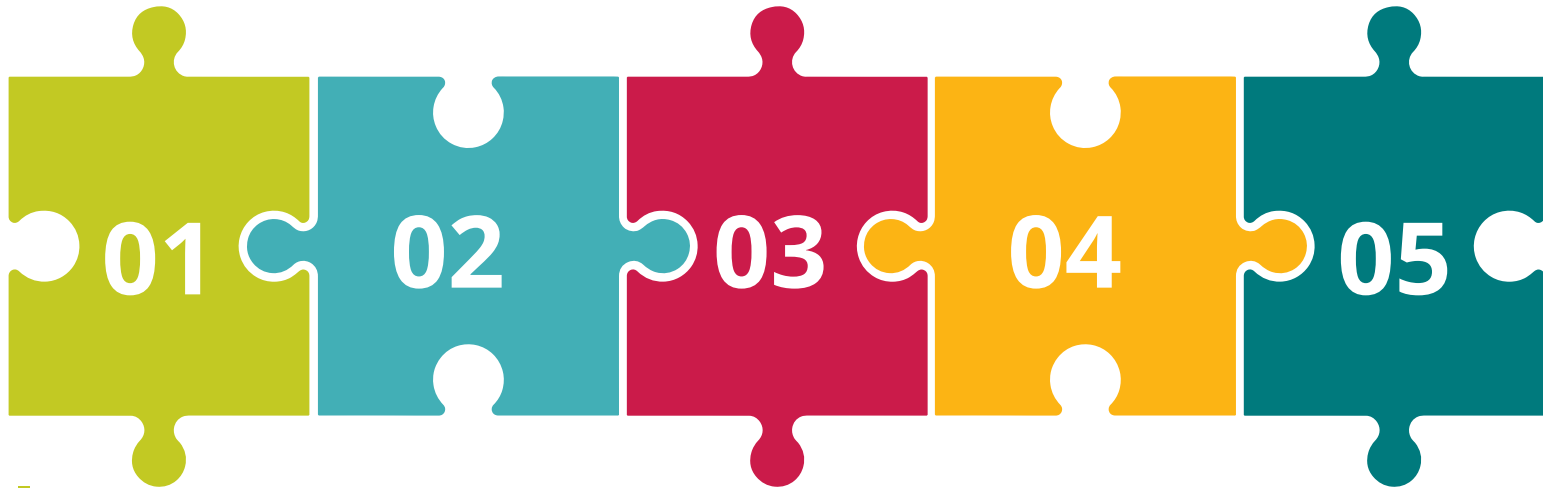


- **100% of our graduates were employed within 6 months of graduation.**
- **81% of their first jobs were EEE related**

EEE Graduates (latest survey)



Some Applications Related To **EEE** Program Curriculum



Electrical Installation Works

Power Systems Studies

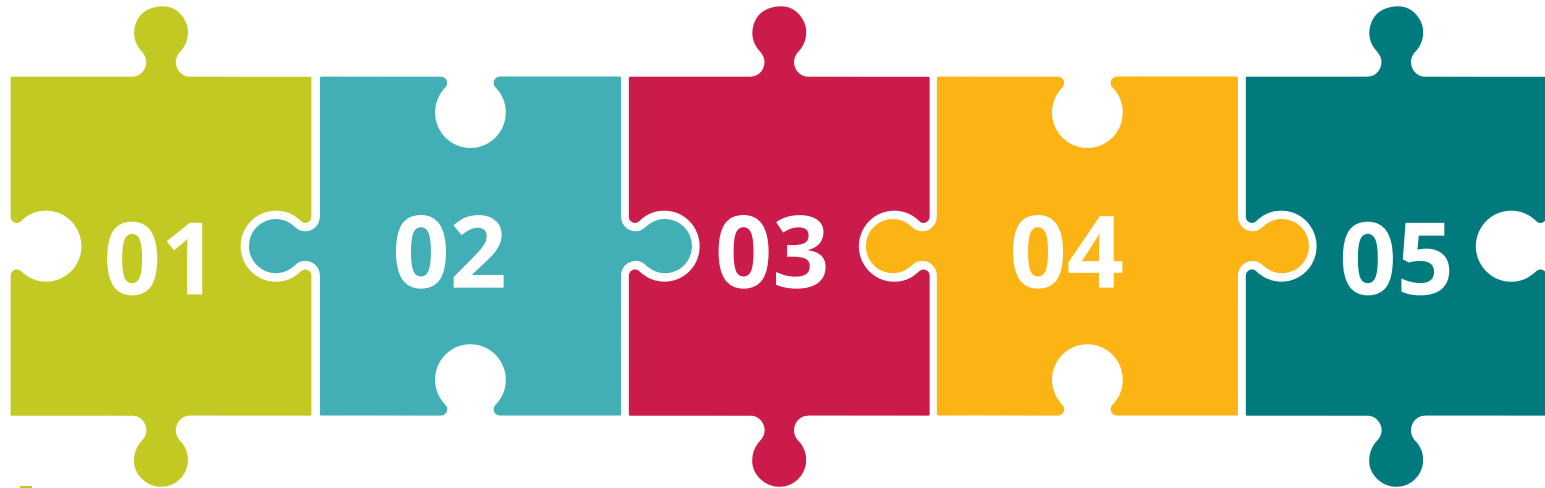
Industrial Automation

Energy Efficiency

Transformers Design



Some Applications Related To **EEE** Program Curriculum



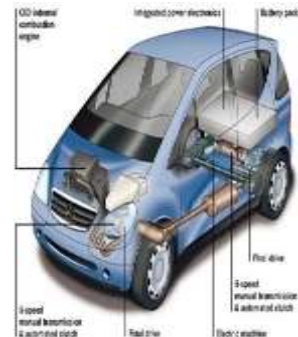
Power Electronics

Solar PV Energy

Wind Energy

Electric Vehicles

MAGLEV Monorails



Samples of **EEE** Graduation Projects

1

E-Bike

2

**Wireless Power
Transmitter**

3

**Hybrid Microgrid for
Telecommunication
station**

4

Smart Green Hospital

6

**Electrical
Installation for a
Hospital**

6

**Energy Analysis and
Management**

7

Delta Robot

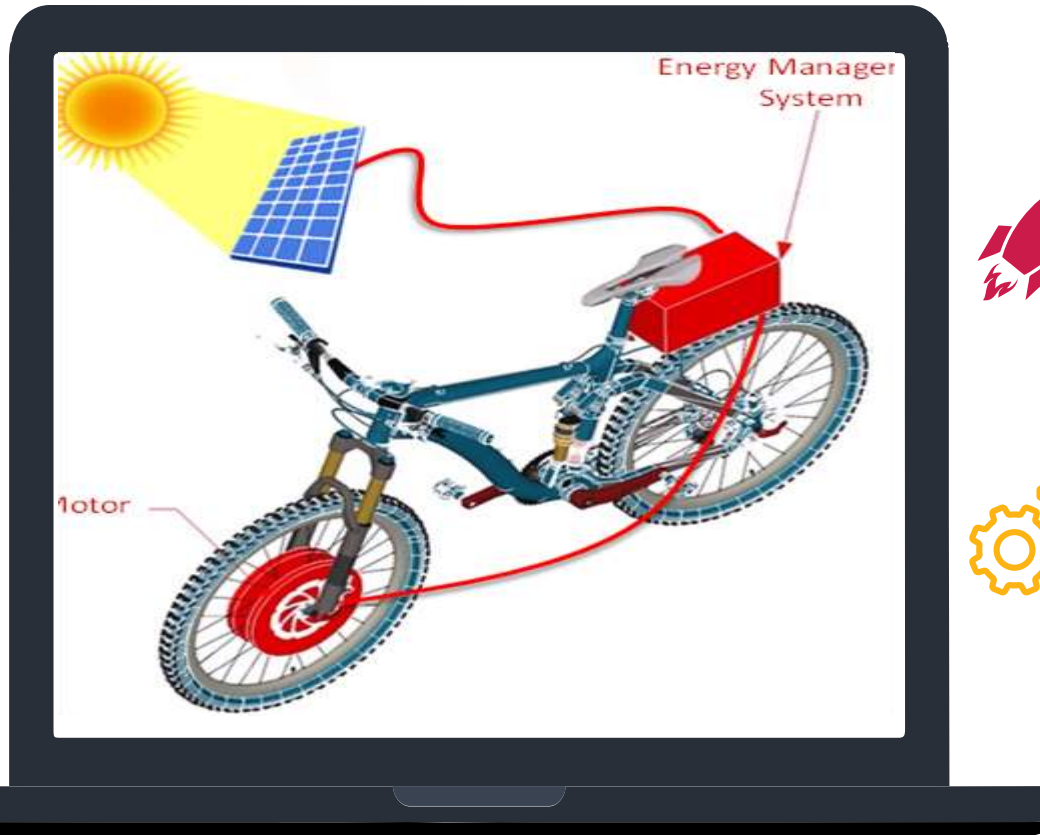
8

**Solar parabolic
trough using PLC &
SCADA**

4

**PLC based control
system for grain
storage silos**

Design and Implementation of a cost-effective E-Bike



Objective:

Introducing to the Egyptian market a public transportation method with a low initial investment cost, locally implemented, also user & eco friendly.

Description:

Designing & implementing a *motor drive* and an *energy management system* to upgrade a regular bike to an e-bike; so it would have 3 modes of operations:

- *Pedals only*
- *Electric motor*
- *Pedal assist*

With 2 different charging sources:

- *Wall socket*
- *PV panel*

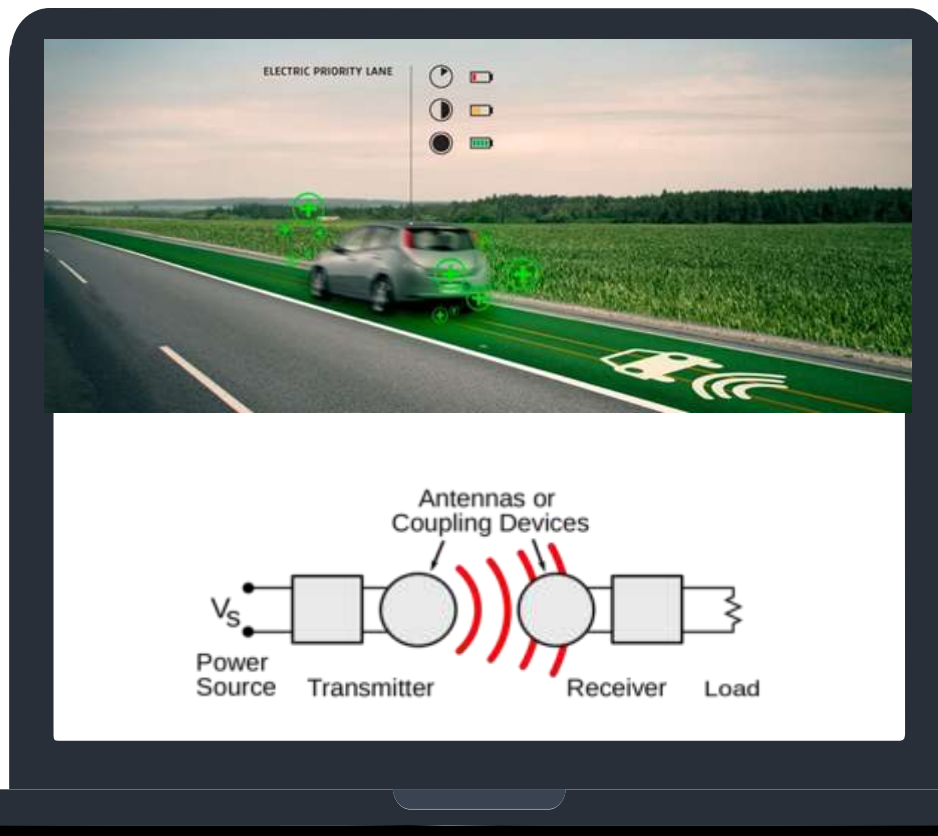
Wireless Power Transmitter



Electric Vehicles (EV) industry is invading the automobile field competing the Internal Combustion (IC) industry since it introduces a zero-emission vehicles which are friendly to the environment



Wireless power transfer (WPT), wireless power transmission or electromagnetic power transfer is the transmission of electrical energy without wires. The concept of WPT can resolve several issues regarding EV but the most significant one is that you can drive and charge your car simultaneously.



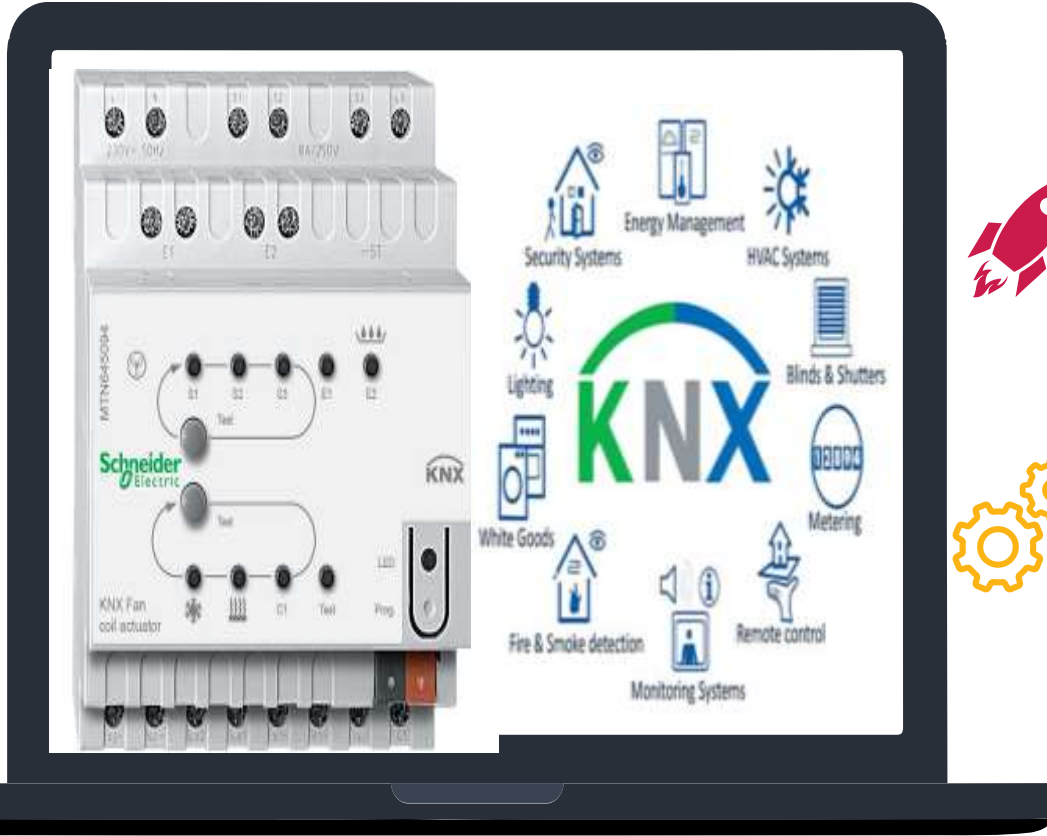
Hybrid Microgrid operation and control for telecommunication sites sponsored by **Vodafone Egypt**



- **Project description:** Study and implement **hybrid power supply configurations** for **telecommunication sites** to maximize the penetration of **renewable energy** while satisfying the operational constraints like:
 - DC and AC Voltage stability
 - Frequency stability
 - Power quality
 - System autonomy
 - Energy storage lifetime
- **Project objective:** Design the system including
 - Hybrid energy storage system and its control
 - Power converters control
 - Power management system
 - Energy management system
 - Graphical user interface
 - Economic analysis

Smart Green Hospital Sponsored by Schneider Electric

1) Load estimation.	10) Bus bar routing and sizing.
2) Lighting.	11) Cable routing.
3) Sockets.	12) Cable trays sizing and routing.
4) Circuit breakers.	13) UPS sizing.
5) Cables sizing.	14) Power factor correction.
6) Distribution boards.	15) Earthing.
7) Lifts and fire pumps.	16) Voltage drop calculations.
8) HVAC .	17) Short circuit calculations.
9) Feeding system and room sizing.	18) Ecodial and protection.
	19) Light current.



- KNX devices are building automation devices sponsored by Schneider electric.
- 3D room model (Mackket) will be done to demonstrate the various devices functionalities and automation scenarios.

3D view:



Energy Analysis and Management



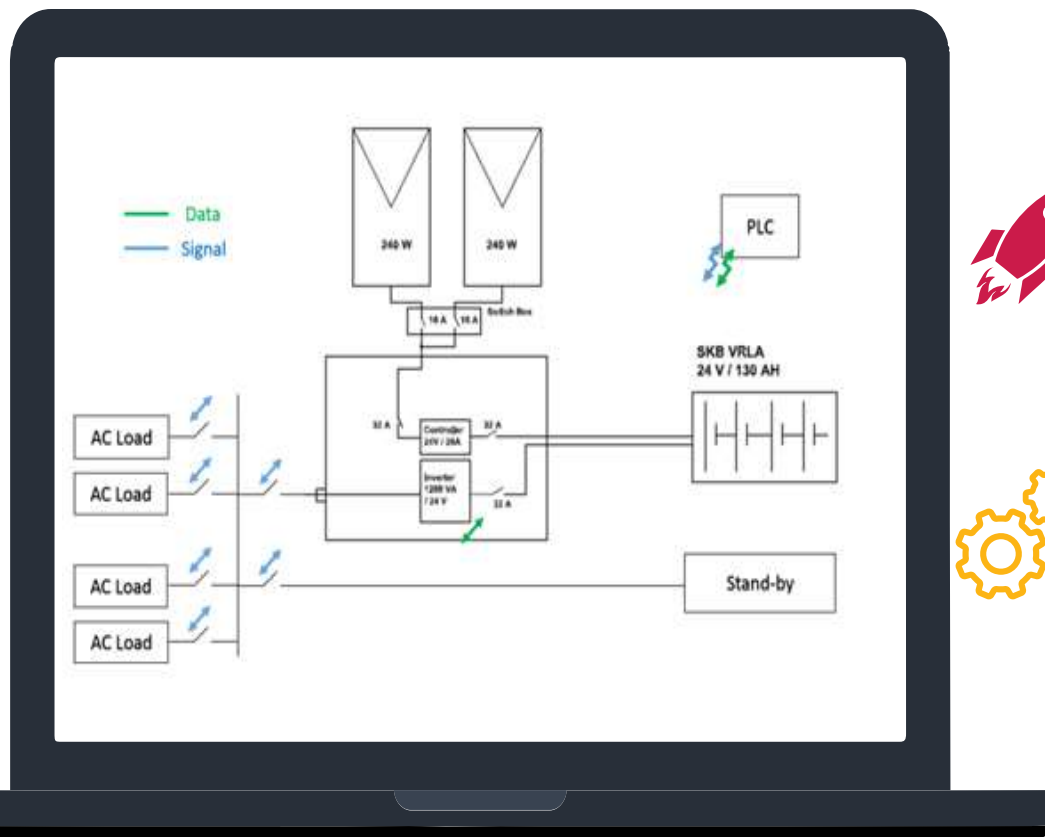
• Summary:

Automation systems and industrial plants are growing increasingly complex, with more flexible production in larger plants. So more insights into plant performance is needed with less and less people to do the job. Data storage and transactions needs to be reliable, cyber secure, and with high capacity.

• Objective:

The aim of our project is to fully design and implement energy data acquisition system to monitor different types of energies such as electricity, heat and compressed air pressure from different sites to a centralized server. Followed by reports and technical analysis to the findings to make plan for continuous improvements in the following areas, Energy Saving, Co2 Emission monitoring and Improving energy efficiency.

Smart Microgrid



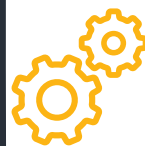
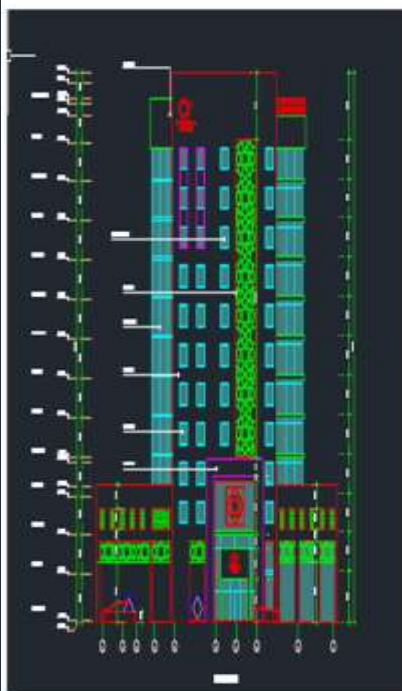
Project description:

- The aim of this project is to construct an isolated system, formed by distributed energy resources (DER), energy storage system (ESS), and loads that are electrically interconnected and hierarchically controlled.

Objectives:

- Connect PV inverter to the system as a distributed energy resource (DER).
- Programming PLC to implement Demand Side Management.
- Use of Smart Meter to measure: energy - power - current - voltage and transmit to PLC
- Develop the needed communication system to exchange the information between the different controllers

Electrical Installation works for a Hotel with Earthing System Simulation kit



- | | |
|------------------------------------|-------------------------------------|
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Delta Robot



Design and implementation of a delta robot for picking and placing light objects

Control of Solar Parabolic Trough



**Design,
Monitoring and
control of solar
parabolic trough
using PLC &
SCADA**

Control of Grain Storage Silos



**Design of a PLC-
Based control
system for grain
storage silos**

Contact Info



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**Thank
You**