



**POLYTECH**  
PARIS-SUD



UNIVERSITÉ  
**PARIS  
SUD**

**IUT DE CACHAN**

## **Conception of laboratory research on «Modelling and interconnection of smart Grids»**

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# PRESENTATION PLAN

I

Introduction

II

Structure of Laboratory

III

Power loss due to faults

VI

PV installation

V

Work carried out and Perspectives

# I. Introduction

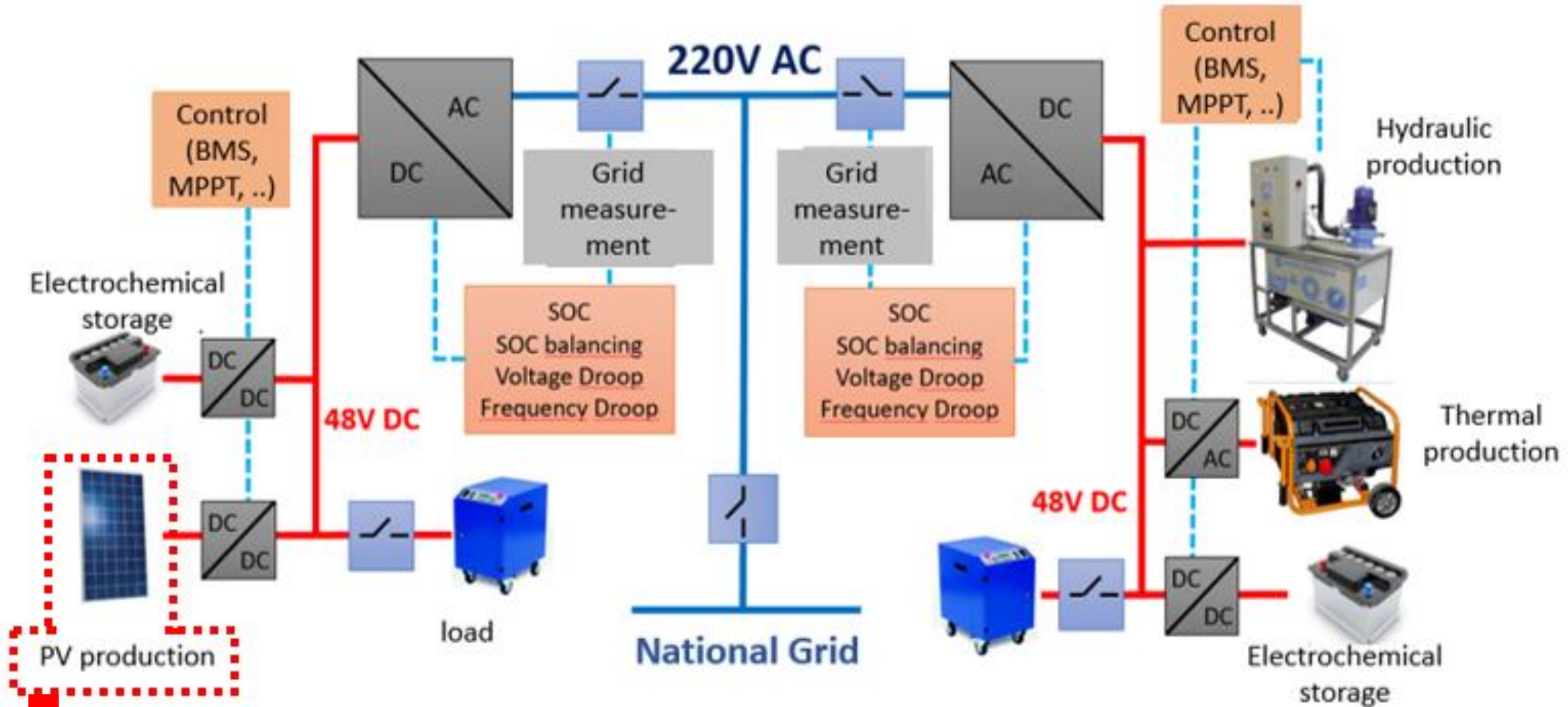
## *Context*

- ❖ Need specialist in the field of renewable energy and electrical engineering
- ❖ Photovoltaic integration in the energy mix of Laos

## *Opportunity*

- ❖ Joint project between faculty of Engineering (FEN), Laos, and Université Paris Sud (UPSUD), France, to establish a research laboratory on smart grids at FEN (**Phase1: installation solar farm at FEN**)
- ❖ Creation of an "Energy" option within FEN
- ❖ Support of Association Développement Energie Emploi in laboratory project
- ❖ Implementation of a joint final project between French and Lao students

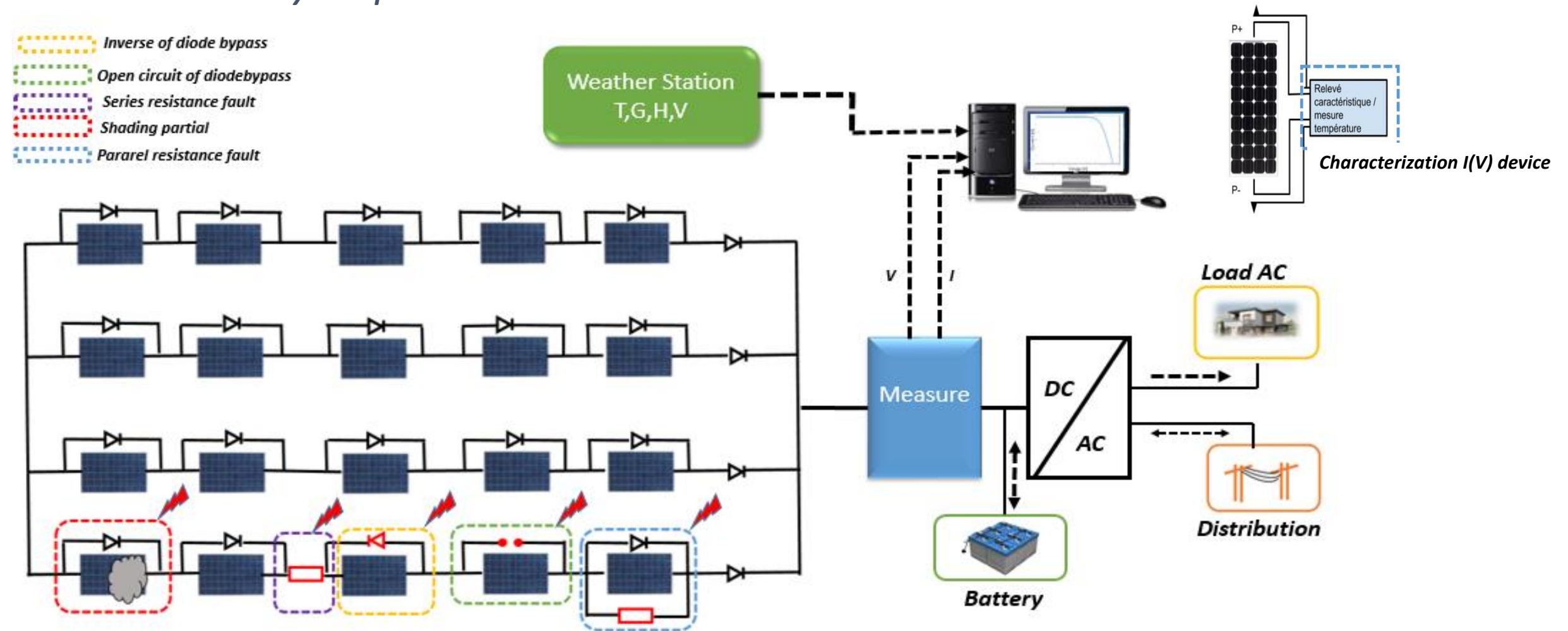
# II. Structure of Laboratory



***1<sup>st</sup> Phase of project (PV installation with faults detection devices )***

# III. Power loss due to faults

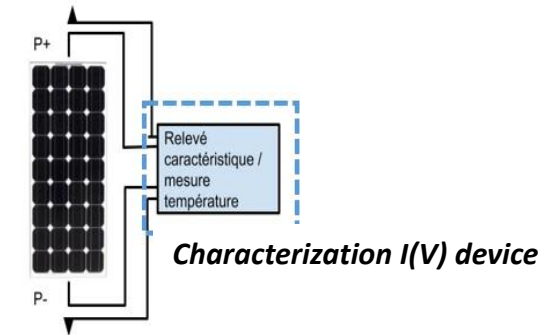
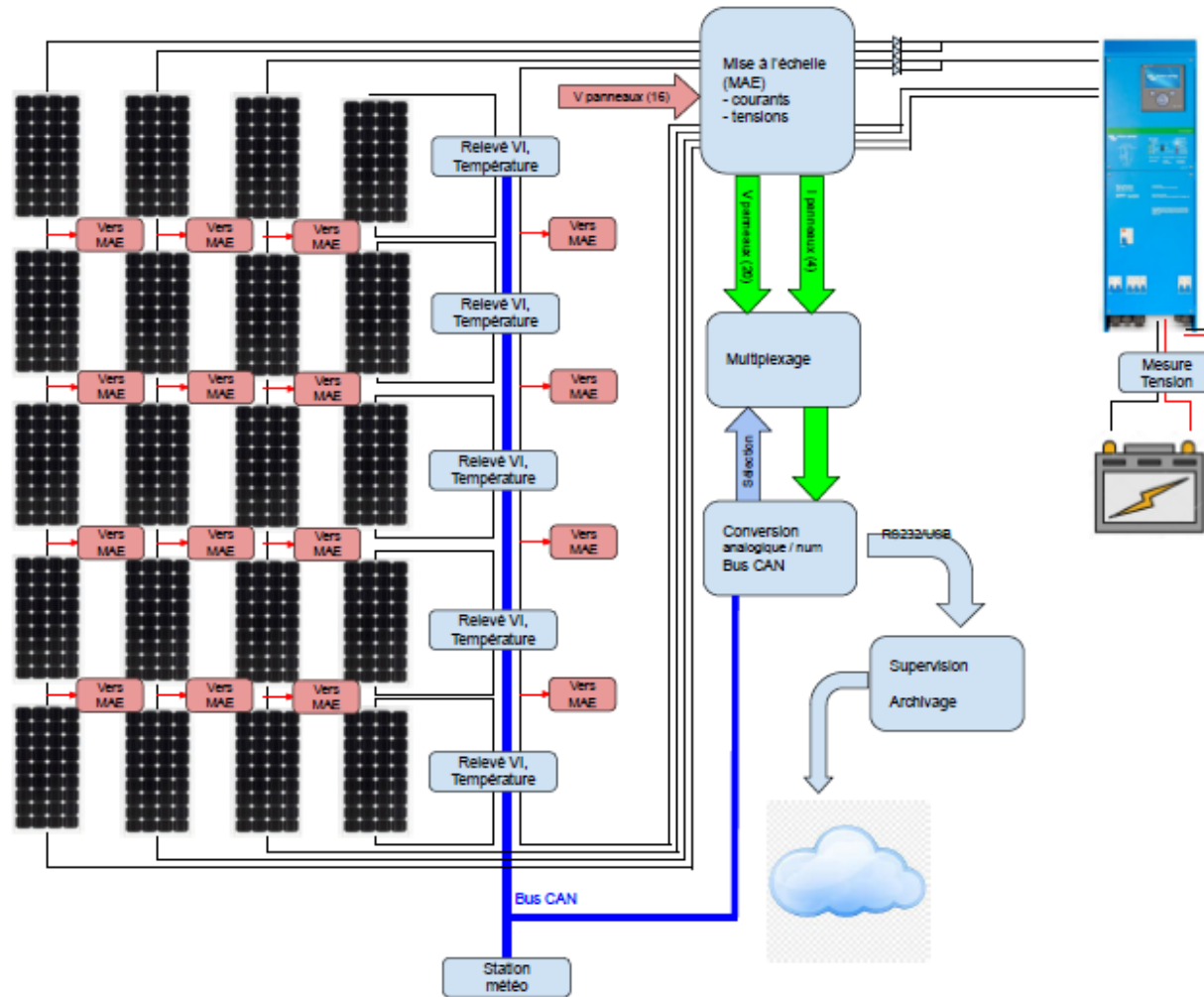
## ❖ Faults in the system photovoltaic





## IV. PV installation

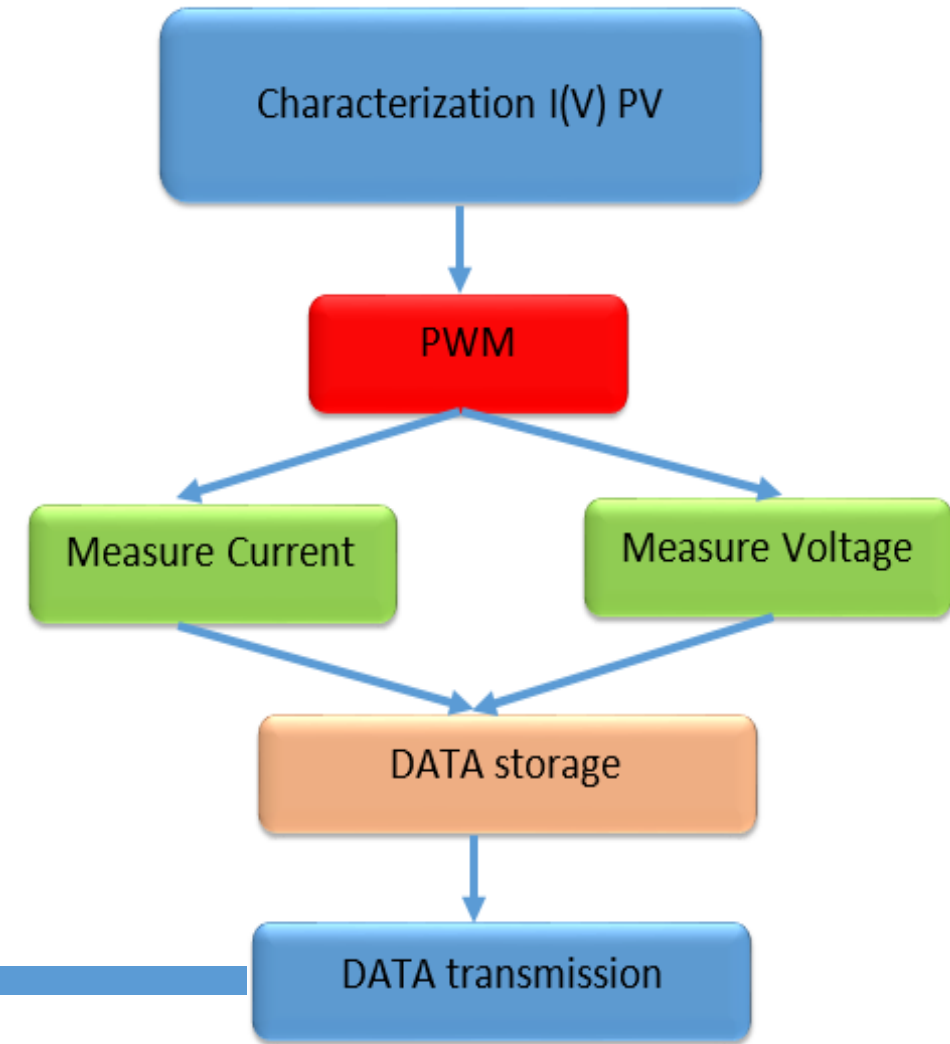
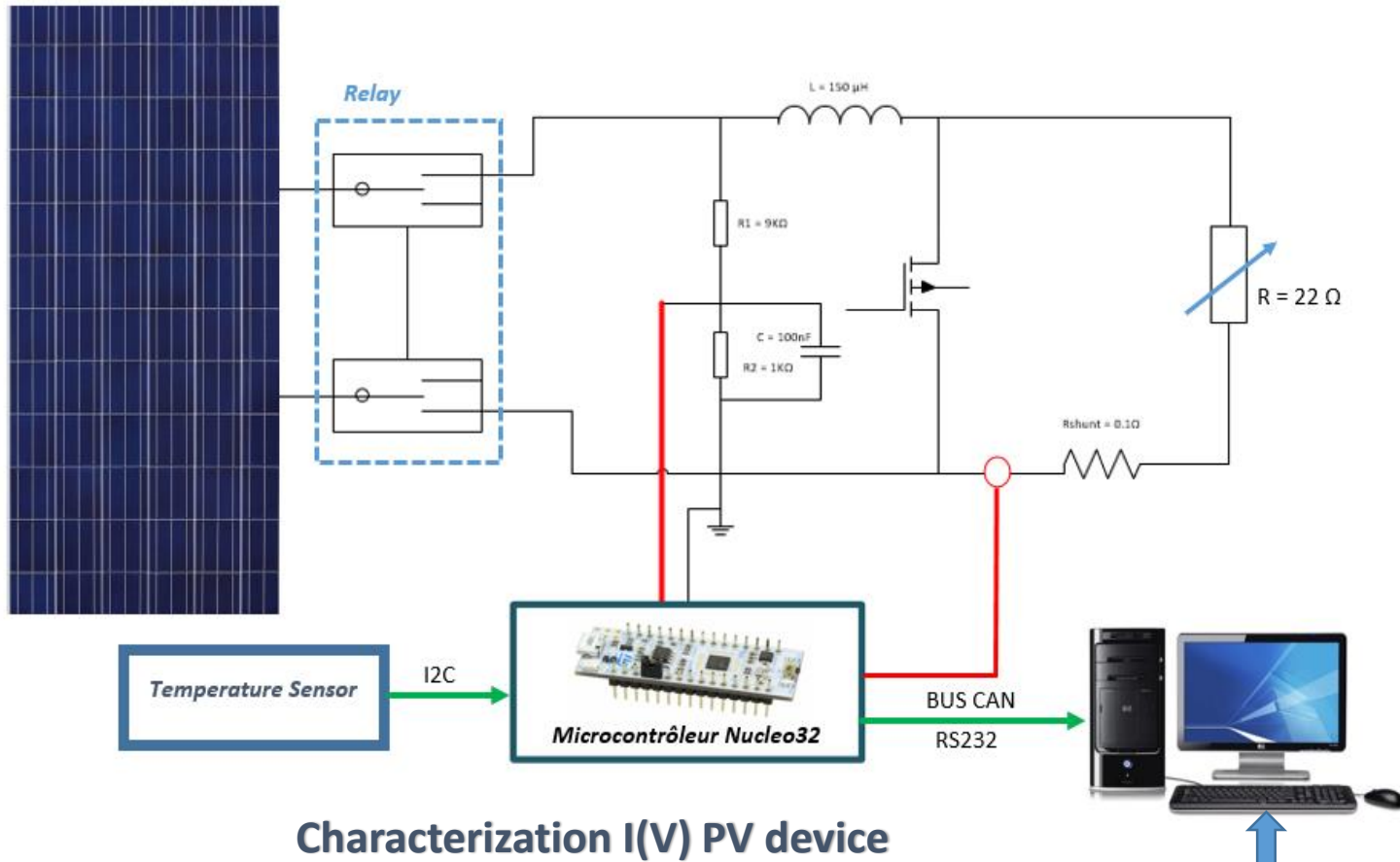
## ❖ *PV system installation Design (2 KWc)*



**Data Acquisition every 5 minutes**

- ☐ Voltage in each module
- ☐ Current each String
- ☐ Power Production
- ☐ Weather data (Wind Speed, Solar irradiance, direction of wind and humidity)
- ☐ Characterization I(V) of module PV

# IV. PV installation





# IV. PV installation

## ❖ PV system installation at FEN



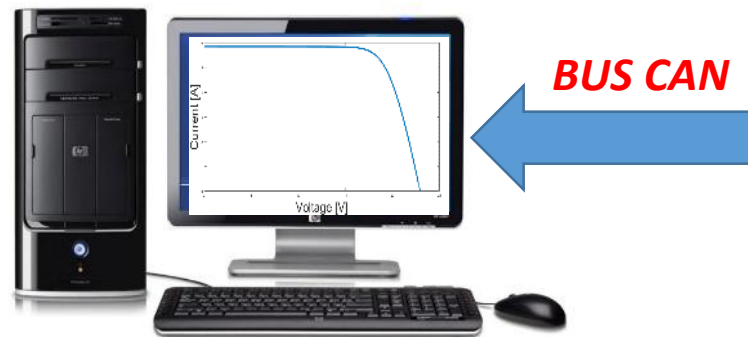
PV System installation



Characterization I(V) device



PV System with weather station



Data acquisition



System inside Laboratory



# IV. PV installation

## PV System installation





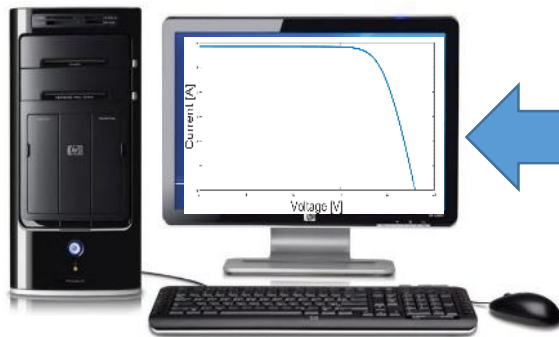
# IV. PV installation

## Characterization I(V) device

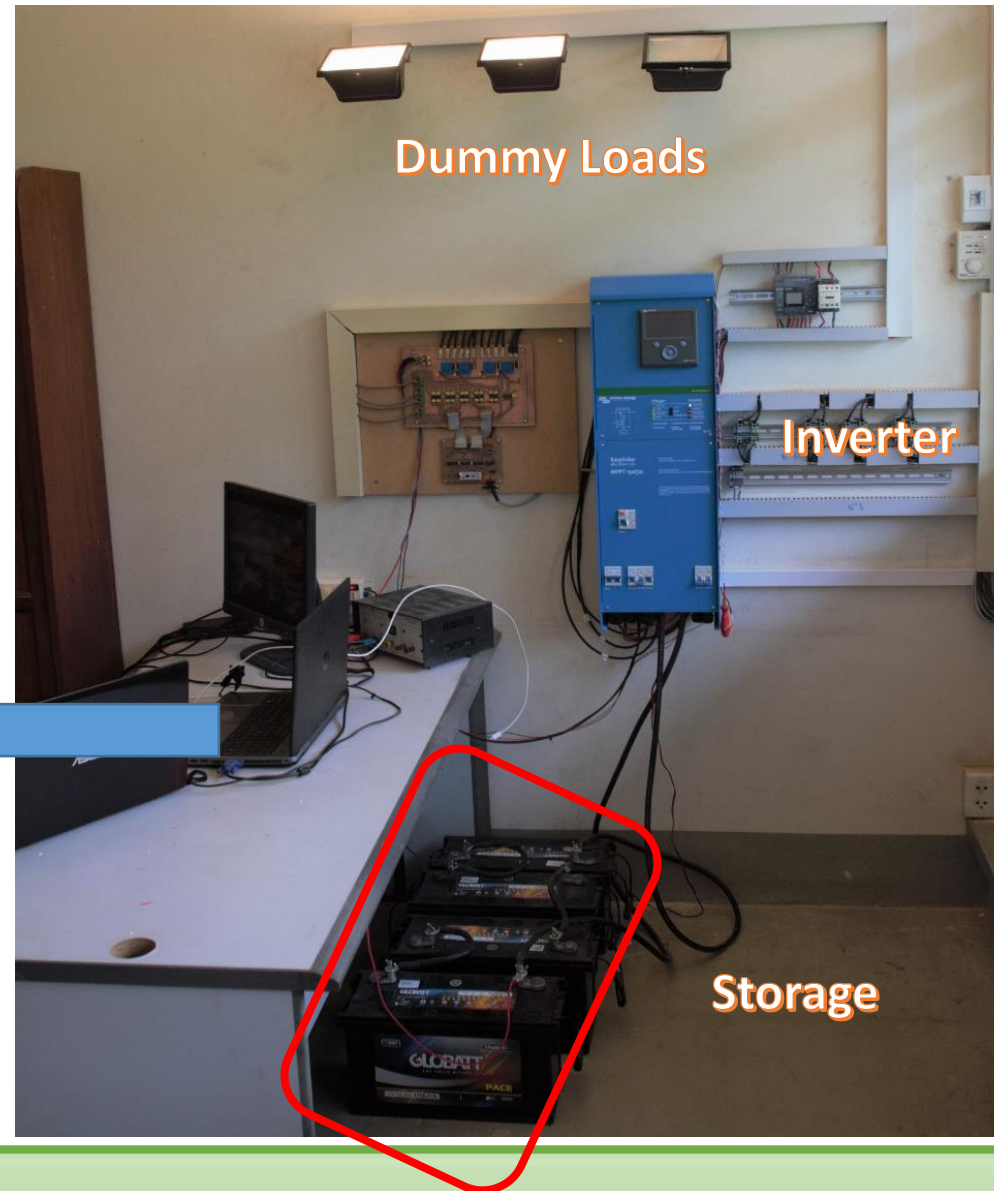


# IV. PV installation

## Inverter and data acquisition



Data acquisition





# IV. PV installation

## PV System with weather station (Underway)



# V. Work Carried out and Perspectives

## Work carried out

- ❖ Set up the first research laboratory in Electrical Engineering in Laos
- ❖ Set up PV farm with data measurement and acquisition devices

## Perspectives

- ❖ Smart PV farm with failure analysis and detection
- ❖ Grid connected PV systems
- ❖ Renewable energy integration in the national grid (Energy production mix)
- ❖ Micro-grid study (e.g. Clustering distributed generation)



Thank you for your attention

