Mission Report
Ghislain REMY, Marc ARDILLIER, Jean DEPREZ
Palestine Polytechnic University - Hebron
June 22nd – 29th , 2012

1- Context

In November 2009, the Palestine Technical University Kadoorie – Tulkarm and the Palestine Polytechnic University Hebron for the Palestinian side, the Laboratory of Electrical Engineering and the IUT Cachan of Paris-Sud 11 University for the French side, have submitted a proposal to the Palestinian- French Research Program AL-MAQDISI.
The project "Design and Control of Photovoltaic Systems" has been elected in September 2010.

The initial objective of the project was to implement in PTU and PPU two different power electronics structures to transfer energy from photovoltaic panels to a battery, using Maximum Power Point Tracking (MPPT) Algorithms.
Since the first meeting of the project teams (November 2010), the following points have been treated:
- Functional analyses of the energy conversion: mathematical modelling of photovoltaic (PV) panels and power converter systems: simulation on Matlab/Simulink and Simplorer software.
- Specification, ordering and installation of the hardware in PTU and PPU (PV panels, Batteries, Controller, and power converter).
- Test and validation of a structure for MPPT energy transfer

Three missions have been done by the French team to Palestine (November 2010: Ghislain REMY, Jean DEPREZ; October 2011: Ghislain REMY, Jean DEPREZ; June 2012: Ghislain REMY, Marc ARDILLIER, Jean DEPREZ). A part of these mission have been supported by MedLink, independently of the Al Maqdisi program.
Two missions have been done by the Palestinian team (Juin 2011: Jaffar JALLAD, Mekawi IRHAIZ; February 2012: Jaffar JALLAD, Mekawi IRHAIZ).
One additional mission (July 2011: Khaled TMAIZI) has been supported by MedLink.

Following recurrent problems due to
- the low scientific and technical level of the Palestinian participants
- the inference of the board of trustees of PPU against the decisions of the steering committee of the project
- the difficulties of the Palestinian team to enter in the production phase
- the absence of research team in PPU
we have decided to reduce the objective of the program. We will try to obtain, at the end of the project (December 2012) an elementary system based on a classical hardware and software structure. According to this objective, the remaining activities of the program should be more closed to training than to research.

2- Objectives of the mission

The main objectives of the mission were:
- a training workshop on PCB (Printed Circuit Board) software and hardware.

PPU has been equipped for one year with a LPKF etching machine (USAID donation). This machine is not used. It is the same than those used in IUT Cachan. The training workshop should train the teachers in Palestinian Universities for producing PCB with the machine and to be familiar with the design PCB software ALTIUM.
- the realization of a classic Buck Converter
- the test of the converter for energy transfer between PV panels and a battery.

3- Financial aspect

- The Travel ticket of Jean DEPREZ (565 €) is covered by MedLink
- The Travel tickets of Ghislain REMY and Marc ARDILLIER (1130 €) are covered by the Al Maqdisi budget of the French side.
- The indemnity (per-diem) of Ghislain REMY (180 €) and Marc ARDILLIER (180 €) are covered by the Al Maqdisi budget of the Palestinian side.
- The local transportation (Airport – Hebron, Hebron – Jerusalem, Jerusalem - Airport) of the missionaries (134 €) are covered by the Al Maqdisi budget of the Palestinian side.
- One night in hotel in Jerusalem for Ghislain REMY (58 €) and Marc ARDILLIER (58 €) are covered by the Al Maqdisi budget of the Palestinian side. The hotel in Jerusalem for Jean DEPREZ (58 €) is covered by MedLink.
- The components and cupper necessary for the realization of power electronic boards in PPU and PTU have been bought by MedLink (619 €) and reimburse by the Al Maqdisi budget of the French side.
- Food and accommodation of the participants to the meeting in PPU is covered by the Al Maqdisi budget of the Palestinian side.

4- Participants to the working meetings

Palestine Team:
PTU: Mahmoud ISMAIL**,** Mohammad DRAHI, Jaffar JALLAD
PPU: Mekawi IHRAIZ, Wadah SULTAN, Zaher SAAFIN, Sami ALSALAMEN, Khaled TMAIZI

French Team:
IUT CACHAN, LGEP (Paris-Sud 11 University): Ghislain REMY
IUT CACHAN: Marc ARDILLIER
MedLink NGO: Jean DEPREZ

5- Agenda of the mission and program of the working sessions

<u>Agenda of the mission</u>

Friday June 22nd
- Flight Paris CDG – Tel-Aviv Ben-Gurion (Air France AF 2220)
- Taxi Tel-Aviv Ben-Gurion – Hebron
- Night in Al Khalil Hotel

Saturday June 23rd
- Installation of software
- Training workshop
- Diner in Hebron with the group and night in Al Khalil Hotel

Sunday June 24th

- Training workshop
- Diner in Hebron with the group and night in Al Khalil Hotel

Monday June 25th
- Training workshop
- Diner and night in Khaled TAMIZI's home.

Tuesday June 26th
- Training workshop
- Al Maqdisi project
- Meeting of Al Maqdisi steering committee (Raed AMRO, Mahmoud ISMAIL, Ghislain REMY, Jean DEPREZ)
- Pastry party with Duaa ABUMAIZEN
- Diner in Hebron with the group and night in Al Khalil Hotel

Wednesday June 27th
- Al Maqdisi project
- Graduation ceremony in PPU
- Diner in Hebron with the group and night in Al Khalil Hotel

Thursday June 28th
- Al Maqdisi project
- Taxi Hebron – Jerusalem
- Diner in Jerusalem and night in Jerusalem Hotel

Friday June 29th
- Meeting with Philippe CAPPELAERE and Julie BELMONT in the French Consulate

Taxi Jerusalem -Tel-Aviv Ben-Gurion and Flight Tel-Aviv Ben-Gurion - Paris CDG (AF 1621)

Program of the working sessions

- Saturday 23rd
- Installation of the software Altium
- Test of the PCB machine
- Training workshop. Session 1: Altium Designer introduction
- Training workshop. Session 2: Introduction to Schematic capture: Buck converter.

- Sunday 24th
- Simulation of the Buck converter
- Simulation of Boost and Boost+Buck converters
- Training workshop. Session 3: Altium schematic capture: Buck converter (end)
- Training workshop. Session 4: Introduction to PCB editor.

- Monday 25th
- Measurement of the maximum current as a function of the width of the track
- Training workshop. Session 5: libraries of components
- Training workshop. Session 6_1: Place - Routing
- Training workshop. Session 6_2: Using the LPKF Machine
- Training workshop. Session 6_3: PCB of the Buck converter

- Tuesday 26th
- Training workshop. Session 7: PCB of the Buck converter (continuing)
- PCB for the prototype of the Buck converter board
- Etching the prototype, solving the problems

- Determination of the test protocol for the Buck converter
- Starting the soldering of the converter

- Wednesday 27th

- Finishing the soldering of the converter
- Test of the board: fixing soldering problems
- Modification (hardware) of the board to solve error in conception
- Results on PV panels characterization

- Thursday 28th

- Design of a Basic Buck converter
- Test of the converter
- Proposal for the following

6- Results and Scientific report

Four days were dedicated to the PCB design training workshop. We think that the trainees who have regularly followed the sessions should be able to use the main functionalities of ALTIUM software for designing electronic boards. A Buck Converter was produced at the end of the training session.
The two following days were dedicated to the test of the converter. We faced many problems due to bad soldering and mainly to errors in conception of the electronic circuit. The command part of the power electronics, which was derived from an existing circuit in IUT Cachan, was not suitable in our case. At the end, we were not able to reach the objective: energy transfer from a PV panel to a battery.
Experimental data dealing with electrical characterization of PV panels collected in PPU have been documented. Some of these data are still not reliable and need to be repeated, with a precise documented protocol.
Irradiance and temperature measurements, collected in PTU, have been documented (some of these data were previously not correctly read by the French team who apologizes for that). Without correlated voltage across PV panel, these curves are not useful.

A detailed scientific report has been elaborated during the sessions. It is available as attached document to this report.

7- Comments

Despite our recommendation to widely open this workshop to teachers and technicians interested in PCB design, the participants were restricted to the PTU and PPU Al Maqdisi teams. Additionally, the participants (one technician, two lab supervisors and one assistant professor) of PPU were not regularly present during all sessions… Obviously, as usual, even if the session is organized in their Universities, PhD in electrical engineering in PPU feel them not concerned by this practical aspect of their specialty…
As it can be seen on the list of the participants, Mekawi IRHAIZ was the only one from PPU more or less involved in the Al Maqdisi project (Khaled TMAIZI is officially not a member of the Palestinian team and was not, before our arriving invited to participate to the workshop).

From the French side, we have to apologise for a lake of sufficient preparation of the workshop. This relates a de-motivation following the previous workshops in France and the fact that there is no significant production in Palestine between the workshops in PPU or PTU. This does not excuse the fact that, taking responsibility to animate the seminar, the French team did not take the time to realize

and test in Cachan a prototype of the Buck converter, which was the "red line" for the training workshop.

During a short meeting, the steering committee of the Al Maqdisi project has ratified the fact that the project does not proceed as envisaged. The Palestinian participants are not those which had initially been chosen. There is no Palestinian research team able to carry out the project suitably. The few individuals who work partially on the project do not have scientific, technological and methodological sufficient levels. All this will be developed in the final report.

In spite of this irrefutable fact, the two teams will work to produce a technical result at the end (January 2013) of the project, even if this one is far from the initial objective.
In addition, this failure should not affect the positive cooperation of IUT Cachan with PPU and PTU in the field of training of trainers.

These points have been discussed during the meeting in SCAC with Julie BELMONT and Philippe CAPPELAERE.

8- Next activities in the frame of the Al Maqdisi program

French team:

- Jean DEPREZ will recalculate all the design for a Buck converter.
- In September Jean DEPREZ and Marc ARDILLIER will make the PCB and the measurements that have not been done during this workshop

Palestinian team:

- Jaffar JALLAD and Mohamad DRAHI will record temperature, irradiance and PV open voltage, in the ms range, during one day with variable irradiance (semi cloudy day…). The objective is to characterize steady states and transitories.
- The Palestinian participants have to train themselves in PCB design in order to be able to duplicate the board after design and validation by the French team in Cachan

Next missions:
In the proposal for the project the provisional missions are
- Mission Palestine-France: number 6
- Mission France Palestine: number 5

4 missions Palestine France supported by Al Maqdisi have been done
Jaffar JALLAD – Mekawi IRHAIZ, June 2011
Jaffar JALLAD – Mekawi IRHAIZ, February 2012
1 mission Palestine France supported by MedLink (Flight ticket and accommodation) has been done:
Khale TMAIZI, July 2011
2 missions Palestine France supported by Al Maqdisi have to be scheduled

4 missions France Palestine supported by Al Maqdisi have been done
Ghislain REMY, November 2010
Ghislain REMY, October 2011
Ghislain REMY, Marc ARDILLIER, June 2012
3 missions France Palestine supported by MedLink (Flight ticket) and PPU/PTU (accommodation) have been done
Jean DEPREZ, November 2010

Jean DEPREZ, October 2011
Jean DEPREZ, June 2012
1 mission France Palestine supported by Al Maqdisi has to be scheduled
MedLink could pay the flight ticket for one additional mission.

Ghislain REMY, Marc ARDILLIER and Jean DEPREZ thank their Palestinian colleagues for the organization of the meetings and for their warm welcome.

Cachan, the 6th of July, 2012

MedLink
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Jean DEPREZ
MedLink

Ghislain REMY
LGEP / IUT Cachan

Joint Documents (1):

- Scientific Report

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