



**Report on the mission of
Jafar JALLAD, Mekawi HURIZ
LGEP and IUT Cachan – Paris-Sud 11 University
February 12th-17th 2012**

1- Context

This mission takes place at the beginning of the second year of the joint research project "Design and Control of photovoltaic systems".

During the first year, the structure of the system has been determined. The components of the system (PV panels, batteries) have been chosen, bought, installed and characterized in PTU and PPU. The basic structure of the Buck-Boost DC/DC power converter and its elementary control by a PSoC microcontroller has been tested in October 2011.

The next step was to design the command and control PCB board.

It was initially planned a mission for 1 Palestinian researcher in France. But, in order to accelerate the progress of the project, we suggested a mission for 2 Palestinians (1 from PPU and 1 from PTU) from Sunday February 12th to Friday February 17th.

The 2 participants had to be strongly involved in the design of the power converter and the control of the converter using PSoC. They will have to repeat in Palestine the PCB design (for duplication, modification and improvements after tests...) so it was suitable that they are used to manage with a PCB machine in Palestine.

The preparation of the mission supposed that the Palestinian participant trained themselves to the use of Protel Altium PCB software (A 30 days evaluation version of Altium designer is available from the web site altium.com).

Before the mission, as mentioned in the last mission report, the Palestinian team had to continue and to propose the specification of the components (L, Ce, Cs, transistor and diode constraints) of the buck boost converter (100 kHz PWM), according to the characteristics of the PV panel under sun irradiance. This had to be validated by simulation.

Both teams had to think about a new design of the PSoC command board, taken into account the number of analog and digital I/O available on the chip and the suitable I/O for the control algorithms (4 analog inputs for voltage and current in input and output).

2- Objectives and provisional agenda of the mission

The main objectives of the mission were:

- Simulation of the power converter
- Design of the board (control and power)

- PCB fabrication
- PCB tests, Measurements ,Validation

The provisional program of the mission was:

- Sunday February 12th: arrival in Paris
- Monday February 13th: simulation of the power converter, design of the board
- Tuesday February 14th: PCB fabrication
- Wednesday February 15th: PCB tests, Measurements, validation
- Thursday February 16th: Measurements, validation.
- Friday February 17th: departure from Paris

In addition with this technical issue, methodology about publication and ppt presentation should be discussed.

3- Participants to the working meetings

Ghislain REMY (LGEP / IUT Cachan)
 Jean DEPRez (Medlink NGO)
 Mekawe HURIZ (PPU)
 Jafar JALLAD (PTUK)

Jean-Yves LECHENADEC (IUT Cachan) and Eric LABOURE (LGEP / IUT Cachan) have given very useful information on PCB design and Buck-Boost converter, respectively.

4- Financial aspect

- The expenses (Flight tickets + Palestine-Jordan travels) of Mekawe HURIZ (???? USD) and Jafar JALLAD (???? USD) are covered by the Palestinian side.
- Travels expenses in France (RER, Metro) are covered by MedLink (90.4€)
- Food (202.88 €) and Accommodation (500 €) are covered by MedLink
- Perdiem for Makawi (150 €) and Jaffar (150 €) are covered by MedLink

5- Agenda of the mission and program of the meeting

Sunday February 12th

- Arrival in CDG Airport at 1:55 p.m. Transfer to Bagneux, via Paris by RER B.
- Welcome in Bagneux RER station by Jean DEPRez, transfer by car and installation to the guest house "Residence des Jardins" in the campus of ENS Cachan.
- Diner at night in Paris with Joëlle MAILLEFERT and Jean DEPRez

Monday February 13th (LGEP)

- 8:30 a.m.: Short visit with Jean DEPRez of the automation lab in IUT Cachan
- 9:00 a.m.: Transfer to LGEP (Gif Sur Yvette) by car with Ghislain REMY
- 9:30 a.m.: **Information on the installation of the PV panels in PPU**
Analysis of data (temperature, irradiance) collected in Hebron
- Lunch in LEGP
- 2:00 p.m.: **Research Seminar in LGEP ("Optimisation in Energy Distribution")**
- 4:00 p.m.: **Calculation of the components for the buck-boost converter**
- 6:00 p.m.: End of session, return to Cachan by car with Ghislain.

Tuesday February 14th (LGEP)

- 8:30 a.m.: Transfer to **LGEP** by car with Ghislain.
- 9:30 a.m.: **Explanation on the sizing of the components for the buck-boost converter**
Simulation of the converter using Matlab.
- Lunch in LGEP
- 2:00 p.m.: **Simulation of the converter using Simplorer. Specification of components** (data sheets and providers catalogues)
- 6:00 p.m.: End of session, return to Cachan by car with Ghislain
- Visit in Paris at night

Wednesday February 15th (IUT Cachan)

- 8:30 a.m.: **Physical implementation of the Buck Boost converter.** Choice of the voltage and current sensors, MOSFET's driver.
- Lunch in IUT
- 1:00 p.m.: **PCB design. Demonstration on the PCB machine.**
- 6:00 p.m.: end of session

Thursday February 16th (IUT Cachan)

- 8:30 a.m.: **PCB design of the power part.**
Test measurement on driver + MOSFET
Estimation on the losses and efficiency
- Lunch in IUT
- 1:00 p.m.: **PCB design of the Command & Regulation part**
- 5:30 p.m.: end of session

Friday February 17th

- 10:00 a.m. Check out in "Residence des Jardins" and discussion with Jean DEPREZ.
- 11:00 a.m. Transfer by RER to Charles de Gaulle Airport.

6- Results

The detailed description of all working sessions and all the results obtained are available in the scientific report, joined to this general report.

We have analysed irradiance and temperature records in Hebron. We dispose on a data base of 5 months with a 15' time resolution.

Ghislain asks for using PSoC (or PIC if it is more convenient) as data logger to register every 10 ms during one day (one sunny day and one cloudy day) temperature, irradiance and if possible the open circuit voltage across the PV panel (record of 8,640,000 points for each input). This will give important information on the time constant of the PV panel, useful to calibrate the time resolution for the MPPT algorithms.

At the end of the mission, the detailed structure of the power and command electronics has been established. All the components have been determined, according to the calculated and simulated constraints and the availability in the market.

The first step of the PCB design has been performed: all the component's foot-prints and connections are implemented. At the end of the workshop, placement and routing had to be done. The scientific report includes the work on PCB done by Ghislain after the workshop.

7- Comments and suggestion

The initial objectives of the mission have not been reached. About 50% of the job is still to do.

Although Jafar made simulations under PSIM, the Palestinian team did not succeed to determine values and constraints on components as it was asked since last November, although, in both universities, Matlab, PSIM and Simplorer are available and the circuit to simulate is a classical one...

We have spent the afternoon of the first days and a large part of the second day to do the entire job whereas we expected to only have to validate the job.

Generally speaking, although they make effort, the scientific and technical background of Jafar and Mekawi, is not sufficient: they are able to partially understand, like students, the hardware and software solutions proposed by the French team, but they are not yet able to propose any solution to enhance the research project. In addition, their skills and knowledge in technology are not enough developed to follow the translation in practice (PCB or measurements) of the proposed solutions... It seems also difficult for them to write a consistent technical report to summarize the activities of a session.

Since the last mission in France in June 2011, and even before, we have already informed PPU, PTU and the French Consulate on our disagreement about the choice of the participants.

One's again, we express that we have nothing against Jafar and Mekawi. We discussed frankly with them and they know our position. We only say that they are not the good persons for this job. This should not be pleasant for them to be in this situation. In fact, they have to be trained before acting in a research project.

We think that the steering committee has to reconsider the following of the project. Our suggestion is to switch from research project to training project, more suitable according to the level of the participants that the Palestinian team dedicates to the cooperation.

Paris, February 22nd, 2012



**Pr. Jean DEPREZ,
President of MedLink**

A black ink signature consisting of several loops and a horizontal line.

**Dr. Ghislain REMY
French Team Leader**

Joint Documents (1):

Scientific Report

