Grid Connected Converter

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Client

Dr. Venkata Yaramasu
Assistant Professor at NAU
Director of Ampere Lab
School of Informatics, Computing, and Cyber Systems
Research Interests
Research interests include renewable energy, high power converters, variable-speed drives, electric vehicles, power
quality, smart grid, and model predictive control.
Education
PhD, Electrical Engineering, Ryerson University, Toronto, Canada
ME, Electrical Engineering, S.G.S. Institute of Technology and Science, India
B.Tech, Electrical and Electronics Engineering, Jawaharlal Nehru Technological University, India

Introduction

- Our client Dr.Yaramasu research focuses on power electronic applications.
- He is working on different projects that focuses on the following power conversion applications :

    A- Wind Power Systems.

    B- Photovoltaic Systems.

    C- Motor Drives.

Problem
- There is no laboratory scale prototype converters available in the market that fits all of these applications.
- Needs plug and play converter to fit the three power conversion applications.
- Having such converter will help our client to develop new power converter topologies and test new controlling schemes such as model predictive control.
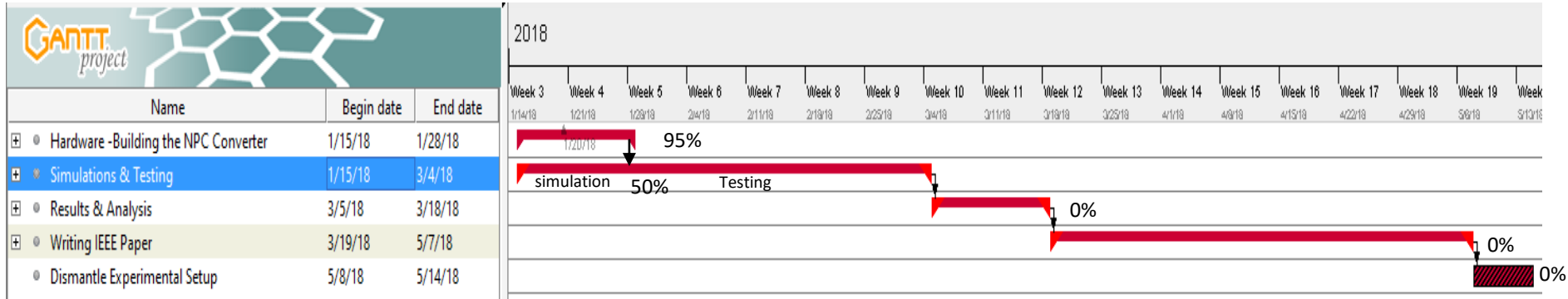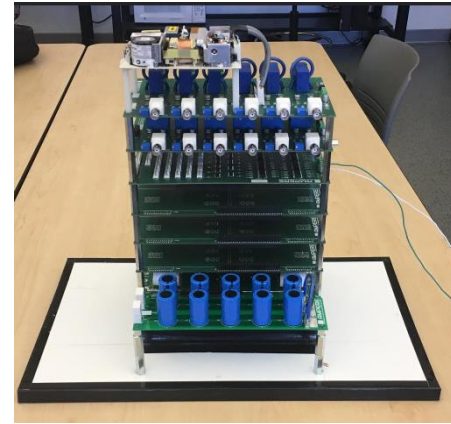
Goal
- Implement and build a prototype of multilevel converter for high power applications and test it using model predictive control.
- Practical power level is at 5 MW.
- Prototype power level is at 5 kW.

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Spring 2018 Schedule Overview

**Main tasks :**

- Hardware.
- Simulations & Testing.
- Results & Analysis.
- Writing IEEE Paper.
- Dismantle Experimental Setup.

| Name	Begin date	End date
Hardware -Building the NPC Converter	1/15/18	1/28/18
Simulations & Testing	1/15/18	3/4/18
Results & Analysis	3/5/18	3/18/18
Writing IEEE Paper	3/19/18	5/7/18
Dismantle Experimental Setup	5/8/18	5/14/18

Simulations & Testing

- Using MATLAB with Simulink function.

- Real-time implementation method.

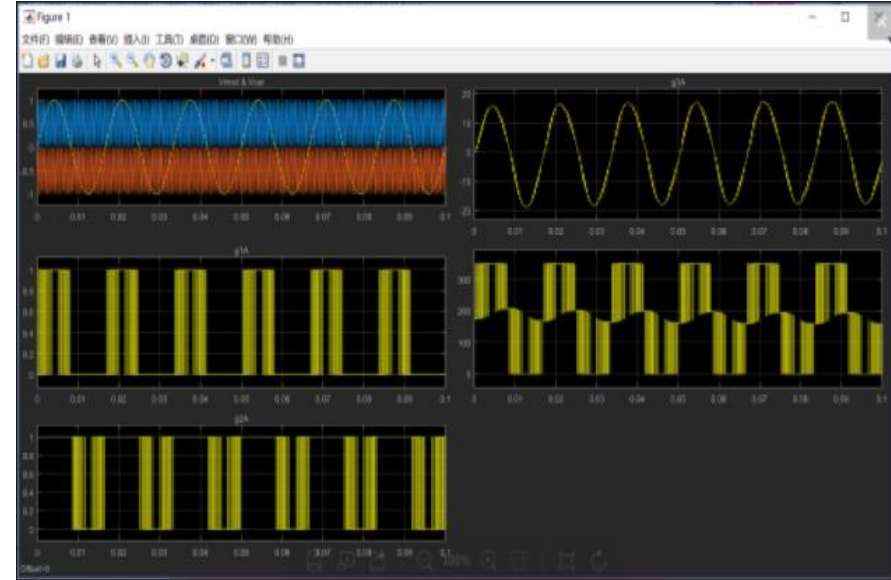- Approximately a month is scheduled for simulation and testing .
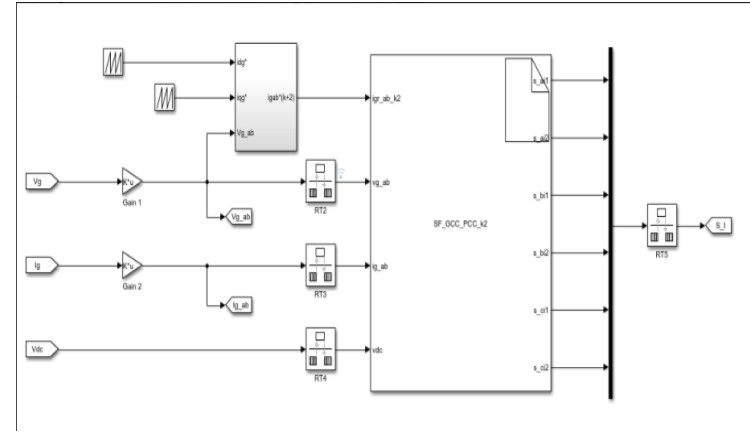
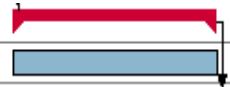| Simulations & Testing	1/29/18	3/4/18	
RTI with open-loop PWM and R load	1/29/18	2/4/18	
RTI with PCC of NPC with R load	2/5/18	2/11/18	
RTI with PCC of NPC converter with grid	2/12/18	2/25/18	
RTI with VOC of NPC converter with grid	2/26/18	3/4/18	
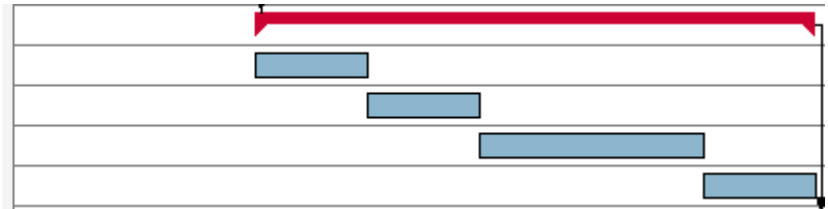
Results & Analysis

- Data is collected using MATLAB.

- Two weeks for recording results.

- Results is illustrated using plots and waveforms.

⊟ ● Results & Analysis	3/5/18	3/18/18	
● Record and plot results in illustratorr (MATL...	3/5/18	3/18/18	

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Writing IEEE Paper

- Seven week for writing the IEEE paper
- Six sections in total.
- One section per week.
- One week for editing and revising
- Due date is 5/8/18.

|	Start	Finish
Writing IEEE Paper	3/19/18	5/7/18
Section I (Introduction)	3/19/18	3/25/18
Section II (PCC SCHEME FOR GCC)	3/26/18	4/1/18
Section III (SIMULINK IMPLEMENTATION OF PCC SCHEME)	4/2/18	4/8/18
Section IV (REAL-TIME IMPLEMENTATION OF PCC SCHEME)	4/9/18	4/15/18
Section V (RESULTS AND ANALYSIS)	4/16/18	4/22/18
Section VI (CONCLUSIONS)	4/23/18	4/29/18
Revise Complete Paper	4/30/18	4/30/18
Professional Editing of IEEE Paper	5/1/18	5/7/18
Paper Submission	5/8/18	5/8/18
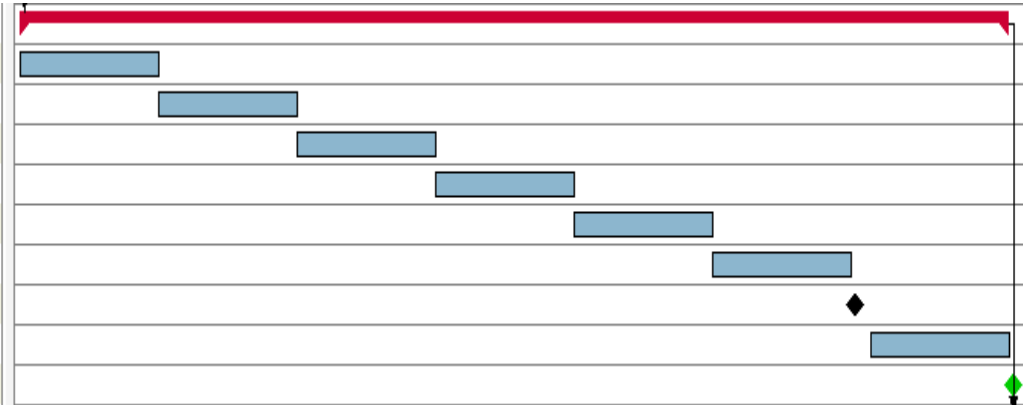
Dismantle Experimental Setup & Possible Delays

Current Status:

Simulation & testing

Possible Delays :
- Design mistakes.
- Burning components when testing.
- The noise problem.
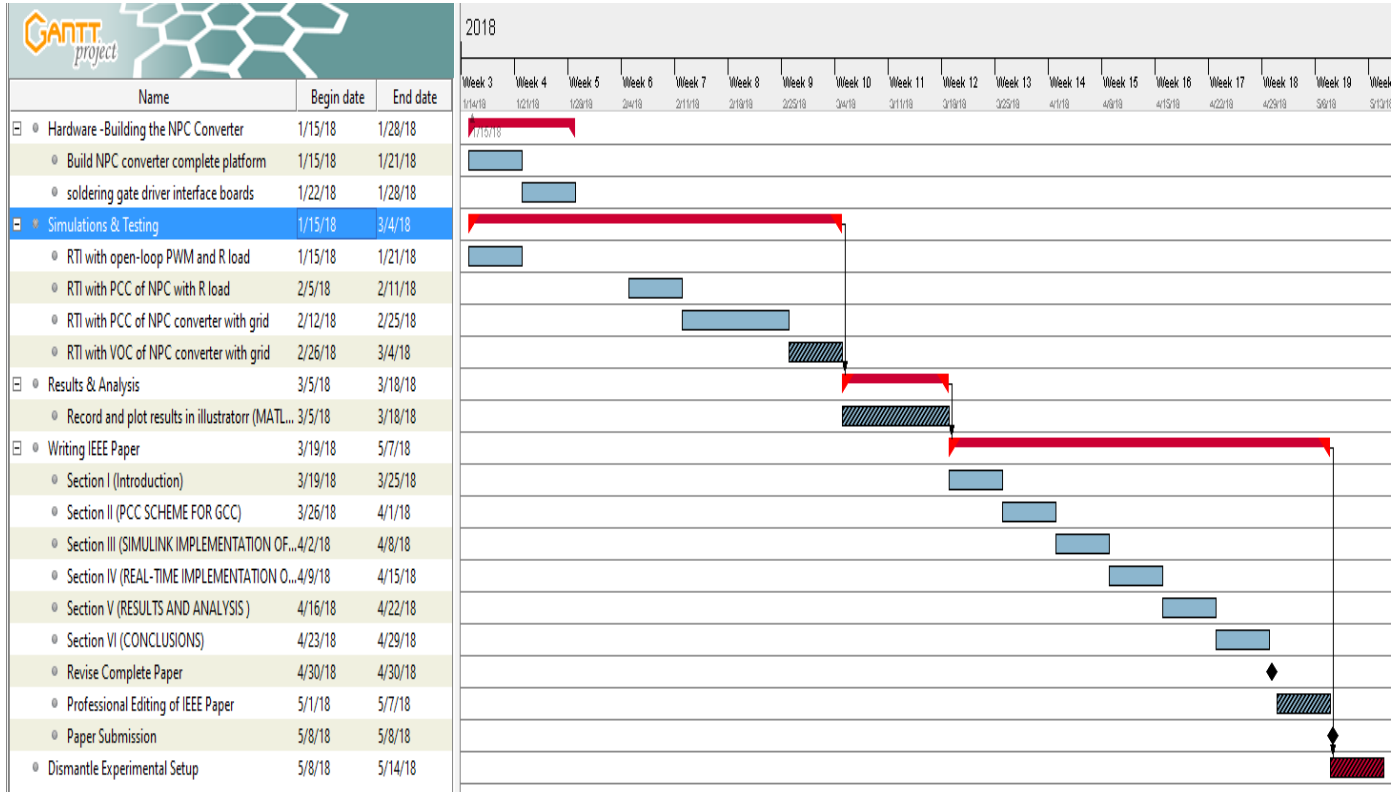
Conclusion

- The schedule is designed in a chronological order.

- Highest priority tasks are :
    A- simulation and testing.
    B- results and analysis.
    C- writing the IEEE paper.

- Each task is depending on the previous task except simulation which is independent.

- Team is on schedule, and hopefully we don't face any delays.

Thank You

Questions