ISES Solar Charging Station

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October 9, 2013

Overview

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Tyler Faulkner

Introduction

- The Institute for Sustainable Energy Solutions (ISES)
- Premier research division that works on renewable energy
- ISES has in its possession multiple solar photovoltaic modules

Ze Chen

Client Information

- Sponsored by Dr. Thomas Acker

- Northern Arizona University Professor

- Research Interests
  - Renewable energy systems
  - Thermal-fluid system analysis

- Professional activities
  - Director of NAU Sustainable Energy Solutions
  - Reviewer of ASME Journal of Solar Energy

Ze Chen

The Need

- Northern Arizona University currently does not have a place that uses a sustainable, renewable energy source, that students and faculty could use in order to charge small electronic devices.

Goal

- Design a solar charging station capable of providing enough power to charge small electronic devices.

Figure 1: Solar charging station by Samuel Monger

Objectives

Table 1: Primary project objectives with measurement basis

Objective	Measurement Basis	Units
Charge Small Devices	Total power output	kW
Inexpensive	Cost of the system	$
Educational	A digital readout to inform users of power output	kW
Asthetically pleasing	Survey students and faculty in order to choose the most pleasing design	# of votes
Grid Connection	Energy output to determine the amount going into the grid	kWhr
Withstand Environment	Determine the total stress experienced by the system	kPa/psi

Yaqoub Molany

Operating Environment

- Target Location: W.A. Franke College of Business (Patio), NAU.

- Mostly sunny throughout the day

- Able to withstand:
  - Rain
  - Snow
 - Hail
  - High Winds

Constraints

- Building Codes
- Electrical Codes
- Number of usable solar panels
- Weather conditions

QFD

		Engineering Requirements					
		Power	Energy	Stress	Cost	Yield Strength	Weight
Customer Requirements	Aesthetically Pleasing				x		
	Educational	x	x		x		
	Withstand Environment	x	x		x		x
	Charge small devices	x	x				
	Safety			x	x	x	x
	Snow removal				x		
	Inexpensive				x		
Units		kW	kWhr	kPa	$	kPa	N
		3	36	x	1000	x	x

Figure 2: Quality Function Deployment Diagram

Thomas Penner
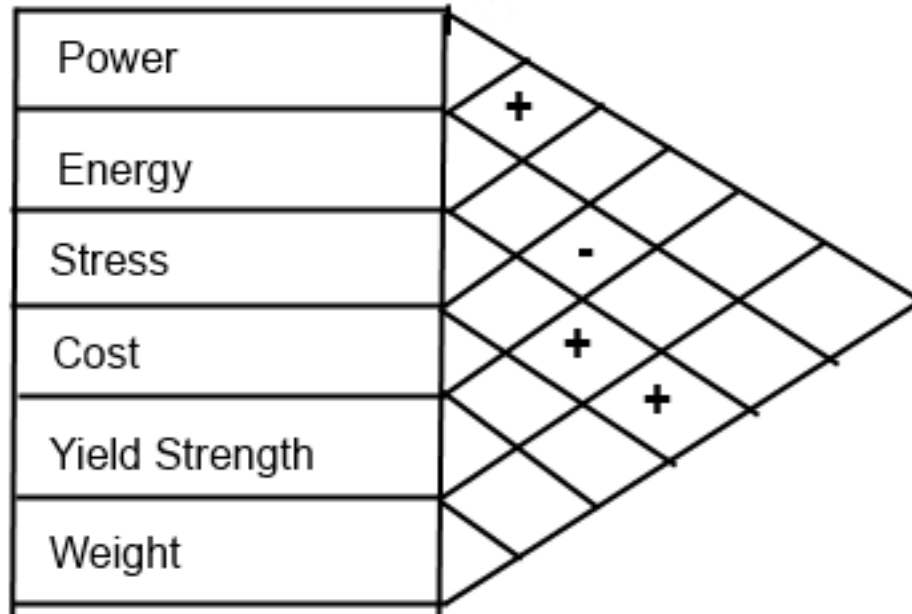
House of Quality

Figure 3: House of Quality
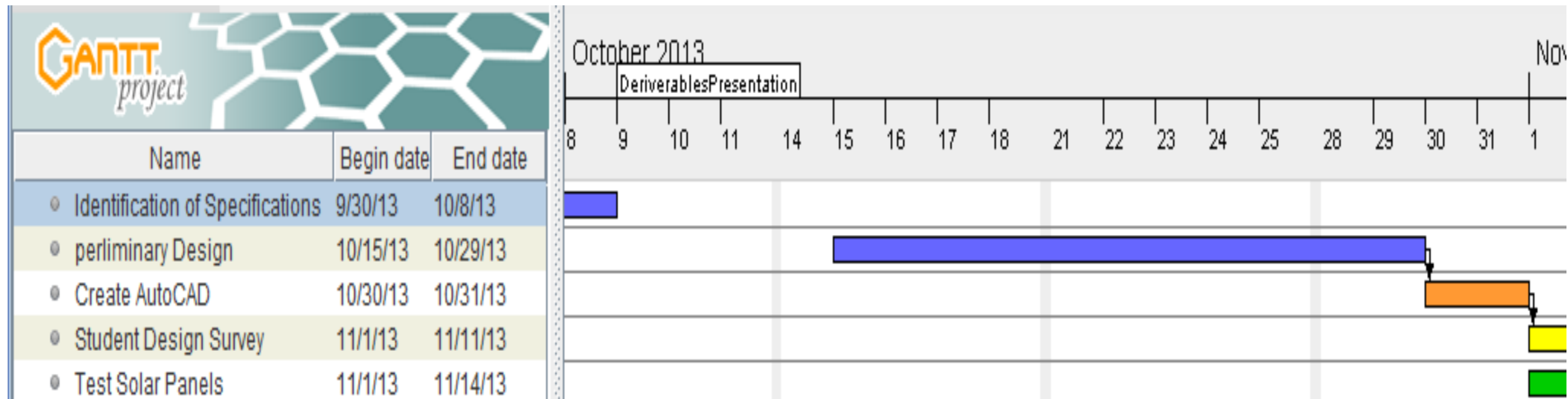
Gantt Chart

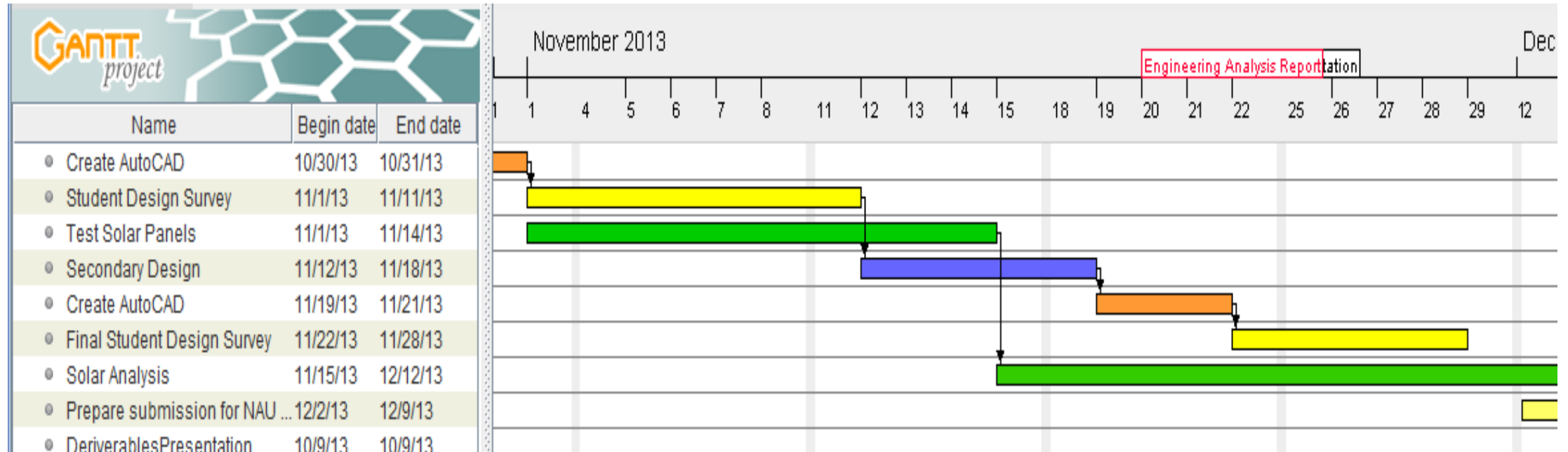Figure 3: October Tasks

Gantt Chart

Figure 4: November Tasks
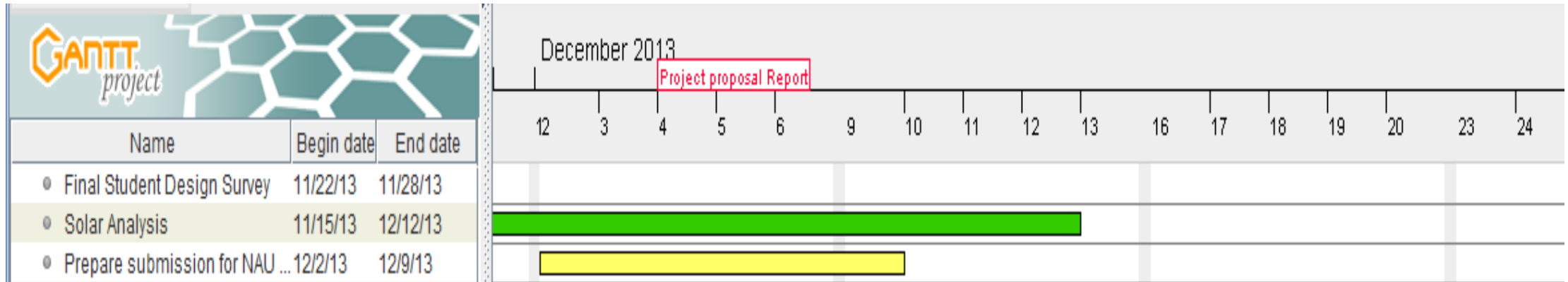
Alexa Kearns
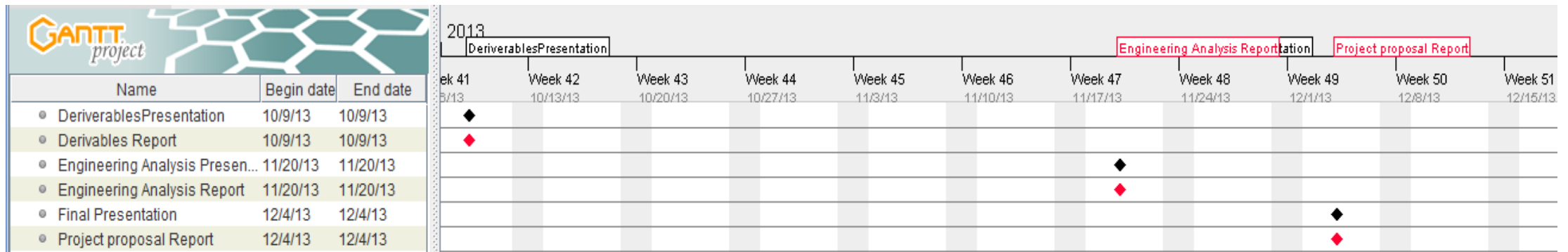
Gantt Chart

Figure 5: December Tasks

Figure 6: Milestones

Conclusion

- The client is Dr. Thomas Acker, director of the Sustainable Energy Solutions Group at NAU.

- The need is recognized for a solar charging station capable of powering small electronic devices.

- A QFD and House of Quality were used to determine the most important aspects of the design.

Tyler Faulkner

References

- http://nau.edu/CEFNS/Engineering/Mechanical/Faculty-Staff/Thomas-Acker/

Questions?