Fall 2012

DEVELOPMENT OF LABORATORY MODULE FOR SMALL WIND TURBINE CONTROL SYSTEM

PROJECT PLAN

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PROBLEM STATEMENT

To develop a Laboratory module for Small Wind Turbine Control Systems that will resemble a small scale renewable electrical network.

CUSTOMER NEEDS

- Accurately simulate wind conditions implemented in MATLAB to the turbine, which is coupled to a motor.
- Monitor voltage, current, power, and speed of all components used in the system.
- Create a suitable control system so that load first utilizes the power produced by the wind and, use the battery as a backup power supply.
- Develop a graphical user interface (GUI) for the control system in LabView.

SYSTEM DESCRIPTION

This project acts as an educational tool for students learning about the effects of wind energy on a power system. The objective of the project is to take wind measurements and simulate the power output to the system. Being Phase V of the project, our goal is to improve the existing system and build upon or alter Phase IV according to the required specifications.

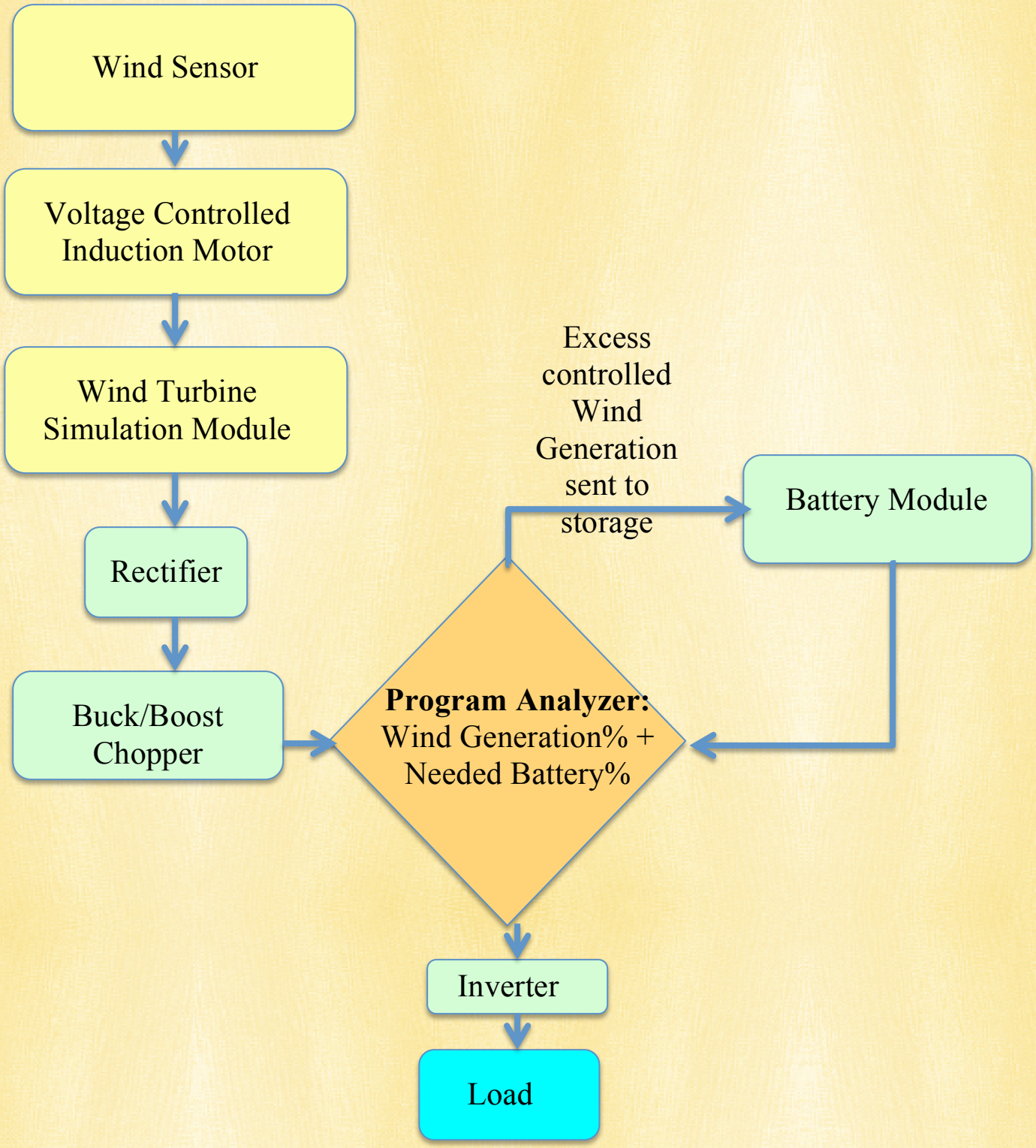
Sub-Group 1: Hardware Testing

- Innovative research on the functionality of each circuit element in the project.
- Rearrange circuitry and add components as required by the system.

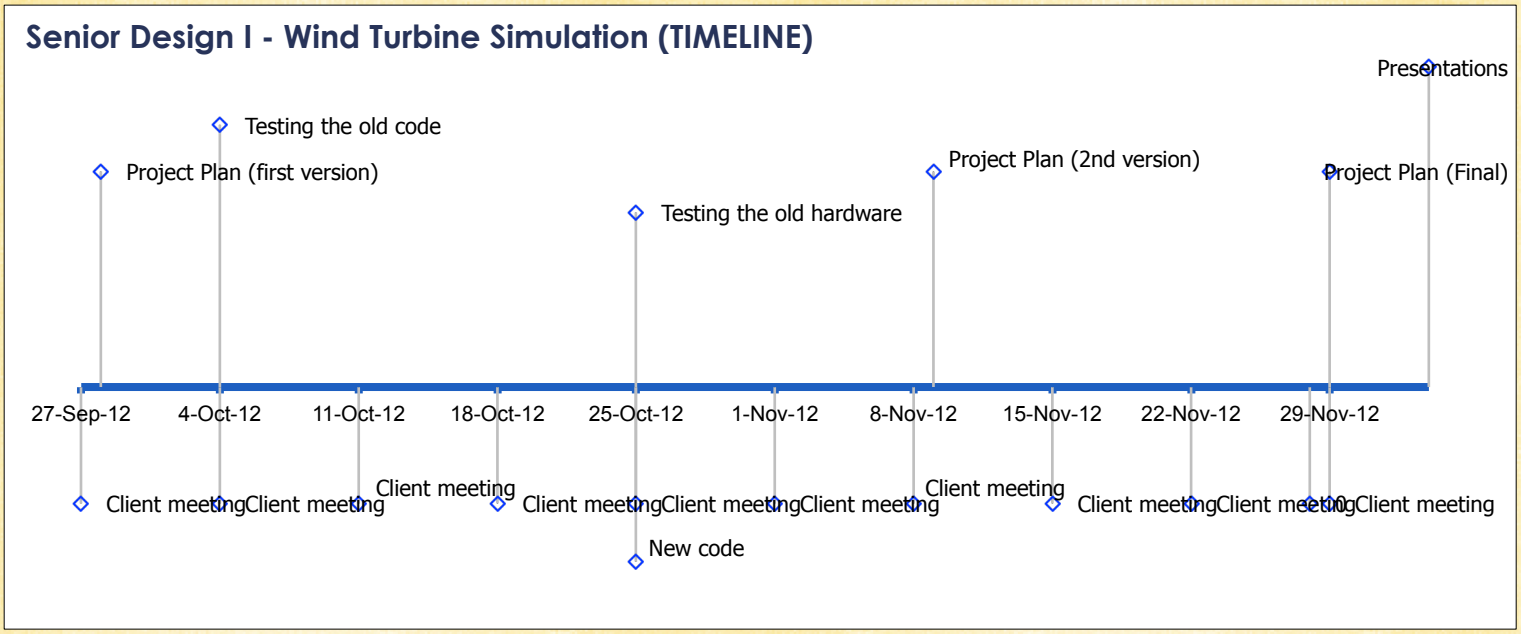
Sub-Group 2: Software Simulation

- Study the existing power system by running simulations in MATLAB using LabVIEW in order to measure power flow
- Build a user-friendly LabVIEW User Interface so that students may be able to interact with the system and so that voltage and current levels in the system may be monitored

Concept Sketch



TIMELINE FOR PHASE V PART 1



RESPONSIBILITIES

Hardware Group

Adam Literski – breakdown system requirements/adjust project desires/analyze minimum components

Achila Jayasuriya – Test old components to see what functions and what needs to be replaced

Logesh Sampathkumar –Retest old project for data/ Optimize wiring

Software Group

Liaochao Song – Program that converts mph into rpm

Eurydice Ulysses – retest old project for data/review old programs

Josephine Namatovu – Begin program for primary power system

Functional Requirements

- Turbine to generate 24V DC output
- Turbine generator to have a 400W peak output
- Motor to simulate outdoor wind speed
- Wind vane and anemometer to transmit outdoor wind profiles

Non - Functional Requirements

- All work i.e. calculations, simulations, and schematics should be documented

Precautions

- At least two people should be in the design lab when working on the project
- Every team member should sign in when in the lab
- Take note of the IEEE regulations about voltages and currents used for the components
- All should review the lab manual for the wind turbine