



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

Senior Design Project Description

Company Name	Carrier Corporation	Date Submitted	04/18/2018
Project Title	Analysis and mitigation of measurement and result variability in Carrier Air Cooled Chiller Lab (CARR_CHILL)	Planned Starting Semester	Fall 2018

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person.

Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

Discipline	Number	Discipline	Number
Mechanical	2	Electrical	1
Computer		Systems	2
Other ()			

Company and Project Overview:

Carrier is a world leader in heating, air-conditioning and refrigeration solutions. Built on Willis Carrier's invention of modern air conditioning in 1902, Carrier is a world leader in heating, air-conditioning and refrigeration solutions.

In this project, students will analyze the infrastructure used in the Carrier Air Cooled Chiller Lab and characterize the variation inherent in the measurements and results obtained while testing in the lab.

The Air Cooled Chiller Lab in the Carrier Charlotte Factory is used to gather data used to analyze new product designs as well as provide data to customers and regulatory organizations on the performance of the system.

The lab infrastructure is complex and is comprised of six elements: the equipment under test, the sensor complement to gather data, the data acquisition system, the infrastructure used to control operating conditions, the test plan specification and the test technicians/engineers.

In this project, students will develop following skills: Data Analysis, Requirements & objective gathering, and Project management.

Project Requirements:

The objective of this project is to understand the main causes of variability in the results obtained at the lab. Fundamentally, a machine that is tested on multiple occasions with the same test plan



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and in the same lab should produce consistent results within an expected variability range. This is believed not to be the case currently for the lab.

The requirements for this project are as follows

- 1) A full analysis and documentation of the lab system.
- 2) Conduct interviews with lab users and customers to understand capabilities required
- 3) Analysis of past data sets to understand variability in the data
- 4) Identification of the root causes of variability (pointing to a specific component in the lab infrastructure)
- 5) Creation and execution of tests aimed at furthering the characterization of the lab (if needed)
- 6) Suggestions on further improvements to reduce variability

Expected Deliverables/Results:

- System Diagram of the lab, showing inputs, outputs, disturbances, sensor location, etc
- Data Analysis of lab results and characterization of the data
- Report detailing causes of variability and presentation to Carrier engineering team
- Suggestions for improvements.

Disposition of Deliverables at the End of the Project:

Hardware developed is the property of the Industry Supporter. Please specify what disposition you would like for the hardware developed by the Project team. Typically the work product is displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made to deliver at a future date.

List here any specific skills, requirements, knowledge needed or suggested (If none please state none):

Data Analysis

System Analysis (input, output, component characterization, etc.)

Root cause analysis