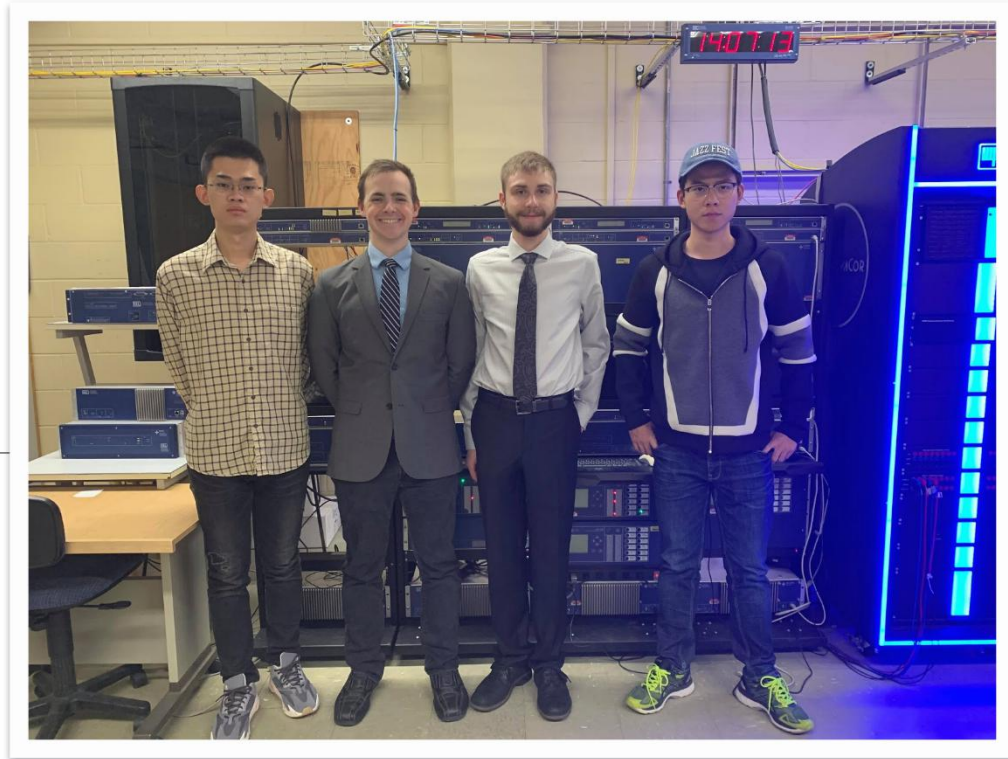


Review



Team Information

Team Client
Dr. Brian K. Johnson

Team Mentors
Hussain Beleed • Joseph Stanley

Team Members
Jialong Dai • Brian Guiana • Yikai Lu • Dakota Pfaff

Purpose of Meeting

1. Present Current Team Status.

2. Present Options for Possible Project Direction.

3. Establish Final Goals for Project Completion.

Project Goal

Develop laboratory exercises to introduce students to industrial control lab equipment and concepts.

Project Value Statement

- Developing ICS Lab curriculum will help expedite learning.
- Labs will help students better understand SCADA concepts.
- Labs will utilize current industry equipment and standards.

Project Specifications

- 4 - 5 laboratory exercises following progression of ECE 444/544 class.
- Exercises must be complete within a 2.5-hour timeframe.
- Exercises must have clear documentation for students & lab assistant.



Team Schedule - Fall Semester

October 2019

- Approval of Requirements Oct. 3, 2019

November 2019

- Engineering Outreach Concept Nov. 1, 2019

December 2019

- Lab Learning Outcomes review Dec. 2, 2019
- Orders placed for devices requiring 2+ months to arrive at UI Dec. 20, 2019

Team Learning

- Review of ECE444 Labs
- RTAC Work with Joe Stanley
- Group Learning of SCADA Concepts



Reviewing ECE544/444 Labs

- Labs focus on quality of communication.
- Labs clearly outline every step.
- Learning accomplished by filling out tables.

Fall Semester Challenges

- Learning introductory concepts
- Narrowing scope of project
- Working with lab equipment
- Lack of physical deliverables

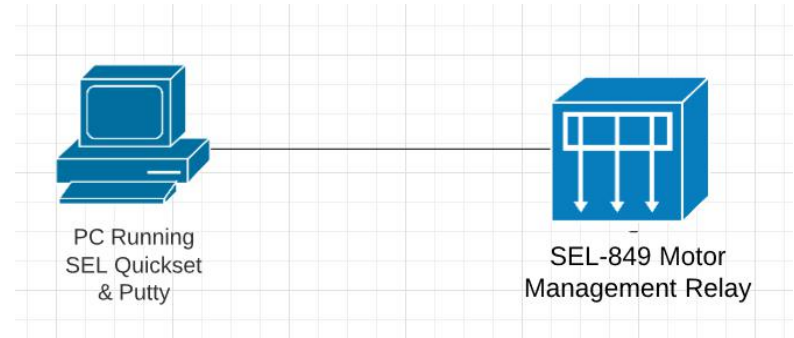


Lab 1 – SEL-849 Intro Lab

Lab Outline:
Work with SEL-849

Learning Outcomes:
Understand IEDs, Basic
Communication

Materials Needed:
SEL-849, Raspberry Pi,
Computer with Putty & SEL Quickset

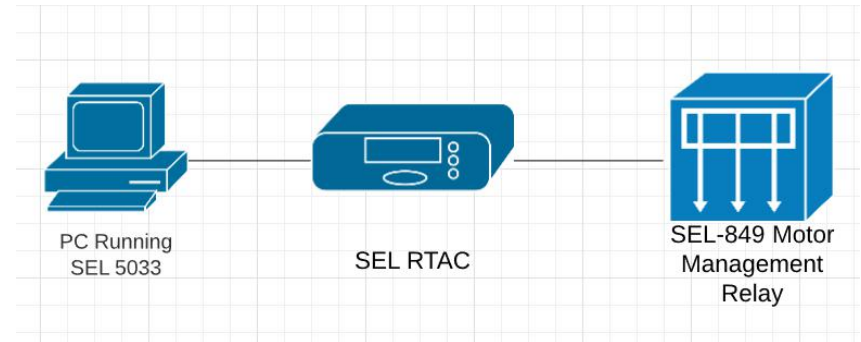


Lab 2 – RTAC Intro Lab

Lab Outline:
Initiate Client/Server connection with
SEL RTAC and SEL-849

Learning Outcomes:
Understand RTU, Client-Server

Materials Needed:
SEL RTAC, SEL-849, SEL 5033
Software, Rasbery Pi or KoCos
ARTES460



Lab 3 – Basic SCADA Lab

Lab Outline:

Add more devices and meters to setup from previous lab. Respond to signals between different devices.

Learning Outcomes:

Working with HMIs, basic communication protocol, basic substation automation

Materials Needed:

SEL RTAC, SEL 849, SEL 5033 Software, SEL 411Ls, SEL-2730M, Raspberry Pi

Option A - Cyber Security

01	SEL-849 Intro Lab	Work with SEL-849 to read settings, edit logic, and take measurements.
02	RTAC + SEL-849 Lab	Establish communication between SEL-849 and RTAC. Collect data in SEL 5033 software.
03	Basic SCADA Lab	Add more devices to setup from previous lab. Respond to signals between devices.
04	Troubleshooting Lab	Update settings of IEDs and RTU in SCADA system to ensure a fault is not missed.
05	Cyber-Security Vulnerability Assessment	Identify possible cyber-security threats in a provided system, adjust to avoid threats.

Option B - Power System

01	SEL-849 Intro Lab	Work with SEL-849 to read settings, edit logic, and take measurements.
02	RTAC + SEL-849 Lab	Establish communication between SEL-849 and RTAC. Collect data in SEL 5033 software.
03	Basic SCADA Lab	Add more devices to setup from previous lab. Respond to signals between devices.
04	Multiple Protocols Lab	Set up multiple communication protocols within a single system. Analyze challenges.
05	MicroGrid Lab	Case study. Set up simulated microgrid to increase system resiliency

Option C - Mixed Approach

01	SEL-849 Intro Lab	Work with SEL-849 to read settings, edit logic, and take measurements.
02	RTAC + SEL-849 Lab	Establish communication between SEL-849 and RTAC. Collect data in SEL 5033 software.
03	Basic SCADA Lab	Add more devices to setup from previous lab. Respond to signals between devices.
04	Troubleshooting Lab	Update settings of IEDs and RTU in SCADA system to ensure a fault is not missed.
05	Multiple Protocols Lab	Set up multiple communication protocols within a single system. Analyze challenges.

Team Schedule - Spring

Semester

January 2020

- Lab Procedures 1st drafts complete

Jan. 30, 2020

February 2020

- Lab Procedure Team run-throughs start
- Lab Procedure Outline review, finish group testing

Feb. 3, 2020

Feb. 28, 2020

March 2020

- Begin Lab Testing (in person & EO)
- Complete Lab Testing

March 2, 2020

March 27, 2020

April 2020

- Final Lab Procedure & Materials Due
- Expo Materials Due and Reviewed

April 23, 2020

April 20, 2020

May 2020

- UI Design EXPO
- Final Report / Drawings

May 1, 2020

May 8, 2020

Deliverables

1. Detailed lab exercise guides for student.
2. Setup guides for TA, including equipment, software, and possible error troubleshooting.
3. Appropriately configured software, equipment settings, and upload method.

Expected Spring Challenges

- Ensuring learning outcomes of lab exercises are met.
- Preventing equipment malfunction.
- Finding volunteers for lab exercises.
- Accommodating classes of up to 25 students.