

## Mentor Part

1. **So, we had the information of the equipment now and we want to know how to use models to make the virtue of remotely.**

Okay. Actually I could help you on the part of connecting the analog model, analog power system model that we have in the lab and connect the single line diagram for a transmission line or and a load. And then by the part of connecting this device remotely, I don't have somehow much experience on that.

I could use this device like to do the experiment on the lab. I did that last year. So I could like set up the experiment, the law, the transmission line, everything I connect the relay to them, but the bar to how to use the IP address, how like to access using Mininet.

This part you need to take care of it. Does that mean? And then we need like the IP Address for this device. And from that, I think you could like access to it. But we need to make sure that with doctor Johnson to be able to discuss with you about is it possible to connect it remotely? Like directly just plug the internet cable here, because it has, if you see a number one, it has a serial cable. Okay? But from the back side of the relay the over current element this one, 351. You have ethernet cables.

Is it possible like to when I blog the ethernet cables and give you the IP address? Is it possible to access it remotely using the Mininet or I don't know, how to access? But usually this device has a software. The software is in our lab.

2. **Is that accelerator or any other software?**

Yeah, we have this one, the synchro phasor waveform. The other one, just let me check the full name of it. I could provide you like with the names of the software and the front page because I used it before.

3. **Would you love to share the screen with us?**

I don't have much information to share. Just I'm trying to search what's the name of the software, but I could like go to the lab access to at the computer. And then give you a brand secret of the front page of the software.

What type of the software is used there in the lab? From that you could like make a search and find a way to connect to that software. Or is it possible like do you use this device to connect it with the minute?

Yeah, that we have but for the hardware like I could tell you what connecting everything together. But you need to take care as you find when you have the Mininet to try to communicate with it. And we need like a doctor Johnson to have like some comments about that.

But I think for SEL, they might have this option. And also, Joe might be helpful to give you some guidance on that. Yeah, so you could like send them an email if he's not coming. Now we have the 351. We would like to communicate with it remotely.

we have the Mininet. Does the Mininet is capable of communicating between the relay and the software or the HMI so you need just to make sure because I don't have experience in communication, but with the between software and the release .

**4.If we have the address of the a school computers, so we can connect to the school library with our computer, right?**

Right. Yeah, I think to use like the VPN. Yeah, you need the VPN to access to the computer and we could like connect you to the computer that is like connected to the analog system. And from there you could and then I will make the setup. And then you could like communicate with it. But how to do that, II need just to we need some guidance from doctor Johnson about the VPN if we have like a technical support, like I know JJ has left, so would like to talk to Mike. I think doctor Lee might is responsible for or you can like send an email to doctor Johnson guys ask him we need to do this like now, the hardware part, we could do it. We saw this step. Then the other step is we need to connect between the device computer which is the analog power system computer, and with your computer back in China. So, this is the missing piece you need to find how to do it by communicating with doctor Johnson. He might like refer you to mike or somebody else was responsible to do the technical support. And from that part, we could like find the missing piece.

**5. Do you think we need both the DNP 3 and mobile bus or we just need to choose one?**

I think one is enough, one protocol is enough like each one like his has his own like advantages and disadvantages but I think DNP3 mostly used by SEL, there is another one which is good that's for fast speed. Now you are not looking for fast speed release, you are just looking how to connect between the analog power system virtually ,you connect with that virtually this is your base of the game.

**6. Doctor Johnson told me there is no independent software for modeling the DNP3 or the model bus. Some students usually use a python or MATLAB to imitate this control.**

I think the protocol used in DNP3 you need to access to; I don't know how I say used to program the communication. Frankly, I don't know how they program it. So, we need like to discuss that with doctor Johnson. This is the lab I could share this one with you. This is an experiment I did in a lab. This is how we connect them together back in the lab. We make the settings for the relays. I could make the settings for the release using the software we could inspect the signals in synchro phasor waveform, this is used to show the signals. So, I could help with that part like connect the device. And then we need like to make sure from doctor Johnson how we could like communicate between you and the hardware.

**7. Hi, doctor Johnson. Last week, we learned about Modbus, dnp3 and SEL ,so here is the thing, we know that we use SEL-351 in the Idaho labs. Do you know if there is something we can do for remote control like software?**

Okay, so we went basically we would have to have somebody set up .No, a computer to allow you access to or basically set up the equipment to allow the

remote access.

I would need to maybe work with Abdallah to find somebody to help set that up.

**8. What do you mean like set up a computer like for the lab?**

What we would do is one is I would probably set up a request group under the VPN, whatever computer we have isn't open to everybody on campus. It's so similar to what we have for the area. Yes. We have a stuff their access in the RTBS because that has no protection whatsoever. And so basically then people would be able to either set up or you would have a computer or you would have a model or we could set it up where so from that you could run like accelerator to do the configuration for the relay if you ready to the settings. And then we would be able to do a lot of the stuff that .For example, that the labs were set up by the senior design team last year . We would actually do a lot of it remotely other than a little bit for basically the terminal need to physically do the learn.

**9. Doctor Johnson, I downloaded and installed the Mininet yesterday. So, I just study from the scratch. I don't know is there any specific code for Mininet to connect the Idaho lab computer remotely.**

So Mininet is as a computer as a network emulator. So what you can do is you can figure a communication network that has multiple devices on it. And you can also have a talk to individual devices. For example, where you have the SEL-351 that can communicate on DNP3. Basically the network port command can go to a switch and that switch could also have a port going to a computer running meeting in it, Or that's connected to Mininet. So, it can make it look like you're connected to a more complicated network. You can also communicate, have Mininet that communicate with a simulation that's just running a power system simulation. And have it simulated the communication network with that and either have a separate program that's also on that computer or a central computer like reading page with it.

**10. Do you know the IP address of the Idaho lab computer?**

Not of the top of my head. Right now, I don't think it's actually connected to a network isolated from that right now. So that computer is not connected to the outside world right now. We have it sitting on its own standalone network that we can communicate with the devices in the lab. But it can't talk to anything else on the internet. So one of the first steps we would have to do is it like if we're going to set up a network, we would have to actually connect it to that network.

**11. So who's going to be the guy to connect those computers with the network? We also need permission to use the SEL software, Right? To access school library.**

Yeah, so that might be something that we would to have it. So you can do a more desktop on the computer and the lab to be able to run it. I'm not sure how much of a copy that we can how far we can distribute it or installing it on student computers.

**12. You mean like the synchro wave of the event?**

Also, accelerator if they want to be able to go in and set things.

No, Harry and Hussein are the two that are probably familiar with some of that. And then Joe Stanley would be too. I guess some things that I would do for you looking at it would be Mininet and some other options. If you're happy with it, I'm fine with that. Mininet is not as usual firmly used as some of the others. So, I want to have something that can be certainly user friendly. Do this using this for a class by one of the that it doesn't take them all semester and discipline to use it. And so fast is for the variety of goodness that are very good at running this equipment versus considering this learning it from scratch. And I want to balance a little bit.

So basically, there are a couple of other programs similar to Mininet. Some are easier to use than others. So, one of the things to look at is what is the easier one to use that can still accomplish where you can build a communication network and monitor the traffic.

**13. Is there anything we can do about the DNP3 and mod both modeling? So, there's a couple of program software to model the this. Can we use MATLAB or Python to do this?**

Python definitely has libraries for Modbus. I've had other senior design teams use those. And I think there's a DNP3 library as well. And a lot of times it's like you have a design review coming up in a couple of weeks. So usually what the senior design team would research these different options for doing this is for whether you use python, whether to use a commercial tool. I sent you an email this morning, looking at we're just doing a search and see what do you have the emulator or Modbus or DNP3. So if there are computer simulations, you can run to imitate control scheme that's running Modbus or DNP3. That would be another option.

So usually, the senior design team will study some of these options. And then when they come to the design review, they would say these are the strengths and weaknesses of each of these options.

So at the design review, I would encourage you to make a comparison. And then in the design review you can talk about which one might work better. And so, Stanley there would be some very good questions to ask him because he has looked at them with a lot more than I have and he has used some of them.

But so if you do that simulator or whether you set something out or remote in the lab, you would have a computer that's going to be acting as a SCADA master. And then you would have either simulated devices or actual devices that are acting as the slaves. And so you might have the masters and the command to the slaves to get for example, to get data or is there any command to open it called the breaker?

An example of figuring systems to do an example case. So for this project, what you would be doing if you're looking at ways to try to get to the point that we could do those remotely, do some of them with simulation.

**14. So we need more experimental content in the design review, right?**

Yeah, so I the couple things you should shoot for trying to be ready for by the design review. One is going to be having the look at figure out what

experiments you might try to do.

15. We have found some information and the knowledge to show and then is how to use a simulator to, I mean in the walking out of the experiment to design the Mininet?

So one is coming up with some experiments, and the other one is evaluating options for tools. If your team thinks Mininet is the best tool, that's good. And You want to be able to talk with the strengths and weaknesses are for the different tools.

16. We think it we'd better to make the simulation of the lab one before the presentation. So, we can do this demonstration to the person in our first design review.

Abdallah and I will work with finding a student that will help coordinate with you on that.

#### Lead Instructor Part

1. So, you plan to give the design review on December 2 at 3:30 pm?

No. we decide to present on the 6:00pm.

2. 6 pm is not fit for us because we may have another team's presentation to attend, and doctor Johnson may have class at 4 pm.

Ok, then we will change it to 3:30 pm.

3. Also, the project schedule and design validation plan are unacceptable, you need to do it again and send us the new one. And you need to send me the meeting agenda and meeting minutes as well. Don't forget to show us the ppt once you finish it so that you can have a feedback and make some modifications. Okay, we will do it right after the meeting. Thank you for your time, have a good day!