Planning and Preparation

Before an HMI is created in a software SCADA system, the HMI must be planned. The planning process includes gathering information regarding the available devices, data points, and needs of the operator/user. Then, the levels of display hierarchy must be planned, and data points mapped to each level. Initial drafts are often done using pen and paper. Remember to use the best practices outlined in lecture.

Plan a HMI with a two-level display hierarchy

Using what you have learned in the lectures and the following available devices and data types, plan a two-level HMI display hierarchy. Sketch on pen and paper the general placement of the devices and associated data points. In this example, Level 1 should display the overall plant/system and Level 2 should display detailed information about the weather station.
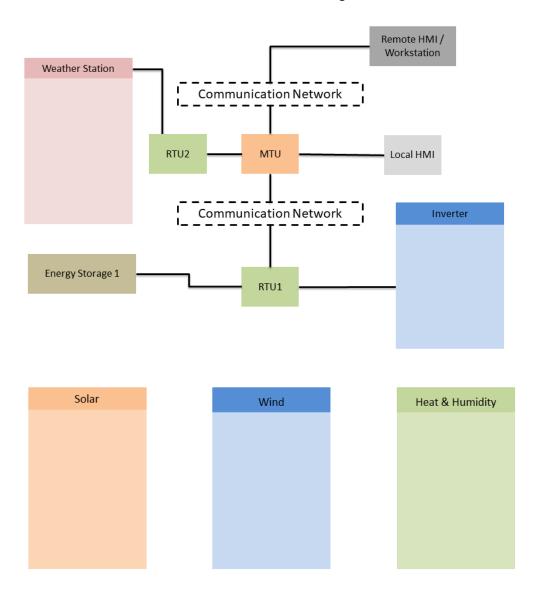
Device	Data Point	Data Type	Units/Values
12v-battery			
	voltage	number	volts
	current	number	amps
	status	discrete	charging, charged, discharging
basic-inverter			
	power	number	watts
	fan	number	rpm
	status	discrete	charging, charged, discharging
solar-panel			
	voltage	number	volts
	current	number	amps
weather-station			
	irradiance	number	watts
	temperature	number	fahrenheit
	wind-speed	number	mph
	wind-direction	number	N, NE, E, SE, S, SW, W, NW
	humidity	number	relative humidity

Review

Exchange your planned HMI display hierarchy with another student. Discuss your choices and note any improvements you may choose to implement after reviewing their design.

Implementation

Use the attached reference HMI levels for the following section.

Remote HMI / Workstation

Weather Station

Communication Network

RTU2 — MTU — Local HMI

Communication Network

Inverter

Energy Storage 1 — RTU1

Solar

Wind

Heat & Humidity

Microsoft Paint

Use Microsoft paint to draw the two attached levels. Do not deviate from the reference images since future steps are dependent upon this HMI design.

Devices and Data Points

Open the SCADA software in a web browser using the following URL.

https://scada-student.irsccsdept.org
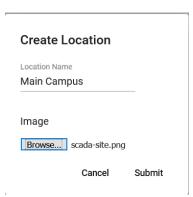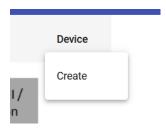
Click **Start New Lab Session.**

Welcome

Download Lab Files

Start New Lab Session

Level 1 Display

On the top right navigation, click **Location.** Then click **Create.**
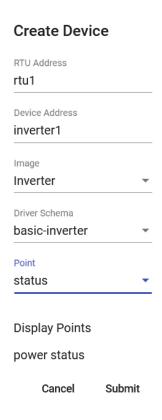
Location   Simulator

Create

List

Enter *Main Campus* for the name. For the image, click **Browse** and locate the top-level image created previously. Click **Submit.**

Create Location

Location Name
Main Campus

Image
Browse... scada-site.png

Cancel   Submit

You are now presented with the view of your top-level HMI. To populate your HMI with devices, click **Device** then **Create.**
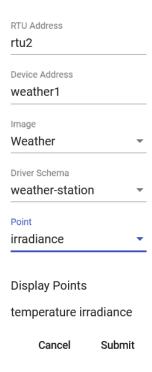
Enter the following information into the device settings. To add displayed data points, click each data point from the drop-down menu. Click **Submit.** Move the inverter image to the appropriate location on the HMI.

Repeat the previous steps for adding a weather station. Note that the RTU address is now rtu2.

Create Device

RTU Address

rtu2

Device Address

weather1

Image

Weather ▾

Driver Schema

weather-station ▾

Point

irradiance ▾

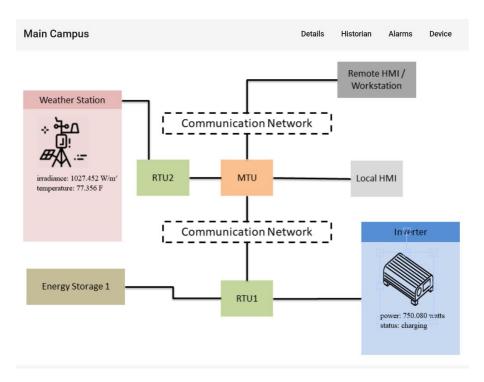Display Points

temperature irradiance

Cancel   Submit

Navigate to the data simulator, located in the navigation in the upper-right corner. This will open a new tab in your web browser. *Do not close any tabs.*

Location   Simulator

In the simulator, select LAB_1 and STEP_1. Click **Submit.** Click the other browser tab to return to the HMI.

Simulator

Labs   Steps

LAB_1   ▾ STEP_1   ▾
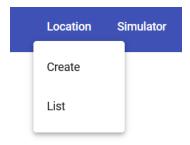
Cancel   Submit

Your HMI should now appear as follows.

Level 2 Display

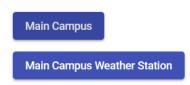On the top right navigation, click **Location.** Then click **Create.**

Enter *Main Campus Weather Station* for the name. For the image, click **Browse** and locate the second-level image created previously. Click **Submit.**

To navigate between HMI views, click **Location** then **List** in the navigation, located in the upper right-hand corner. To change views, click the appropriate location button.

Locations

Main Campus

Main Campus Weather Station

In the Main Campus Weather Station location, create the following devices, using the method outlined previously.

Create Device

RTU Address
rtu2

Device Address
weather1

Image
Sun

Driver Schema
weather-station

Point
irradiance

Display Points

irradiance

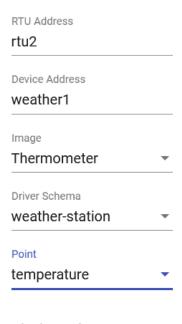Cancel   Submit

Create Device

RTU Address

rtu2

Device Address

weather1

Image

Wind ▾

Driver Schema

weather-station ▾

Point

wind_direction ▾

Display Points

wind_speed wind_direction

Cancel   Submit

Create Device

RTU Address

rtu2

Device Address

weather1

Image

Thermometer ▼

Driver Schema

weather-station ▼

Point

temperature ▼

Display Points

humidity temperature

Cancel   Submit

Open the data simulator and select LAB_1 and STEP_1. Click **Submit** then return to the HMI browser tab. Your HMI should now appear as follows, displaying simulated data for the three devices.

Main Campus Weather Station   Details   Historian   Alarms   Device

Solar

irradiance: 1027.452 W/m²

Wind

wind_direction: NE
wind_speed: 6.889 mph

Heat & Humidity

humidity: 49.553 %
temperature: 77.356 F

RTU: rtu2   Device: weather1   Schema: weather-station