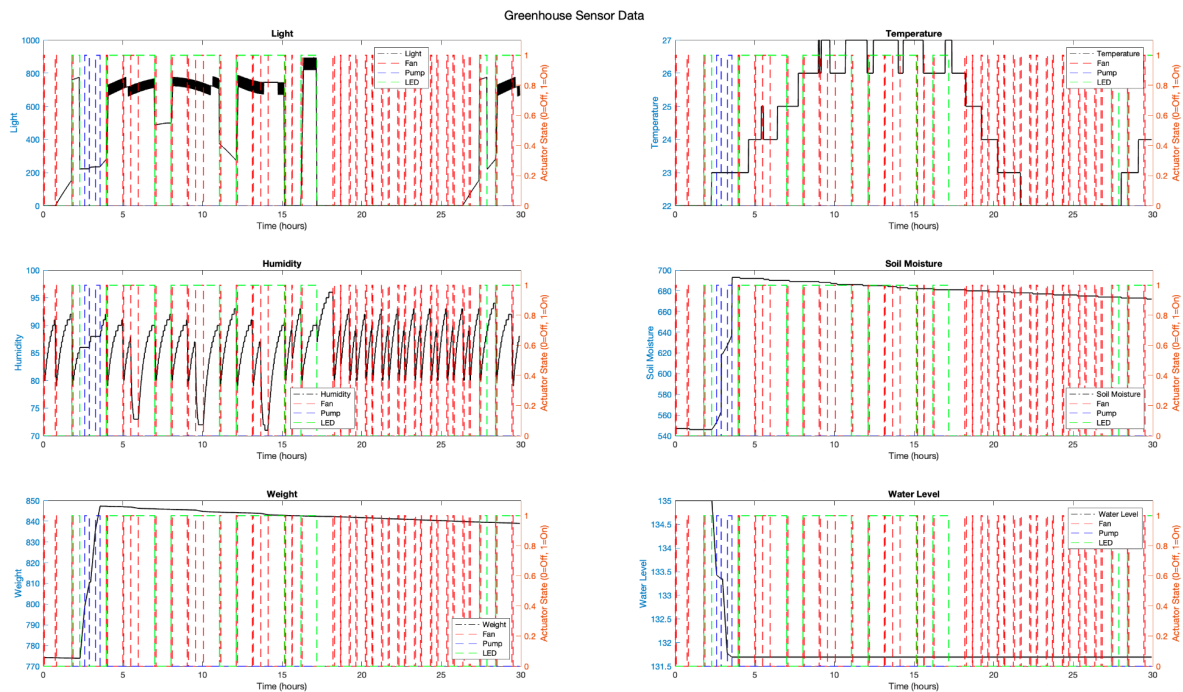Simulated graph:

The fan is indicated by the red lines, the pump is indicated by the blue lines, and the led is indicated by the green lines. When an actuator is turned on, the line goes up to one as shown by the axis on the right side of the plot. When it turns off, it goes back down to 0.

The simulated data shows that each actuator has an impact on its associated behavior. In the light plot, when the led is turned on there is a steep increase in light intensity. When the fan and the led are on at the same time, there is more noise in the readings but a general decrease in light intensity. This may indicate that, when the fan is on, the leds may also be dimmed to execute a lower temperature behavior. When the pump is on, the light was lower, but this is likely because they are uncorrelated.

In the humidity plot, there are frequent fluctuations within about a 25 point range. These fluctuations coincide with the fan actuating. When the fan is off, there is a steady rise in humidity which drops steeply when the fan is turned on. This clear correlation may also be because the air near the humidity sensor is being moved by the fan.

The weight plot shows a steep increase when the pump is on which makes sense because water is being added. Over time the weight decreases very slightly, likely as a result of the fan evaporating some of the water.

The temperature plot shows range between 22 and 27 degrees. Generally, the temperature increased when the led was turned on and decreased when the led was turned off and the fan was turned on.

In the soil moisture plot, the soil moisture only looks to be impacted by the pump as there is a steep increase in moisture when the pump is on. There is some decrease over time, likely as a result of the fan turning on periodically.

In the water level plot, the water level decreases steeply when the pumps are turned on and remains constant. This makes sense because the pumps are the only actuators that affect the water level.

Hardware graph:

Greenhouse Sensor Data (Smoothed + Downsampled, Fan=Red, Pump=Blue, LED=Green)
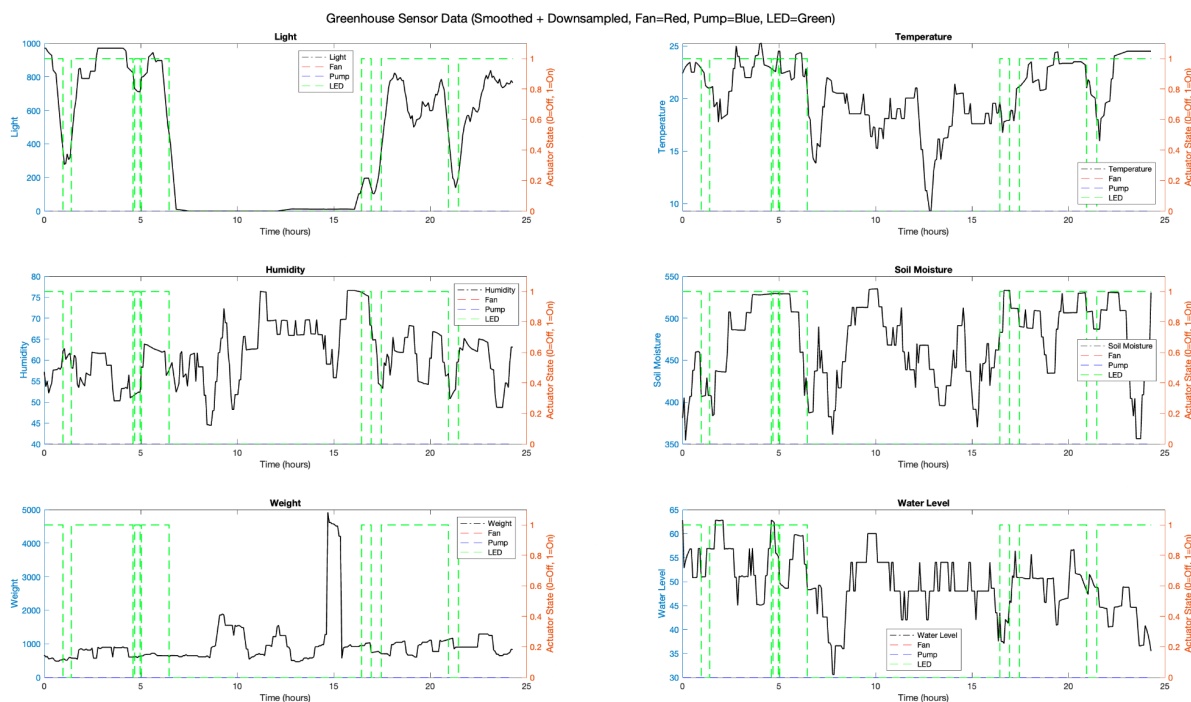
This is the hardware sensor data cleaned with a moving average. The raw data was very noisy and difficult to read. We noticed that the pump did not turn on throughout the 24 hours, so we will debug greenhouse_behaviors.py to make sure the pump turns on.

Each plot shows when the leds were on. The light plot makes sense as the light was high when the leds were on and low when they were off. The temperature plot also shows higher temperatures when the leds were turned on. For the rest of the plots, the light doesn't make as much of a difference. It's difficult to say how they are being affected by the actuators without the fan and pump data. The fan did not turn on as the pumps did not turn on to increase the moisture.

We can infer that when the pumps turn on the humidity, weight, and soil moisture will all increase similar to the simulated TerraBot. The water level will decrease.

The biggest differences between the simulation and the hardware plots are in the weight, soil moisture, and water level plots. The sensor readings are very noisy and fluctuate a lot. There are also some anomalies like in the weight plot where there is a spike in the middle. There are fluctuations in water level which don't makes sense as it can't increase.