Machine Learning for Advanced Process Control Lab- Cyber Physical System Enabled
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User Manual: Using the reactor_client library

Overview

This guide explains how to use the reactor_client library to interact with Azure Digital Twins. You'll learn how to install dependencies, import the class, and send/receive data from five specific digital twins.

Prerequisites

- Python 3.7 or higher
- Access to Azure Digital Twins instance from MLAPC lab
- Basic knowledge of Python

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Step 1: Navigate to the reactor_dist folder

Open a terminal and navigate inside the reactor_dist folder (unzipped) , downloaded from the **Virtual Lab Access** section under itarasu.com

Step 2: Install the Library

Run

```
pip install .
```

To install the library on your pc.

Step 3: Initialise the Client

Keep these lines of code at the top of your program

```
from reactor_client import DigitalTwinsClientWrapper
adt_url = "https://Br-Twin.api.sea.digitaltwins.azure.net"
dt=DigitalTwinsClientWrapper(adt_url)
```

After running your code, you will be prompted to open a browser and enter a device code to authenticate. Share this code with the admin. This will be required every time the code runs.

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Step 4: Sending data to the reactor twin

a) To send the value of heater control

```
dt.update_reactor_controls(heater_current=50)
```

Replace 50 with a value or variable of your choice (between 0 and 100).

b) To send the coolant flow rate

```
dt.update_reactor_controls(coolant_flow=100)
```

Replace 100 with a value or variable of your choice (between 0 and 100).

Step 6: Reading Data (Update Values)

Use dt.get_all_temperatures() to read temperature data from the twin. Then you can use the following keys to get specific data as per the example:

```
temps = dt.get_all_temperatures()

print(f"Reactor Temp (Tr): {temps.get('Tr')}")

print(f"Jacket Temp (Tj): {temps.get('Tj')}")

print(f"Coolant Temp (Tc): {temps.get('Tc')}")
```

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Note: Refer to the test_client.py file given in the folder to see an example and test your connection.

Summary

You can now:

- Read temperatures from ReactorTemp, JacketTemp, and CoolantTemp
- Send control signals to Coolant and Heater
- Extend functionality by importing this library into larger applications

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