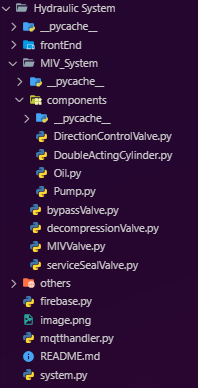
**General Overview and Folder structure**

****

*Figure 1. Folder structure of MIV system*

The core simulation logic resides within the Hydraulic System directory. This directory further contains subdirectories for specific systems being modeled. Currently, the only subdirectory present is the MIV System subdirectory.

**MIV System Subdirectory:**

This subdirectory encompasses all the necessary logic and simulation model code for simulating the opening and closing sequence of the MIV System. It also includes individual component models that contribute to the overall opening and closing behavior.

**Key Components:**

***system.py:*** This Python file serves as the main entry point for the simulation. It contains the logic responsible for calling the required functions to execute the model.

***Component-specific Python files:*** Individual files like BypassValve.py, DecompressionValve.py, and others likely models the behavior of specific components within the MIV System. These files interact with each other and system.py to create the entire simulation.

**Inside MIV system directory**

1. BypassValve.py

The provided code defines a Bypass Valve class responsible for managing the operation of a bypass valve system. It initializes various parameters related to the valve's state and functionality. The run method of this class runs the simulation process by simulating the operation of different components involved in the system:

To make the bypass Valve a functional working model, it is linked to three .py model filed inside of the component’s directory. Now those individual files in components directory namely:

1. Hydraulic pump
2. Directional Control valve
3. Hydraulic Actuator

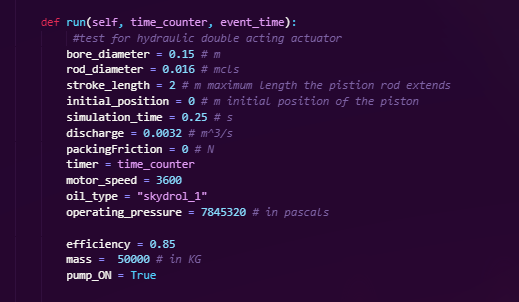
Will consist of a mathematical model which calculates the required parameters based on the input parameters provided by the user. (Later it is expected to make a front-end panel where input parameters can be easily set by user based on their needs).

***Hydraulic Pump:*** Simulates the pump's operation based on specified parameters such as *oil type, motor speed, operating pressure, mass, and efficiency.*

***Direction Control Valve:*** Simulates the valve's operation based on *density, viscosity, pump pressure, and flow rate.*

***Hydraulic Actuator:*** Simulates the behavior of the hydraulic actuator based on parameters such as *bore diameter, rod diameter, stroke length, initial position, simulation time, operating pressure, density, discharge, packing friction, and timing.*

The run method coordinates the simulation of these components, updates the system's state, and publishes the simulation data via MQTT for monitoring and analysis. Additionally, it handles the initialization of values and updates the system's time during the simulation process.



The above parameters are currently used for simulating the Bypass Valve opening and Closure model. Later those parameters can be changed based on the requirements of the system. Similarly, MIV, Service Seal valve and Decompression valve will be ultimately linked to the components directory models to simulate their working but with different parameters they will give different behavior when we simulate the system.