Ventilator Control Code Documentation

Last update: 2021/01/12

Drive link:
https://docs.google.com/document/d/1ubPA0i9rl0JTHQ0E64YsGvYKnO_gZP3VpbNZUGyVLu4/edit?usp=sharing

PCV control:

1. cycle
   Input: (mode) PCV, (int)frequency, (float)IEratio
   Output: void
   Description: In charge of respiratory cycle control, where function regulates the period and call “inhale” and “exhale” functions with setted frequency and I:E ratio

2. inhale
   Input: (float) time/ms
   output: void
   Description: one period of inhalation, regulate inhalation and inhalation plateau state. Call function PIDcontroller and Effector to regulate valves.

3. exhale
   Input: (float) time/ms
   Output: void
   Description: one period of exhalation, regulate exhalation, exhalation plateau, and patient-triggered period reset. Call function PIDcontroller and Effector to regulate valves.

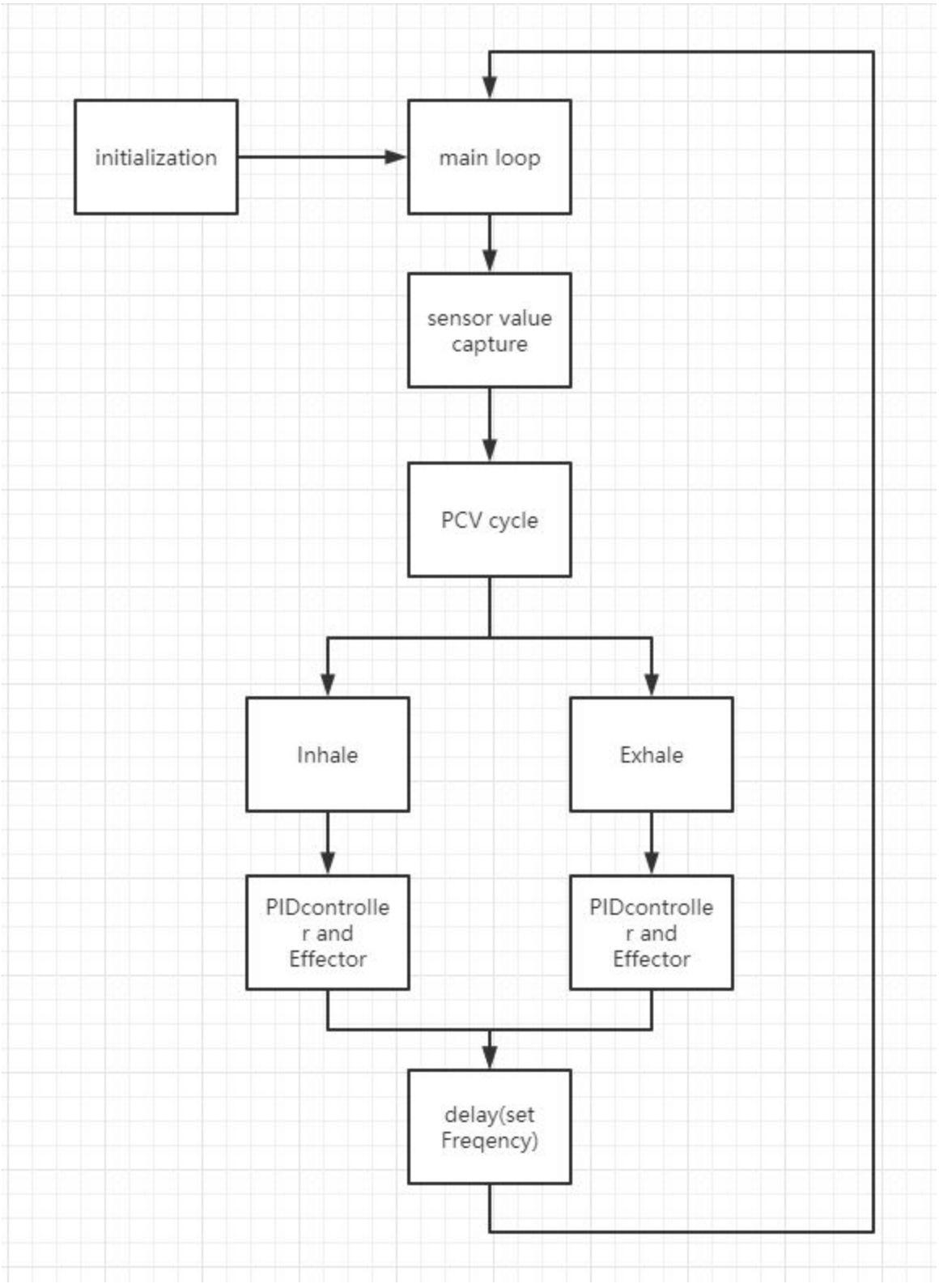
4. PIDController
   Input: (float)targetPressure
   Output: (signed int)targetFlow
   Description: given the setted target pressure value, PIDController returns a primitive int variable that will be furtherly transformed to PWM output.

5. effector
   Input: (signed int)targetFlow
   Output: void
   Description: lowest level of the algorithm, regulates 4 sets of PWM values for 4 valves based on the targetFlow.

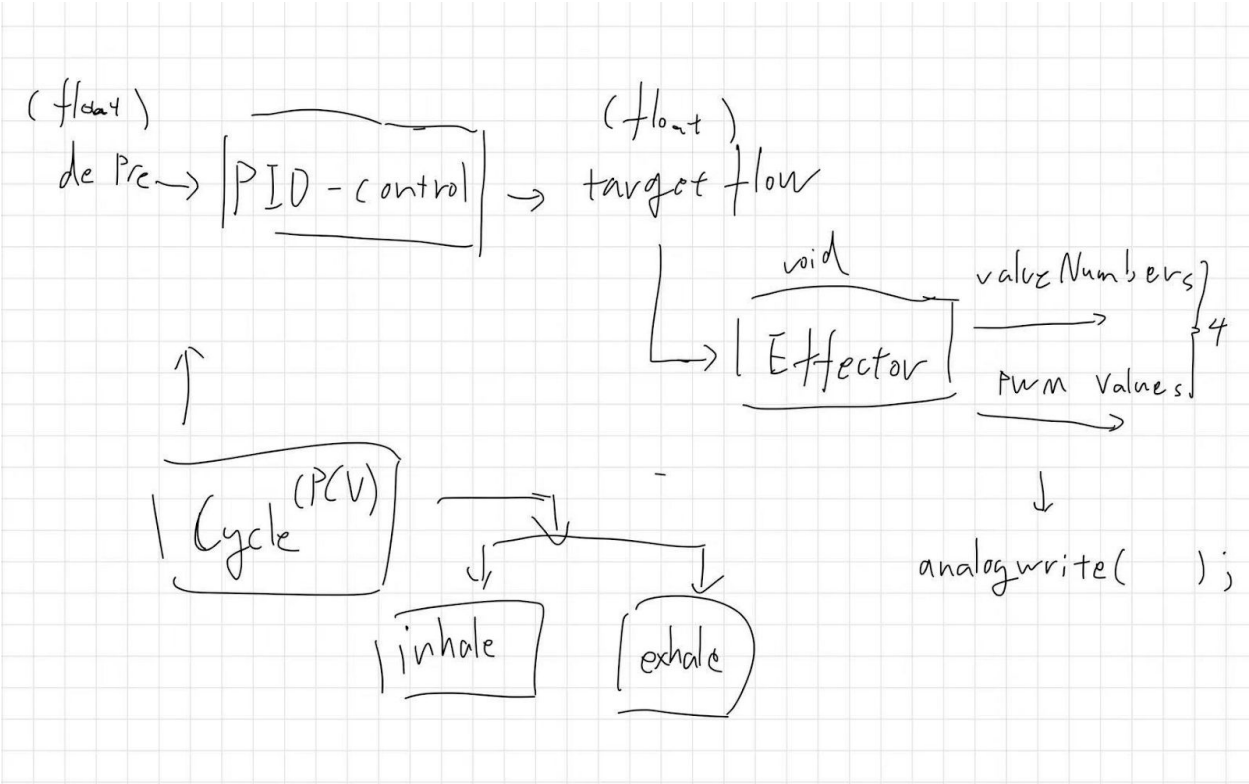
6. in_ex_transform
   // TODO

7. hybridAirRatio
   // TODO
   Input: (float) ratio
   Output: void
   Description: function to mix oxygen and air in a given ratio. Called by the effector.

Flow chart:


initialization
main loop
sensor value capture
PCV cycle
Inhale
Exhale
PIDcontroller and Effector
PIDcontroller and Effector
delay(set Freqency)

Scratch:


(float)
de Pre
PID - control
(float)
target flow
void
Effector
valveNumbers
PWM Values
4
Cycle (PCV)
inhale
exhale
analogwrite( );