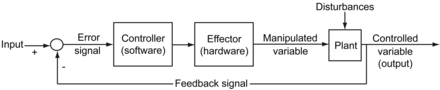
Goal: maintain PIP/PEEP requirements for patient 1 and 2

Yale design: Effective PEEP/PIP = PEEP/PIP set on ventilator (set by doctor) - pressure gated valve setting for particular patient

(plant = patient)

pressure-control modes use airway pressure as the feedback signal to control gas flow from the ventilator (<http://rc.rcjournal.com/content/56/1/85>)

Pseudocode:

while(1):

//Negative Feedback Code

if abs(PIP measured by sensor 1 - required PIP for patient 1) <= max difference

Send signal to the valve motor or valve //Change PIP setting for patient 1

if abs(PIP measured by sensor 2 - required PIP for patient 2) <= max difference

Send signal to the valve motor or valve //Change PIP setting for patient 2

if abs(PEEP measured by sensor 1 - required PEEP for patient 1) <= max difference

Send signal to the valve motor or valve //Change PEEP setting for patient 1

if abs(PEEP measured by sensor 2 - required PEEP for patient 2) <= max difference

Send signal to the valve motor or valve //Change PEEP setting for patient 2

//Alarm System Code

while(1):

//usually indicates problem with the tubing

If cuff pressure on patient 1 > 20 cm H20:

Trigger low pressure alarm patient 1

If cuff pressure on patient 2 > 20 cm H20:

Trigger low pressure alarm patient 2

//if PEEP/PIP goes way out of range - not sure what value we want to use here

If PIP or PEEP pressure > max\_val

Trigger high pressure alarm

If abs(tidal volume measured - tidal volume normal) > 50 mL

Trigger tidal volume alarm

// Notes on max difference:

// [PEEP](https://uichildrens.org/health-library/conventional-mechanical-ventilation) = 5-12 cm H20; adjust for FiO2, CXR (higher PEEP needed for sick lungs)

// = (3-10 cm H2O) -- from a [different website](https://www.nursingcenter.com/getattachment/Clinical-Resources/nursing-pocket-cards/Mechanical-Ventilation-Settings-and-Basic-Modes/Mechanical-Ventilation-Settings-and-Basic-Modes-Tip-Card_January-2019.pdf.aspx)

// Variable PIP = must follow trends of PIP, typically values in the 20s, concerning if

// 30 cm H20 (normal is usually in the 20s)

// = Target PIP is < 35 cm H2O -- from a different website (doesn’t say

// anything about the lower end but it needs a lower cap

// This [website](https://www.rtmagazine.com/public-health/pediatrics/neonatal/selecting-appropriate-ventilator-parameters/) explains how PIP and PEEP vary depending on the person and their

// condition.

// Normal lungs: PIP of 10 to 14 cm H2O with a PEEP of 3 to 4 cm H2O

// Patients with respiratory distress syndrome: varies based on severity, usually

// PIP of 18 to 25 cm H2O and a PEEP of 4 to 6 cm H2O

// Based on this, it looks like the **max difference should be around 3 or 4**