

# **New KPI Proposal: Actuator Travel**

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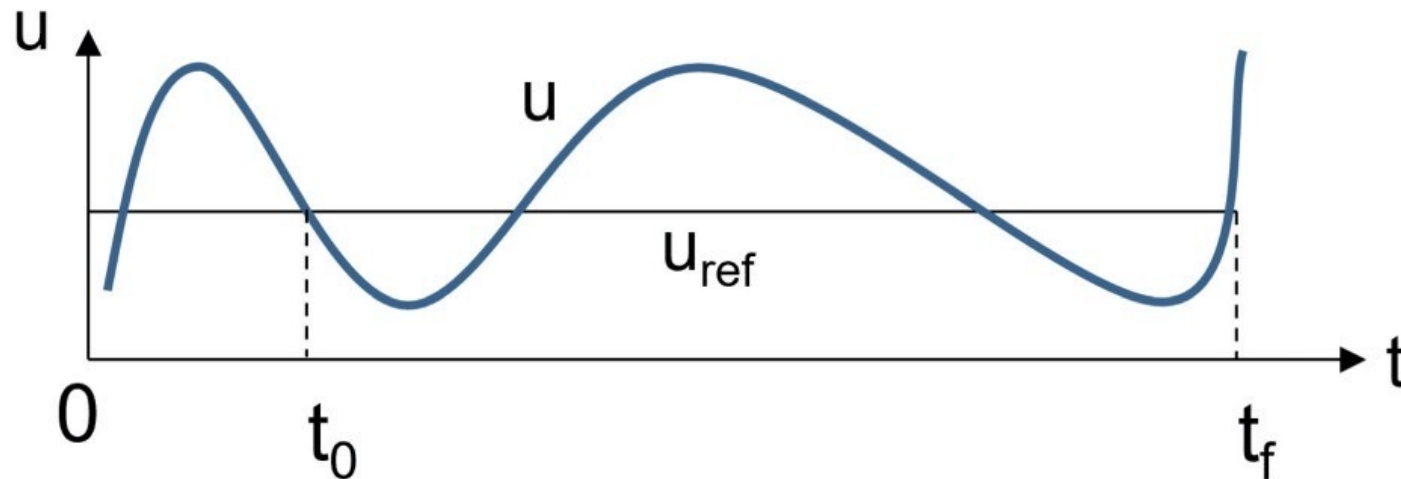
Task 2 Monthly Meeting: 3/26/2024

## Purpose:

- Quantify the frequency of equipment and actuator switching caused by the control system throughout the evaluation period
- Gives a measure of phenomenon like cycling and hunting

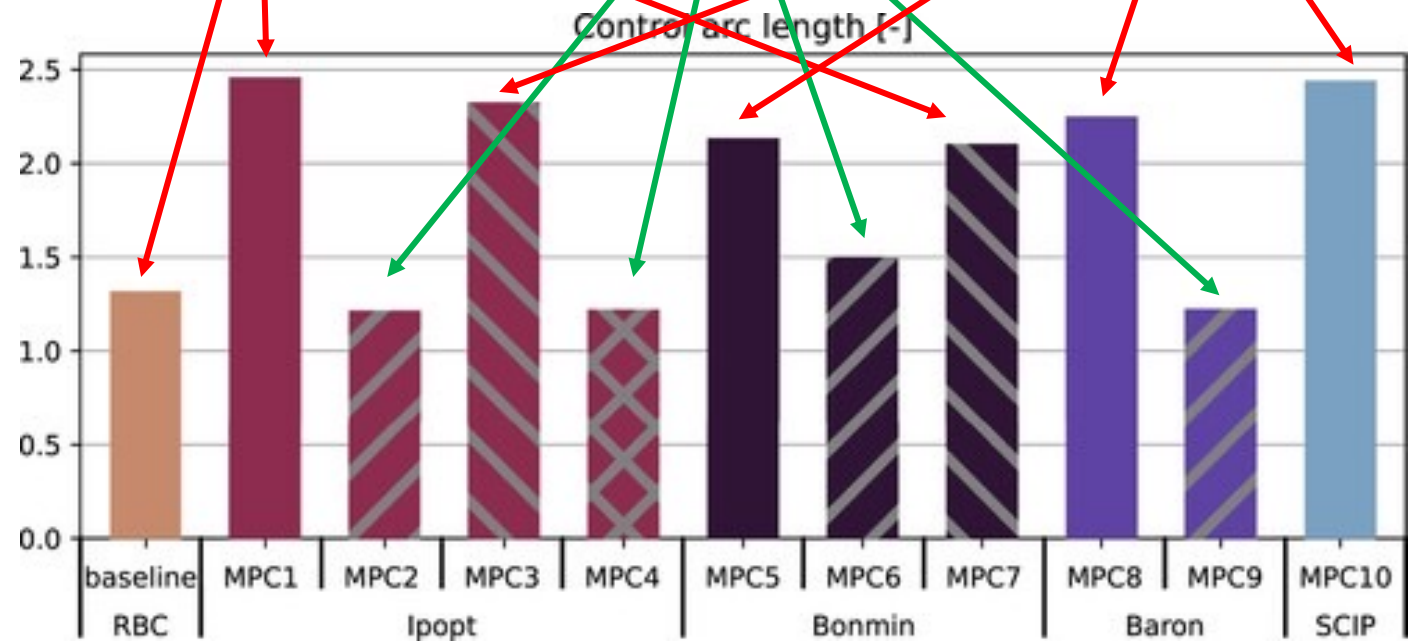
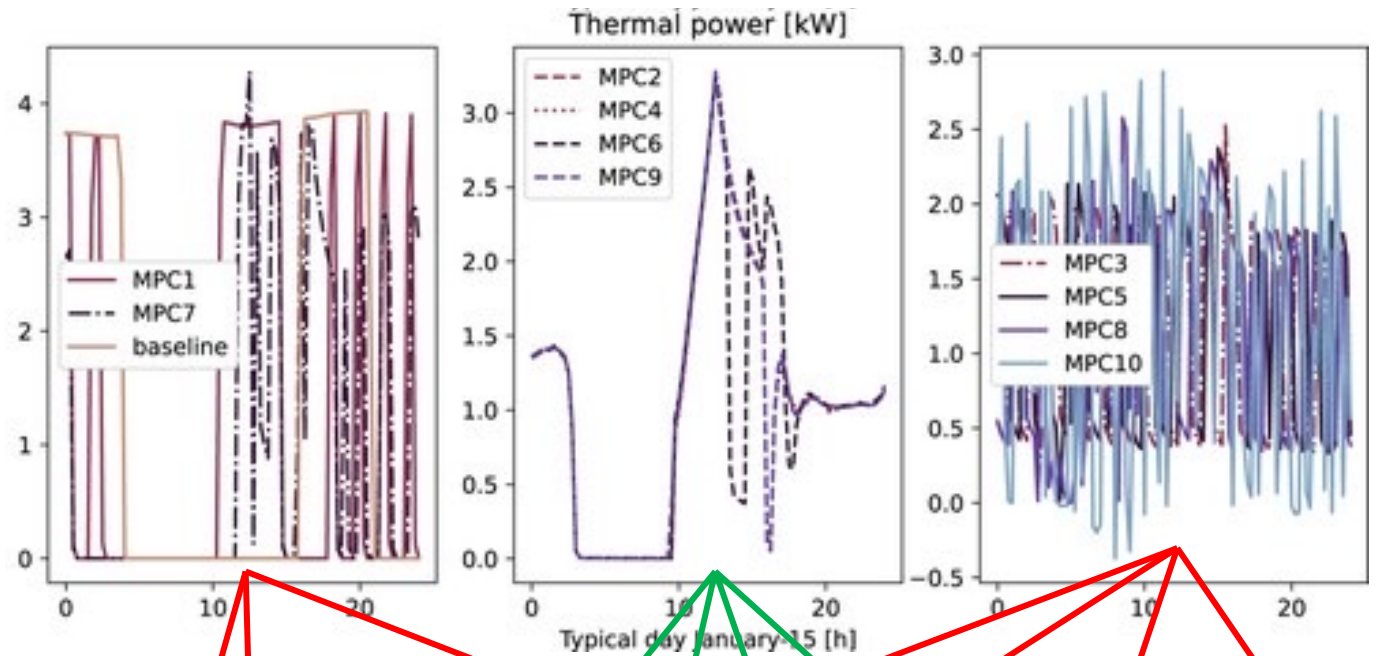
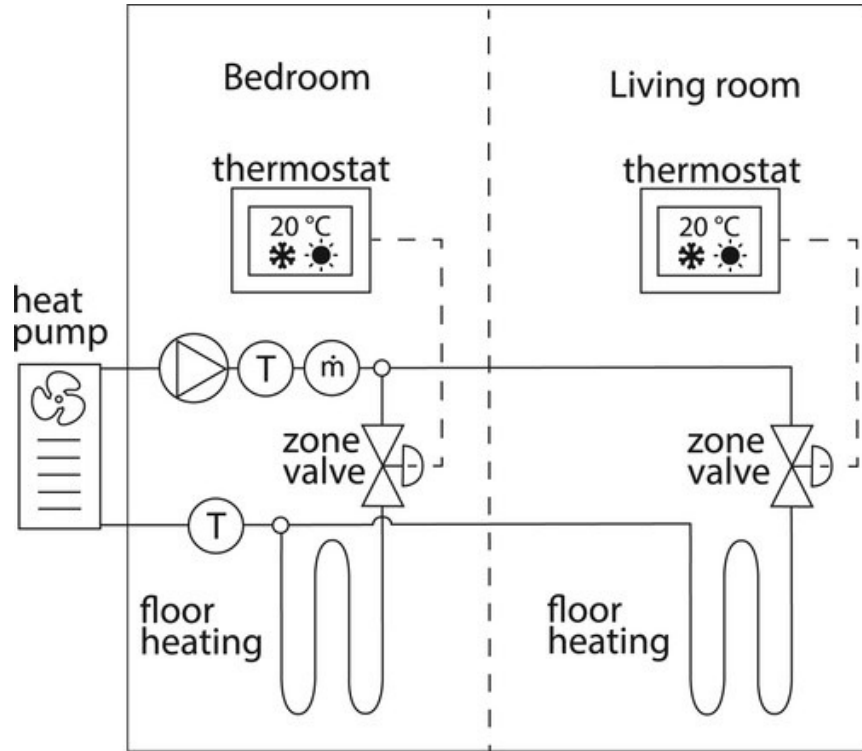
## Proposed Quantification (reference to figure below)

- The ratio of the arc length of  $u$  to the arc length of  $u_{ref}$  (horizontal line) from  $t_0$  to  $t_f$ .
- Summed for each equipment (e.g. heat pump, fan) and actuator (e.g. damper, valve).



# Prototype

- twozone\_apartment\_hydronic



From: E. Zanetti, D. Kim, D. Blum, R. Scoccia, and M. Aprile. (2023).  
 “Performance comparison of quadratic, nonlinear, and mixed integer nonlinear MPC formulations and solvers on an air source heat pump hydronic floor heating system.” *Journal of Building Performance Simulation*, 16(2), 144-162.  
<https://doi.org/10.1080/19401493.2022.2120631>.