

Control and Computing bridging the gap

Daniel Simon

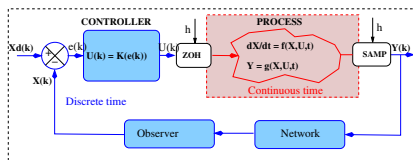
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<http://www.lirmm.fr/camin>



JSInria 2018, June 27–29, Bordeaux

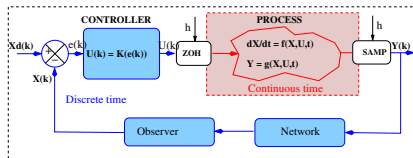


Feedback control



Timing constraints required by the control system's dynamics
 \implies Real-time system

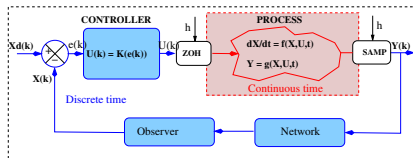
Feedback control



Timing constraints required by the control system's dynamics
 \implies Real-time system

- the plant is uncertain (poorly known parameters, simplified models, ...)
- the implementation is imperfect (varying sampling, data loss over links, ...)

Feedback control



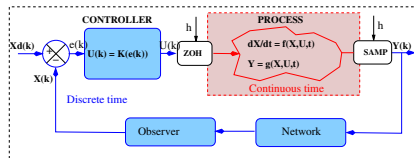
Timing constraints required by the control system's dynamics
⇒ Real-time system

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Feedback control is robust :)



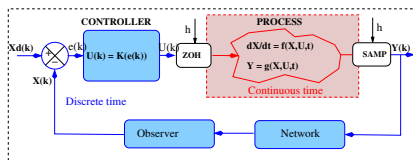
Bridging the gap...



joint design of control & computing

Control design under execution resources constraints

Bridging the gap...



joint design of control & computing

Control design under execution resources constraints

D. Simon, A. Seuret, and O. Sename. *Real-time control systems: feedback, scheduling and robustness IJSS 2017*.

Computing aware control

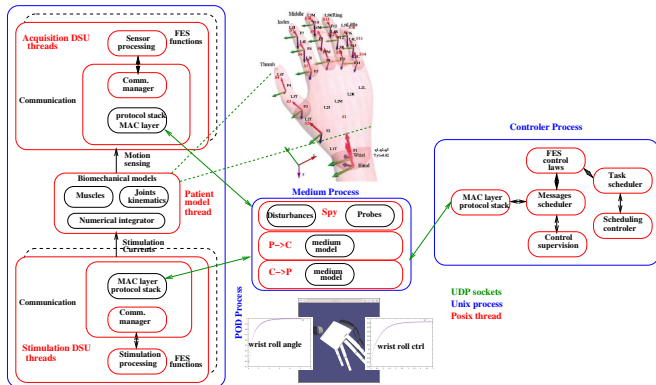
- LPV modeling
- Varying sampling control
- Sample loss robustness
- Event based control

Control aware computing

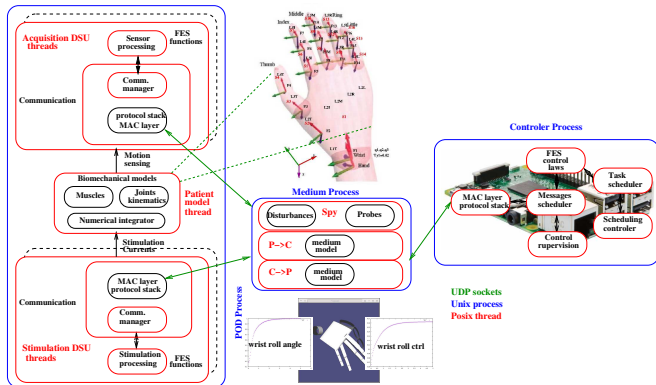
- Relaxed RT assumptions
- Feedback schedulers
- Fluid models
- Server energy control

mixed control/scheduling QoS approaches

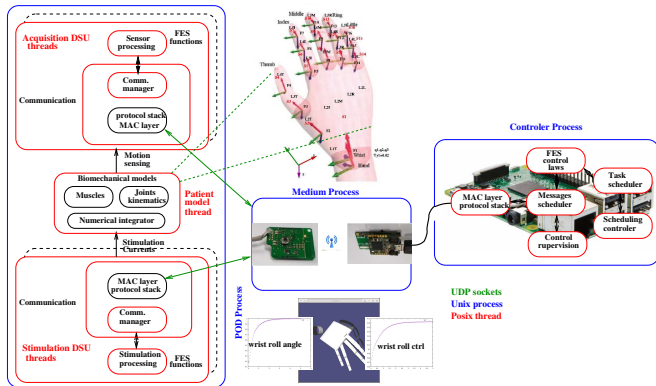
Hybrid simulation : from models to hardware in the loop



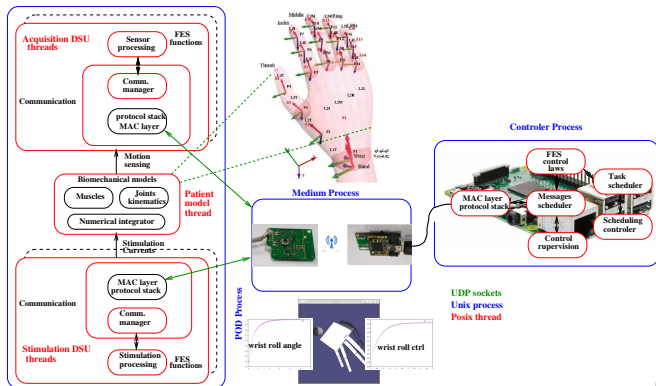
Hybrid simulation : from models to hardware in the loop



Hybrid simulation : from models to hardware in the loop



Hybrid simulation : from models to hardware in the loop



EIT Health
AGILIS ?

