Active structures integrated with wireless sensor and actuator networks: a bio-inspired control framework

Key words:
active structures; wireless sensor and actuator networks; shape control; bio-inspired control

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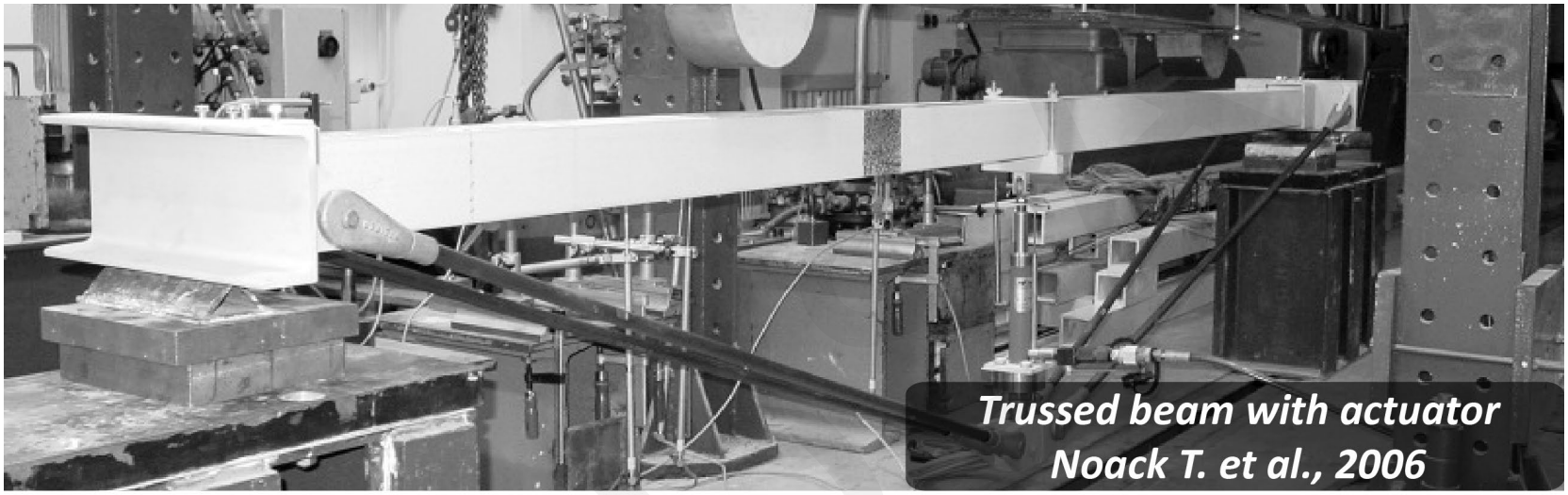
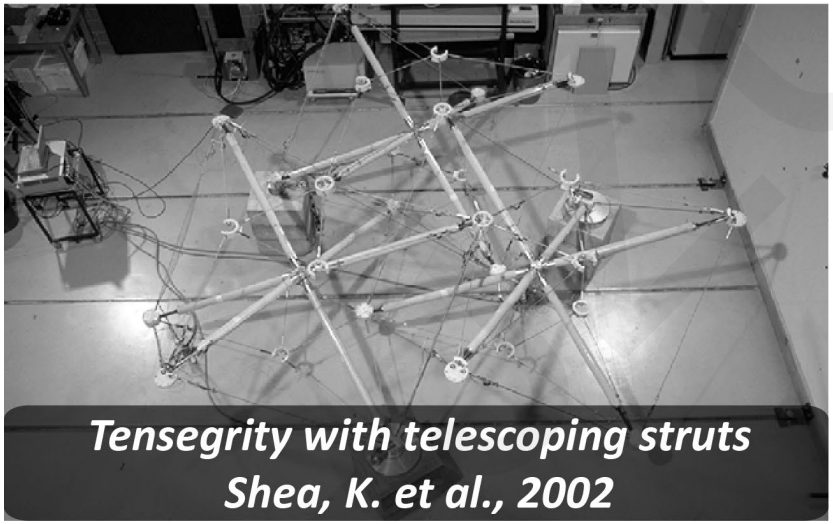
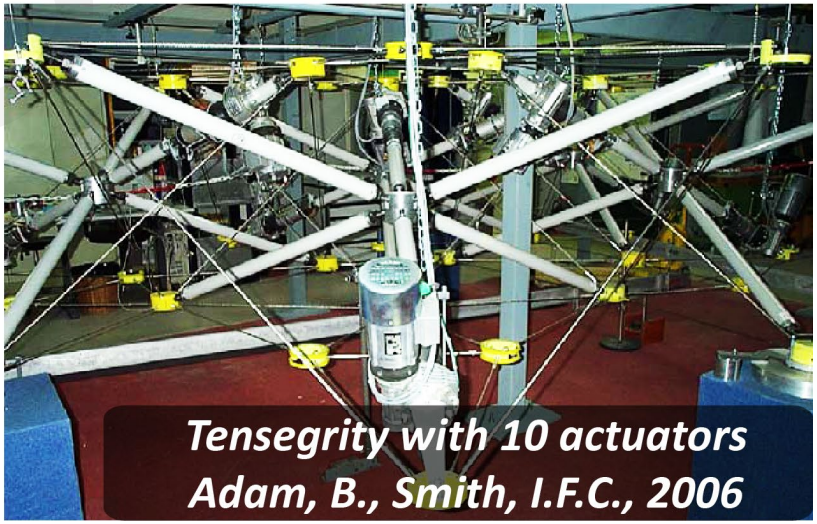
Introduction



Trussed beam with actuator
Noack T. et al., 2006

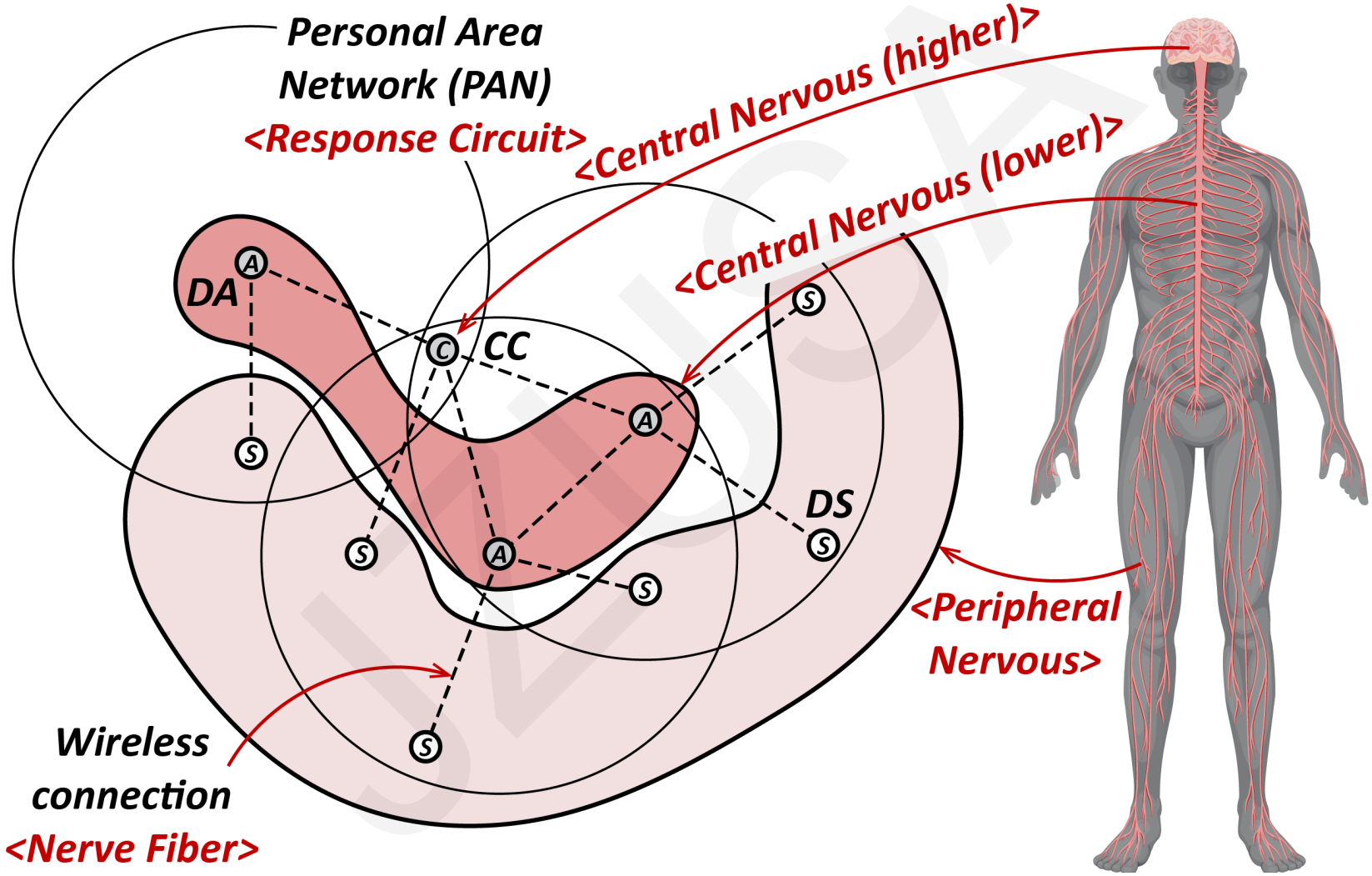


Tensegrity with telescoping struts
Shea, K. et al., 2002

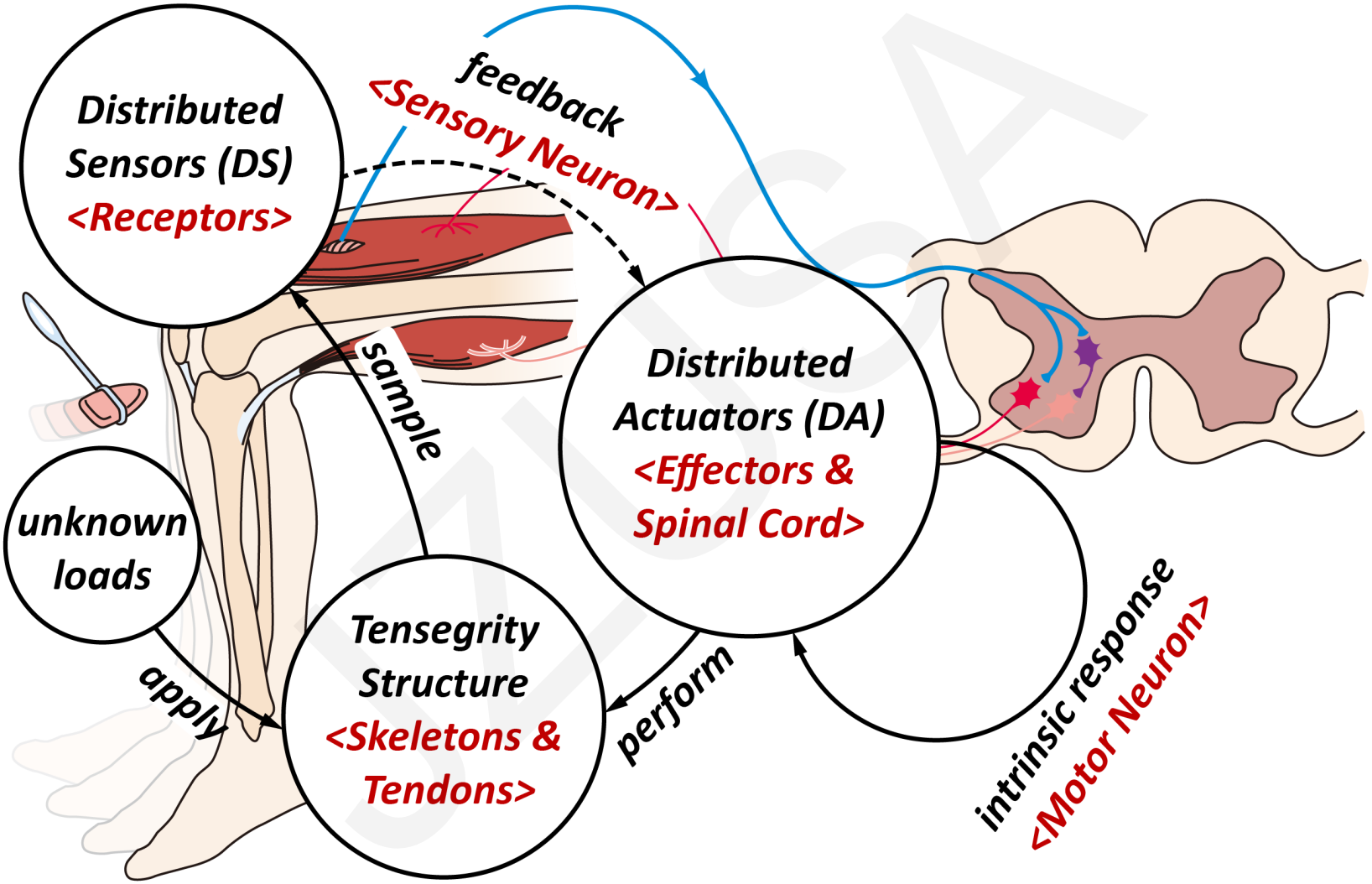


Tensegrity with 10 actuators
Adam, B., Smith, I.F.C., 2006

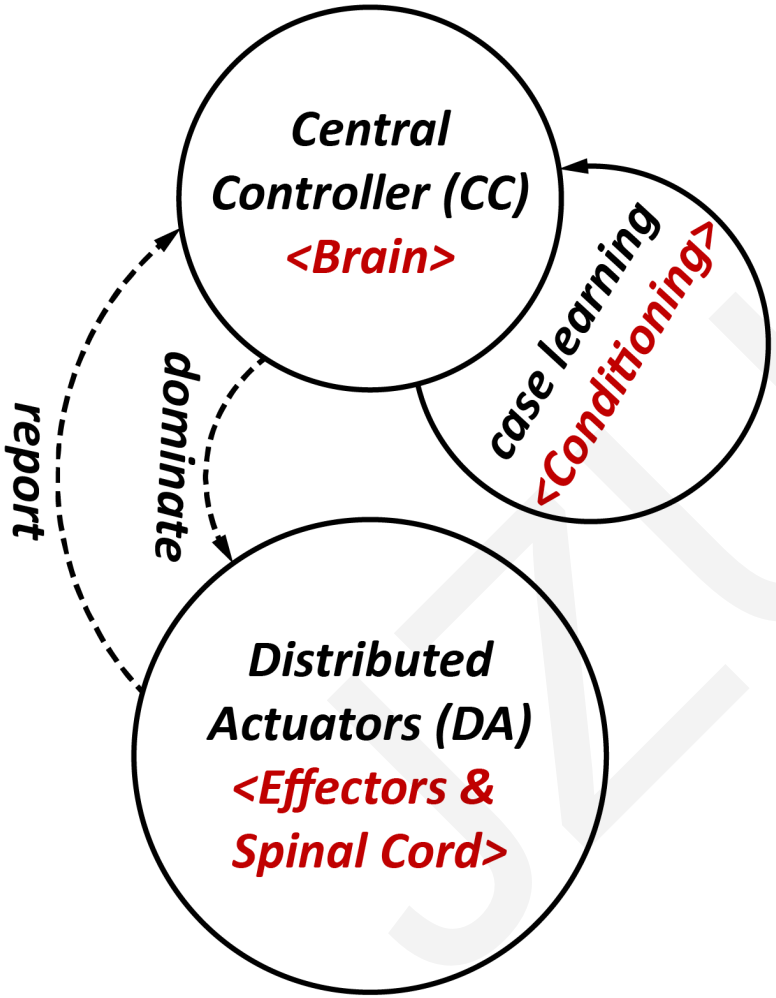
Bio-inspired architecture of WSAN

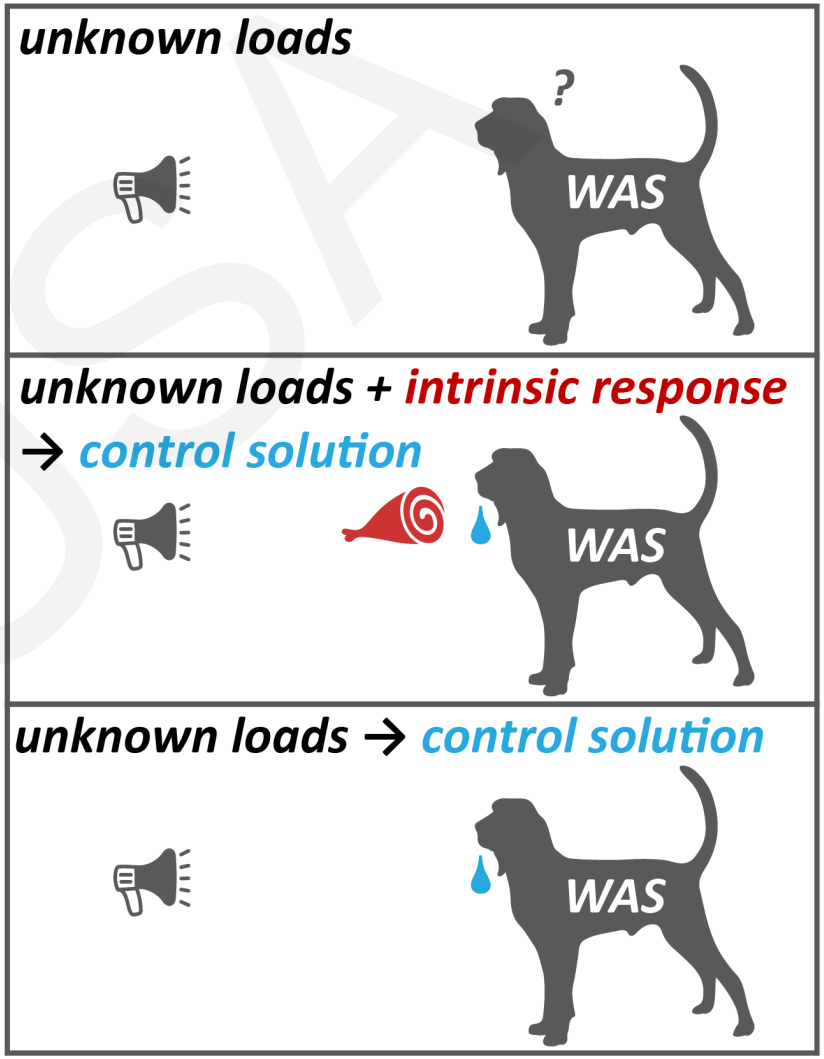


Unconditioned Reflex (UR)

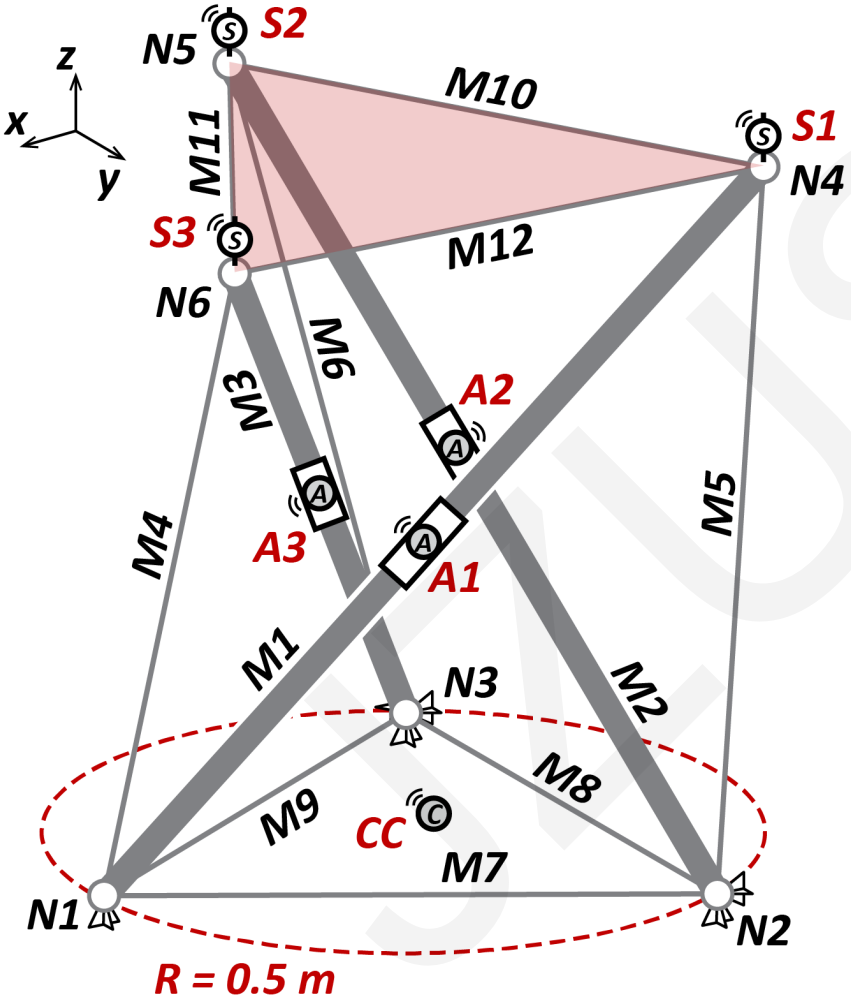


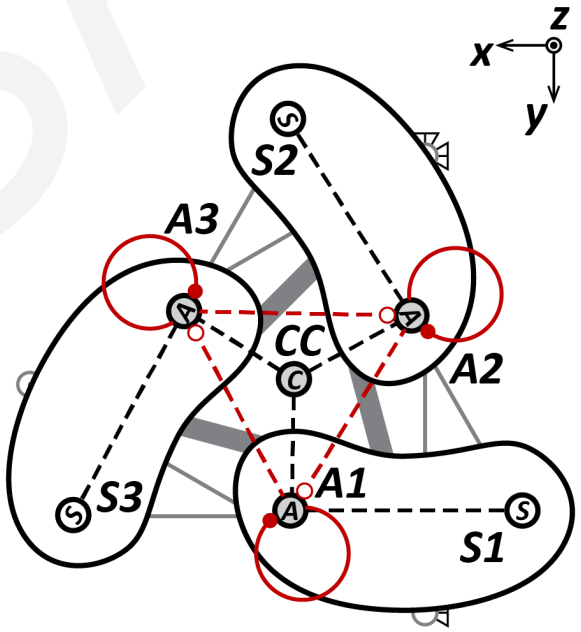
Conditioned Reflex (CR)



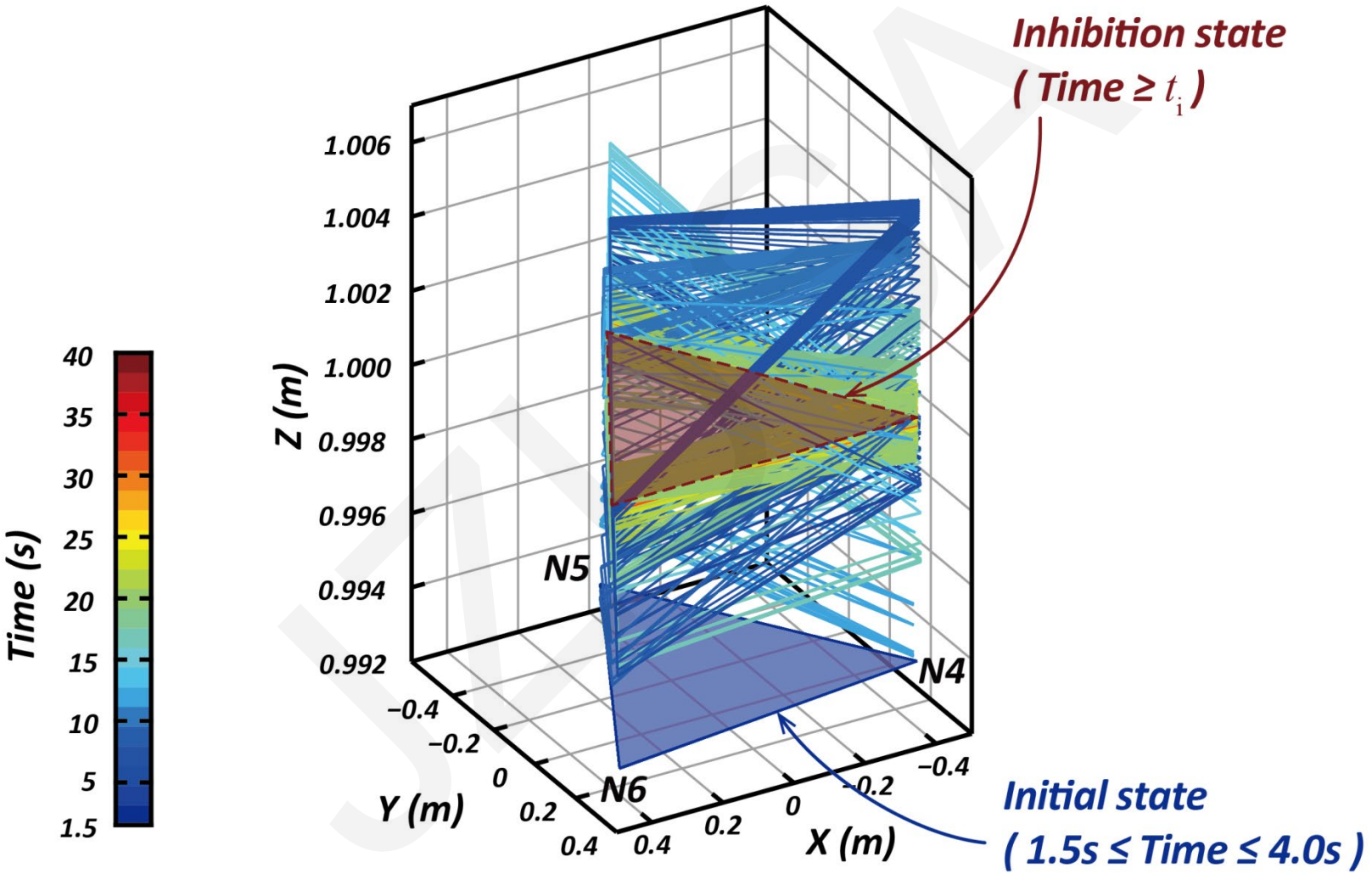


A tensegrity prism with embedded WSAN

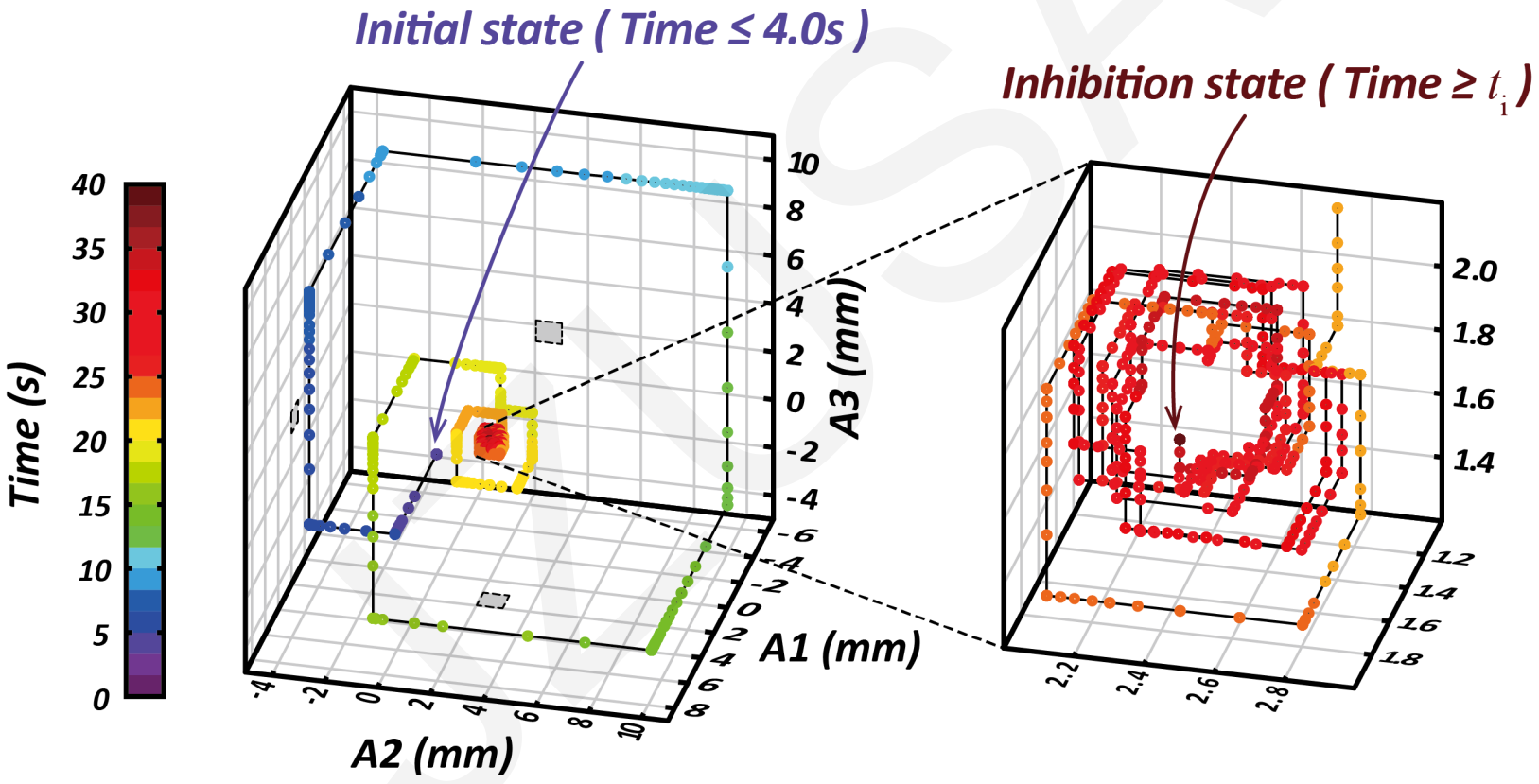




Reversion of the top surface



Convergence of the actuations



Conclusions

- *Instant response and little computational burden.*
- *Less dependence on hardware performance and a more robust system.*
- *Greater adaptability to different types of loads.*
- *Greater flexibility for design of control strategy.*
- *Fewer sources of error (model-free and closed-loop control).*
- *Easier installation or deployment, easier maintenance, lower cost, etc.*