

"Synchronous Transmissions" refers to a wireless communication technique that consists in letting multiple devices transmit during the same time interval; communication is likely to be successful if the transmissions are sufficiently well synchronized, hence the name of *synchronous* transmissions. In the past decade, synchronous transmissions have been shown to enable reliable and energy efficient communication in low-power multi-hop networks. In particular, this technique can be leveraged to realize any multi-hop broadcast (a one-to-all communication) in a given time; a very interesting property for designing real-time systems.

In this dissertation, we showcase that synchronous transmissions are indeed suitable for the design of a large class of cyber-physical systems built atop wireless multi-hop networks and we demonstrate that real-time guarantees can be provided in a reliable and energy efficient manner. Furthermore, we design a specialized software framework to facilitate the implementation of communication protocols based on synchronous transmissions. Finally, we propose a methodology addressing the reproducibility challenge of performance evaluation in networking.



Dissertation

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Sources

github.com/romain-jacob/doctoral-thesis



Defense talk

youtu.be/m_jfX4SiHlw



Presentation

osf.io/rgkdx

Leveraging Synchronous Transmissions for the Design of Real-time Wireless Cyber-Physical Systems

