Enabling Dependable Communication in Cyber-Physical Systems with a Wireless Bus (Paperback)

By Federico Ferrari

Createspace, United States, 2015. Paperback. Book Condition: New. 229 x 152 mm. Language: English . Brand New Book ***** Print on Demand *****.Cyber-physical systems (CPSs) are physical and engineered systems believed to radically transform how we interact with the physical world. By tightly integrating computation, low-power wireless communication, and physical processes, these systems realize safety-critical control loops-with physical processes affecting computation and vice versa-in scenarios where traditional systems are hardly applicable. Potential CPS applications include healthcare, factory automation, and smart structures. The safety-critical nature of most CPS applications demands highly dependable system operation. However, it is currently not possible to apply to cyber-physical systems established concepts for the design and validation of dependable distributed systems. These concepts require guarantees (e.g., on message delivery orderings) that existing CPS communication protocols do not provide. It is indeed extremely challenging to guarantee message delivery in low-power wireless networks, due to, for example, severe computation and memory constraints of typical CPS embedded devices, multi-hop wireless communication, and the need of satisfying also requirements on energy efficiency. State-of-the-art solutions try to overcome these challenges by involving in the exchange of messages as few nodes as possible, but they typically operate only in a best-effort manner....

Reviews

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