**Aalto University
School of Engineering**

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Initiative suggests building a global network of digital twins

Title of the dissertation	Discovering the Digital Twin Web – From singular applications to a scalable network
Contents of the dissertation	Digital twins are virtual counterparts for real-world entities. They contain one or more features, such as simulation models, data storage, and artificial intelligence, that enhance the life of the real entity. Until recently, digital twins have been developed as one-off applications that serve only their specific use case.
	This dissertation introduces the Digital Twin Web initiative for creating a global network of digital twins. The Digital Twin Web, a.k.a. Twinweb, aims to become as prevalent as the World Wide Web (WWW), unlocking the network benefits of user-friendly and globally standardized twins. The basic principles and structure of Twinweb are described in the dissertation, mimicking many of the conventions of WWW, such as open standards, developer-friendliness, and client-server architecture. The Twinweb initiative aims to find the HTML equivalent for digital twins. If successful, Twinweb can help fulfill the promises of Industry 4.0, the Internet of Things, and artificial intelligence.
	The Twinweb approach is based on the results of four journal articles that present a feature-based digital twin framework, a case study on industrial digital twin development, experimentation on a digital twin document, and server software for distributing digital twin documents. First, the framework presents a general, scalable approach for creating digital twins, suggesting a "data link" feature to combine building blocks into one twin. Second, the case study reports lessons learned from building a data-focused, multi-component digital twin for an overhead crane in collaboration with industry partners. The third article built a proof-of-concept for the data link feature, introducing a digital twin document as part of the solution. Fourth, the open-source server software "Twinbase" distributes digital twin documents from owners to users.
	Digital twin documents must be standardized before the global network of digital twins can be built. There are already a couple of competing specifications, and combining them into one approach seems possible and fruitful. The future of networked digital twins seems bright.
Field of the dissertation	Mechanical engineering, Mechatronics
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