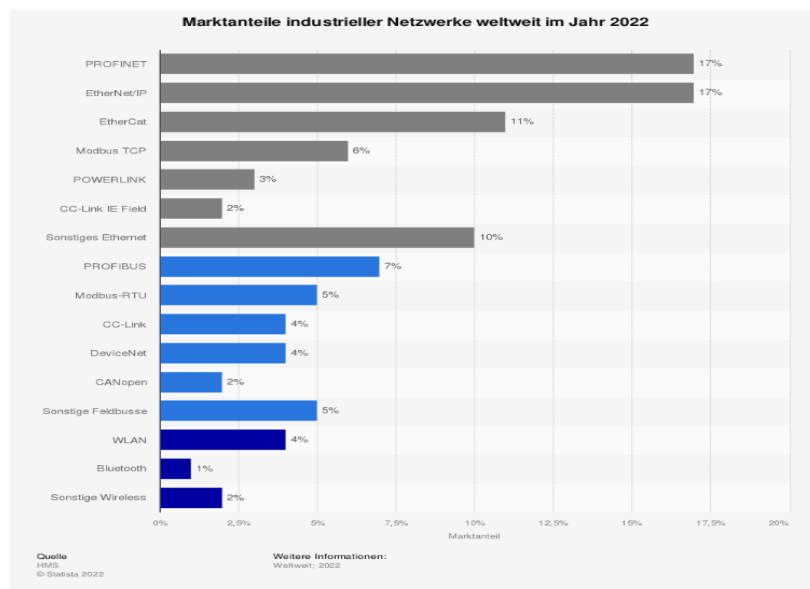


## Research Project

# A Survey on the Industrial Networks and their Applications

## Description

As relates to the Industry 4.0 paradigm, the concept of using intelligent networks to support future smart factories, including integrating human workers and machines, is a main area of focus today. To that end, industrial networks aim to integrate computing, communication and control. In this context, three primary types of communication systems are deployed for industrial applications: Fieldbuses, industrial Ethernet, and industrial wireless networks.



*Figure 1: Industrial networks global market share*

The student's work isn't limited to this work but should at least do the following steps:

- Review of the different industrial networks (fieldbus, Ethernet, wireless), and compare them systematically in terms of their capabilities (data rate, latency, architecture, range, cost, etc.); and link the findings with their applications in the different industrial sectors.
- In-depth analysis of the PHY aspects of the most dominant industrial network systems.
- Finding the gaps in the industrial networks and list the literature related to the recent efforts bridging those gaps.
- Make conclusions about the major challenges for fieldbus technology in the context of Industry 4.0, and summarize the latest research activities to address those challenges.

## Recommended experience

- Excellent knowledge in the principles of wireless and wireline communications
- Good knowledge in computer and industrial networks

## Literature

1. T. Sauter, "The Three Generations of Field-Level Networks—Evolution and Compatibility Issues," in *IEEE Transactions on Industrial Electronics*, vol. 57, no. 11, pp. 3585-3595, Nov. 2010, doi: 10.1109/TIE.2010.2062473.
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3. B. Chen, J. Wan, L. Shu, P. Li, M. Mukherjee, and B. Yin. "Smart Factory of Industry 4.0: Key Technologies, Application Case, and Challenges." In: *IEEE Access* 6 (2018), pp. 6505–6519. ISSN: 2169-3536. DOI: 10.1109/ACCESS.2017.2783682 (cit. on p. 1).
4. J. L. G. Rios, J. T. Gómez, R. K. Sharma, F. Dressler and M. J. F. -G. García, "Wideband OFDM-Based Communications in Bus Topology as a Key Enabler for Industry 4.0 Networks," in *IEEE Access*, vol. 9, pp. 114167-114178, 2021, doi: 10.1109/ACCESS.2021.3104741.