

## Documents

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### Applications of Ontology in the Internet of Things: A Systematic Analysis

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### Abstract

Ontology has been increasingly implemented to facilitate the Internet of Things (IoT) activities, such as tracking and information discovery, storage, information exchange, and object addressing. However, a complete understanding of using ontology in the IoT mechanism remains lacking. The main goal of this research is to recognize the use of ontology in the IoT process and investigate the services of ontology in IoT activities. A systematic literature review (SLR) is conducted using predefined protocols to analyze the literature about the usage of ontologies in IoT. The following conclusions are obtained from the SLR. (1) Primary studies (i.e., selected 115 articles) have addressed the need to use ontologies in IoT for industries and the academe, especially to minimize interoperability and integration of IoT devices. (2) About 31.30% of extant literature discussed ontology development concerning the IoT interoperability issue, while IoT privacy and integration issues are partially discussed in the literature. (3) IoT styles of modeling ontologies are diverse, whereas 35.65% of total studies adopted the OWL style. (4) The 32 articles (i.e., 27.83% of the total studies) reused IoT ontologies to handle diverse IoT methodologies. (5) A total of 45 IoT ontologies are well acknowledged, but the IoT community has widely utilized none. An in-depth analysis of different IoT ontologies suggests that the existing ontologies are beneficial in designing new IoT ontology or achieving three main requirements of the IoT field: interoperability, integration, and privacy. This SLR is finalized by identifying numerous validity threats and future directions. © 2022 by the authors.

### Author Keywords

internet of things; ontology; semantic; web of things

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