

# RDF-Based Semantic for Condition Monitoring of Autonomous Mobile Robot

Metin Yılmaz  
Information Technologies  
TEI- TUSAS Motor Sanayii A.S.  
Eskisehir, Turkey  
[metin.yilmaz@tei.com.tr](mailto:metin.yilmaz@tei.com.tr)  
ORCID: 0000-0001-9478-4114

Ahmet Yazıcı  
Computer Engineering Osmangazi  
University  
Eskisehir, Turkey  
[ayazici@ogu.edu.tr](mailto:ayazici@ogu.edu.tr)  
ORCID: 0000-0001-5589-2032

Eyup Cinar  
Computer Engineering Osmangazi  
University  
Eskisehir, Turkey  
[eyup.cinar@ogu.edu.tr](mailto:eyup.cinar@ogu.edu.tr)  
ORCID: 0000-0003-3189-7247

**Abstract**—In Industry 4.0 Resource Description Framework (RDF), a semantic data model can be used to solve challenges such as unique identification, data availability, and interoperability. In this study, an integration of environmental, mechanical, and software errors in a common language is proposed for an Autonomous Mobile Robot (AMR) application targeting advancement of autonomy, which is one of the important components in Industry 4.0. For this purpose, a semantic ontology for knowledge-based state monitoring is presented. The proposed approach addresses interoperable communication for condition monitoring using semantic technologies. A common fault tracking system has been developed by creating a dictionary for three different types of faults received using RDF. To the best of our knowledge, this study is the first where an RDF-based representation for a Condition-based monitoring use-case utilizing autonomous robots are proposed and demonstrated.

**Keywords**— *RDF, Condition Monitoring, Semantic, Ontology, AMR*