ISO/IEC 15067-3-51:2024-06 (E)

Information technology - Home Electronic System (HES) application model - Part 3-51: 51: Framework of a narrow AI engine for a premises energy management system using energy management agents

Contents

Page

FOREWORD 4
INTRODUCTION 6
1 Scope 8
2 Normative references 8
3 Terms, definitions, and abbreviated terms 8
3.1 Terms and definitions 8
3.2 Abbreviated terms 11
4 Conformance 11
5 Narrow AI engine for energy management 11
5.1 General 11
5.2 Narrow AI engine for energy management in smart homes 12
6 Framework of narrow AI engine for smart home energy management 13
6.1 General 13
6.2 Entities in narrow AI engine framework 13
6.2.1 Narrow AI engine 13
6.2.2 Electrical energy measuring system 13
6.2.3 Energy management agent 13
6.2.4 Local renewable energy 14
6.2.5 Premises devices 14
6.2.6 User preference 14
6.2.7 Web-based energy related services 14
7 Narrow AI engine with EMA 14
7.1 General 14
7.2 Algorithm derivation 15
7.3 Algorithm and decision management 15
7.4 Data management 15
7.5 Operational modes of narrow AI engine 15
8 HES gateway support 16
8.1 HES gateway related services 16
8.2 Inside HES gateway 17
8.2.1 Framework for HES gateway services 17
8.2.2 EEMS service 17
8.2.3 Web energy service 18
8.2.4 AI services 18
8.2.5 Authorization service 18
8.2.6 PEMA services 18
8.2.7 Web info interface module (WAN) 18
8.2.8 HAN interface module 18
8.2.9 HES-CLME 18
Annex A (informative) Example internal modules of narrow AI engine for building AI algorithm 19

A.1 Overview 19
A.2 Internal modules of narrow AI engine 19
A.2.1 Block diagram of the narrow AI engine 19
A.2.2 Algorithm selector 20
A.2.3 Algorithm training, validating and testing 20
A.2.4 Algorithm optimization 21
A.2.5 Algorithm dictionary 21
A.2.6 Algorithm store 21
A.2.7 Decision handler 21
A.2.8 Data pre-processing 21
A.2.9 Data store 22
A.2.10 Data collecting 22
Annex B (informative) Use cases for an AI energy management engine 23
B.1 Supply planning and DR prediction for efficient home management based on narrow AI engine 23
B.2 Use cases of narrow AI engine 24
Bibliography 25

Figure 1 – Core interoperability and HES gateway 7
Figure 2 – HES AI applications 7
Figure 3 – Logical framework of smart home energy management with support from narrow AI engine in the deployed mode 12
Figure 4 – Operating flow of narrow AI engine in deployed mode 16
Figure 5 – Operating flow of narrow AI engine in learning mode 16
Figure 6 – Narrow AI for PEMA application ISEE group 17
Figure A.1 – Operating modules of the narrow AI engine in deployed mode 19
Figure A.2 – Operating modules of the narrow AI engine in learning mode 20
Figure B.1 – Scenario of an EMA with narrow AI engine for efficient smart houses 23
Figure B.2 – Use case of DR management with and without narrow AI engine 24