

Index

Table of Contents

Table of Contents i

List of Figures v

Executive summary 1

1 The industrial automation industry 3

 1.1 Introduction to industrial automation 3

 1.2 Factory and process automation 4

 1.3 Factory and process operations 5

 1.4 Industrial automation system overview 6

 1.5 Industrial automation evolution 8

 1.6 The industrial automation market 9

 1.7 Industrial automation market segments 11

 1.7.1 Industrial software 12

 1.7.2 Industrial control systems 13

 1.7.3 Automation equipment and instrumentation 14

 1.7.4 Industrial robots 14

2 Wireless IoT solutions in industrial automation 17

 2.1 Wireless automation infrastructure 17

 2.1.1 Facilities segment 19

 2.1.2 Service segment 21

 2.1.3 Network segment 22

 2.2 Operations management 29

 2.2.1 Production and process management 29

 2.2.2 Business management 30

 2.3 Equipment management and regulatory compliance 30

 2.3.1 Equipment diagnostics and maintenance planning 31

 2.3.2 Security and Safety 31

 2.3.3 Regulatory compliance 32

 2.4 Business models and project strategies 32

3	Market forecasts and trends	35
3.1	Market analysis	35
3.1.1	Installed base and unit shipments	36
3.1.2	Wireless technologies	37
3.1.3	Regional markets	39
3.1.4	Major vendors.....	41
3.2	Market drivers and barriers.....	44
3.2.1	Macroeconomic environment	44
3.2.2	Regulatory environment	45
3.2.3	Competitive environment	46
3.2.4	Technology environment	47
3.3	Value chain analysis	48
3.3.1	Industrial communications and control industry players	48
3.3.2	Industrial automation industry players	53
3.3.3	Telecom industry players	57
3.3.4	IoT platform and IT industry players	58
3.4	Future industry trends	61
4	Global automation vendors	65
4.1	ABB.....	65
4.2	Bosch.....	68
4.3	Emerson	70
4.4	Endress+Hauser	72
4.5	Fanuc.....	74
4.6	General Electric	75
4.7	Hitachi.....	78
4.8	Honeywell	80
4.9	Keyence.....	82
4.10	Kuka.....	83
4.11	Mitsubishi Electric.....	85
4.12	Omron.....	86
4.13	Pepperl+Fuchs	87
4.14	Rockwell Automation.....	89

4.15 Schneider Electric..... 91

4.16 Siemens..... 93

4.17 Yaskawa Electric..... 95

4.18 Yokogawa..... 96

5 Device and software vendors 99

5.1 Industrial communications and control solution providers 99

5.1.1 Acksys 99

5.1.2 ADLINK Technology..... 100

5.1.3 Advantech 102

5.1.4 Antaira Technologies..... 104

5.1.5 Beckhoff Automation 105

5.1.6 Beijer Electronics Group 105

5.1.7 Belden 106

5.1.8 Cisco 108

5.1.9 Contec 110

5.1.10 Data-Linc 112

5.1.11 Digi International 112

5.1.12 Eurotech 114

5.1.13 FreeWave Technologies..... 117

5.1.14 HMS Networks 118

5.1.15 InHand Networks..... 120

5.1.16 INSYS Microelectronics..... 121

5.1.17 Kontron S&T 122

5.1.18 Lantronix..... 124

5.1.19 Maestro Wireless Solutions 125

5.1.20 MB Connect Line 126

5.1.21 MC Technologies 127

5.1.22 Moxa..... 127

5.1.23 MultiTech Systems 129

5.1.24 National Instruments 130

5.1.25 NetModule..... 132

5.1.26 Newtrax Technologies..... 133

5.1.27	OleumTech.....	134
5.1.28	Opto 22.....	135
5.1.29	Phoenix Contact.....	137
5.1.30	Red Lion Controls (Spectris).....	138
5.1.31	Robustel Technologies.....	140
5.1.32	Secomea.....	141
5.1.33	Sierra Wireless.....	142
5.1.34	Steute.....	145
5.1.35	Wago.....	145
5.1.36	Weidmüller.....	146
5.2	IIoT platform and software vendors.....	147
5.2.1	Altair Engineering.....	148
5.2.2	C3 IoT.....	150
5.2.3	Device Insight.....	152
5.2.4	Exosite.....	154
5.2.5	FogHorn Systems.....	156
5.2.6	IBM.....	157
5.2.7	Litmus Automation.....	160
5.2.8	Oracle.....	161
5.2.9	PTC.....	162
5.2.10	Relayr.....	166
5.2.11	SAP.....	167
5.2.12	Software AG.....	170
5.2.13	Telit.....	172
5.2.14	Uptake.....	176
5.2.15	Wind River.....	176
	Glossary.....	179

Index

List of Figures

Figure 1.1: Examples of industrial automation market verticals.....	5
Figure 1.2: Examples of factory and process operations.....	6
Figure 1.3: Industrial automation system overview	7
Figure 1.4: Industrial automation market value (World 2008–2017).....	9
Figure 1.5: Industrial automation market value by region (World 2017)	10
Figure 1.6: Business activities of key global automation vendors.....	12
Figure 1.7: Annual shipments of industrial robots (World 2008–2017)	15
Figure 1.8: Operational stock and density of industrial robots by region (World 2017)	16
Figure 2.1: Overview of wireless IoT infrastructure in industrial automation	18
Figure 2.2: Examples of field, control and network devices.....	20
Figure 2.3: Example of service segment in a connected automation system.....	22
Figure 3.1: New connected nodes in industrial automation by technology (World 2018).....	36
Figure 3.2: Unit shipments and installed base by equipment category (World 2017–2023) ...	37
Figure 3.3: Unit shipments and installed base by technology (World 2017–2023).....	38
Figure 3.4: Unit shipments and installed base by region (World 2017–2021)	40
Figure 3.5: Major vendors in the industrial communications market	42
Figure 3.6: Key data for industrial communications and control solution providers.....	49
Figure 3.7: M&As in the industrial communications sector (2011–2018)	51
Figure 3.8: Major industrial automation vendors	52
Figure 3.9: Key data for companies active in industrial automation.....	54
Figure 3.10: M&As in the industrial automation sector (2015–2018).....	55
Figure 3.11: Mobile operators by IoT subscriber base (World Q2-2017).....	58
Figure 4.1: Endress+Hauser’s WirelessHART gateway and adapters	73
Figure 4.2: Example of a data acquisition solution using GE MDS devices	77
Figure 4.3: Simplified overview of the Kuka Connect platform.....	84
Figure 4.4: Mitsubishi’s iQ Platform	85
Figure 4.5: Pepperl+Fuchs’ WirelessHART products	88
Figure 4.6: Yokogawa’s gateways and wireless access point based on ISA100.11a.....	96

Figure 5.1: Acksys' AirLink industrial Wi-Fi access point	100
Figure 5.2: Advantech's WISE-3620 wireless IoT Wi-Fi network gateway.....	103
Figure 5.3: Example of an operation monitoring solution based on Contec's devices	111
Figure 5.4: Eurotech's IoT architecture.....	115
Figure 5.5: National Instruments' WSN gateway and measurement nodes	132
Figure 5.6: Opto 22's Groov EPIC system.....	136
Figure 5.7: Cellular remote connectivity to an RTU via the new TC CLOUD CLIENT	138
Figure 5.8: IoT solutions in Altair's SmartWorks suite	149
Figure 5.9: The FogHorn architecture.....	156
Figure 5.10: The Watson IoT Platform	159
Figure 5.11: PTC's ThingWorx platform.....	165