THE ROBOTICS MARKET: LATEST STATISTICS AND INSIGHTS

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Source: Fraunhofer IPA, Audi
Fraunhofer IPA
as part of the Fraunhofer-Gesellschaft

- Third-largest institute of Fraunhofer-Gesellschaft (€2.1bn revenues 2015)
- 450 scientists/engineers; 65 M€ budget; 21 M€ industrial revenues
- Expertise in manufacturing engineering and automation since 1959, in robotics since 1971
- With ~120 staff one of the largest R&D centers (EU) in robotics/automation
Technical equipment and laboratories
In tune with the times

- Application Center Industrie 4.0
- Motion laboratory
- BioPoLis
- Bio-manufacturing laboratory
- Factory planning cockpit
- Electroplating laboratory
- Intervention room
- Coating technology center
- Production laboratory
- Cleanrooms & cleanliness rooms
- Robotics experimentation area
- Synthesis & reactor park
Industrial Robotics on the rise in a globalized economy; some basic statistics

Industrial robot shipments worldwide in thousands of units (2018+ estimated)

Industrial robotics industry 2016: worldwide market and actors

- US$12bn turnover Industrial Robots
- ~55 robot manufacturers worldwide
- ~1,000 systems integrators (all sizes)
- ~€45bn turnover; ~15% CAGR
- Importance of SW, cost share increasing

www.worldrobotics.org, September 2017
Shipments of industrial robotics
Focus automotive, general industries (non-automotive)

Shipments of IR in Germany, shares in automotive, general industries in units

Stock of industrial robots in 2016, automotive, general industries, in units

www.worldrobotics.org, September 2017, Fraunhofer IPA
Attention: thousands are separated by commas

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Industrial robotics: Are points of sales shifting?
Unit price decrease over the years

Performance increase:
- Accuracy
- Speed (cycle time)
- Load capacity
- Programming comfort
- Diagnosis
- Sensors

Index 1990 = 100%
- Average salary worker GER
- Industrial robot unit price

2016: US$46k/unit
Average sales price (all robot classes)

2016: Factor 1.6
→ 3.755€/month

Industrial robotics: Are points of sales shifting?

System price decrease

\[
\frac{\text{Robot unit price}}{\text{System price}} \approx \frac{1}{4.5} \quad \text{; example spot welding}
\]

Selected Light weight robots <30T€
For industrial use but also…

Average price relates to typical spot welding robot application (large version) in automobile industry. Source: IFR, BCG, ABB

Photos: UR5, ABB, KUKA Agilus, Fanuc LR Mate, Rethink Sawyer, Franka Emika
What is a service robot?

**Industrial Robots**

**Service Robots**

**Professional Use**

**Personal domestic**

**Non-industrial environments**

Picture source: Goldbeck, KUKA AG, Bosch Bonirob, Hetwin, SMP Robotics, Omron, International Submarine Engineering, Robert Bosch Hausgeräte, Wonder Workshop
Service Robot Application Areas

**Professional use**
17-23  Field robotics  
24-28  Professional cleaning  
29-31  Inspection, maintenance systems  
32-35  Construction and demolition  
36-39  Logistic systems  
40-43  Medical robotics  
44-46  Rescue & security applications  
47-51  Defense applications  
52  Underwater systems (civil/general use)  
53  Powered Human Exoskeletons  
54  Unmanned aerial vehicles (general use)  
55  Mobile Platforms in general use  
56-60  Underwater systems (civil/general use)  
61  Other

**Personal/domestic use**
1-6  Robots for domestic tasks  
7-10  Entertainment robots  
11-13  Elderly and handicap assistance  
14  Personal transportation (AGV for persons)  
15  Home security & surveillance  
16  Other Personal/domestic robots
Professional service robots
Significant growth

2016: almost 60,000 units, +24%

Forecast 2017: +17% - almost 79,000 units

Forecast 2018 - 2020: about 400,000 units
20% to 25% on average per year
Main drivers: logistic systems

Service robots for professional use. Main applications
Units sales 2015 and 2016, forecast 2017*, 2018*-2020*

Estimated accumulated sales 2018-2020

Source: World Robotics 2017

*forecast
Public relation robots and exoskeletons on the rise

Service robots for professional use. All other applications
Units sales 2015 and 2016, forecast 2017* and 2018*-2020*

Source: World Robotics 2017

*forecast
Good prospects for cleaning robots

Service robots for professional use. All other applications
Units sales 2015 and 2016, forecast 2017* and 2018*-2020*

*forecast

Source: World Robotics 2017
Professional service robots: Increasing turnover

2016: 4.7 US$bn, +2%

Forecast 2017: +12% - 5.2 US$bn

20% to 25% on average per year
Medical robots: most valuable

Service robots for professional use in main applications. Estimated values 2015 and 2016, forecast 2017*, 2018*-2020*

Source: World Robotics 2017

*forecast
Professional service robots:
More than 50% from the Americas

Service robots for professional use
Unit sales 2015 and 2016 by region of origin

Americas: 32,5 '000 of units in 2016, 25,9 '000 of units in 2015
Europe: 15,9 '000 of units in 2015, 15,6 '000 of units in 2016
Asia/Australia: 11,3 '000 of units in 2016, 6,6 '000 of units in 2015

Source: World Robotics 2017
Personal/domestic robots on the rise

Service robots for personal/domestic use.
Unit sales 2015 and 2016 by region of origin.

Asia/Australia: 2,766 (2016) - 2,213 (2015)

Source: World Robotics 2017
700 service robot companies worldwide: New product opportunities for new markets

Values of service robots (domestic/professional) since 2007 [million US$]

- SR domestic (21% CAGR)
- SR professional (16%)

Number of service robot manufacturers of all types by region of origin (2017)

- EU; 243
- CH, IL, NO; 50
- North America; 242
- Asia; 134
- Others; 30

Source: World Robotics 2017
Europe does well at service robot start-up creation (27%)

Number of service robot manufacturers (professional, personal/domestic use) by country of origin

Criteria for Start-Up:
- Product/prototype on the market
- Business max 5 years of age
29% share of start-ups world-wide

Source: World Robotics 2017
Start-up examples (I):
Service robotics in agriculture

Fresh fruit picker Platform for vineyard maintenance Robotic weeder for vegetable farms

FF Robotics (Israel)  WALL-YE (France)  Naïo Technologies (France)
Start-up examples (II):
Service robots in public-relations

Unity Robotics (D)  Bots and us (UK)  Promobot (RU)
Start-up examples (III): Service robots in logistics

MiR (DK)  
Fetch Robotics (USA)  
Robotnik (ES)
75% of Service Robot Suppliers are SMEs

Business sizes of service robots of all types in numbers of employees (by region of origin)

- Europe
- North America
- Asia

Small and medium sized businesses

Source: World Robotics 2017