Blue ocean in robotics
Blue Ocean Robotics

short introduction

john erland østergaard, Ph.D. in physics & mba
founder, partner & Director @ Blue Ocean robotics
Blue Ocean Robotics

Founding partners, owners and operating directors

Claus Risager
• B.Sc. M.Sc. Comp. Science, Ph.D. Robotics & Artificial Intelligence
• Partner & Director

Rune K. Larsen
• BSc. Data Technology, M.Sc. Robotics, E-MBA Change Management
• Partner & Director

John Erland Østergaard
• BSc. Electrical Eng., MSc. Physics & Comp. Science, Ph.D. Physics, MBA
• Partner & Director

Facts
• Start-up Dec. 2012 / Feb. 2013
• Based in Odense, Denmark
• 40 employees, 20 partnerships
• 30+10+80 active projects
• 130+ initiatives in portfolio
• Scape Technologies a/s, 25 %
• 5 spin-outs
• 5 satellites: US, CH, LT, S, NL, (N), (D), (ES)
Innovation achievements

**Johnerland Østergaard**

**Alight Technologies**

**Founder, IPR**
**CEO 2002-2005**
**FTH - VCSEL transmitter**
**Round A & B (3 M€)**
**First contract**

**Founder, IPR**
**Advisory board 2001-2004**
**Optical chip technology**
**Round A (4 M€)**
**Component sales**

**ALIGHT technologies**

**Founder, IPR**
**Board 2008-2012**
**Greenhouse luminaire**
**Round A (1.5 M€)**
**Industrial contract**

**Founder, IPR**
**Parttime CTO 2012-2015**
**LED Curing technology**
**Round A (0.5 M€)**
**Development**

**Fionia Lighting**

**Founder**
**Boardmember 2008-2011**
**Autonomous hospital bed**
**Round A (0.7 M€)**
**Development**

**NEWCO-LED**

**Founder, IPR, expt’d Fall**
**Associated R&D**
**Air cleaning using UV-LED**
**Round A (0.3 M€)**
**Development**
Industry positions
John erland østergaard

**Internal reliability manager**
1996-1997
New technologies for pumps
Product development

**Project manager**
2000-2002
Optical communication
Business development

**Founder, IPR**
CEO 2002-2005
FTH - VCSEL transmitter
Round A & B (3 M€)
First contract

**Board member**
2008-2010
Sensor technology
Turn-over 12 M€

**Board member**
2007-2010
Regional development

**Board member**
2005 -
Broadcast distribution
Turn-over 120 M€

ODENSE CITY
DEVELOPMENT

Your ultimate connection
University positions

John erland Østergaard

Engineer (B.Sc), electronics and computer science, 1989
Physicist (M.Sc), physics and computer science, 1993
Researcher (Ph.D.), semiconductor optics, 1995
Ph.D. Student, 1994
Post-doc, 1997-1998

Post-doc 1995-1996
Professor, Physics and Technology, 2005-2013
Institute Director, SENSE, Faculty of Engineering, 2007-2010, 50 employees, turnover 4.5 M€
Head of Department, TEK-Momentum, Innovation and business development, 2010-2012, 7 employees

Assistant Professor 1998-2000
Associate Professor 2000-2001
MBA Innovation and Technology Management 2001-2003
Ph.D. John Erland Østergaard receives the DOPS annual award 2002 for his groundbreaking research and long publication list within semiconductor optics and nanophotonics as well as for his ability to explore the research results commercially.
More than 50 peer-reviewed publication including Physical Review Letters and Science (H-index 12).
Our Mission and Strategy
Business units, products & services, logical flow, interconnections, Projects & added-value

End-user
Entrepreneur
Technology

Demo
Team

Robotics Business

www.blue-ocean-robotics.com
Blue ocean Robotics
Bridging the Chasm – from academic R&D world to the business and market world

Hype Cycle and Technology Adoption Lifecycle Plotted together

Expectation

Technology Trigger

Peak of Inflated Expectation

Trough of Disillusionment

Slope of Enlightenment

Plateau of Productivity

Innovators
Early Adopters
Early Majority
Late Majority
Laggards

“The Chasm”

Adoption Rate

Time
Our **Mission and Strategy**

Business units, products & services, logical flow, interconnections, Projects & added-value

- **End-Users**
- **Robot Manufacturers**
- **Researchers**
- **Technical Partners**
- **Investors**
- **Funds**

**research & development projects**
- **Robot-Business-Design**
- **Business-driven**
- **Market-driven**
- **Hypothesis-driven**
- **People-driven**
- **Technology-driven**

- **1-5 Robots**
- **Business-Case**
- **Validate**
- **User Experience**
- **Work Organization**
- **Skills Development**
- **Infrastructure**
- **Support and Service**
- **Hardware/Software ad.**

**full-scale implementation projects**
- **5-100 Robots**
- **Installation**
- **Training**
- **24/7 Service**
- **Surveillance, Support**
- **Maintainance**
- **In-Operation**
- **Validate Business-Case**
- **Cont. Development**

- **International Sales Partner Network (ISPN)**
- **Blue Ocean Robotics Group (Joint-Ventures):**
  - Lithuania, China/Hong Kong, USA ...

**• Production**
**• Healthcare**
**• Education**
**• Other**
Where robotics means business!

RoboBusiness Europe is a first-of-its-kind robotics event for the Continent. The purpose of RoboBusiness Europe is to provide robotics developers and end-users with a place to gather together and work on the essential connection between the development of the industry and the end-users’ needs. It is the must-attend industry event for bringing robotics to market: how to tactics, financing, building partnerships, marketplace strategies and commercialization. It’s all about how to create successful competitive advantages.
RoboBusiness silicon Valley & Boston

September 23-24, 2015
San Jose McEnery Convention Center
San Jose, CA

2015 Call For Speakers
The RoboBusiness 2015 San Jose Call for Speakers is now open. If you are interested in presenting, please submit your application today. Deadline: March 20
Submit Presentation

Don’t Miss What’s NEW at RoboBusiness 2015!

ROBOTICS UNDER THE CORPORATE SPOTLIGHT:

- Robotics has made its way into the corporate strategies of more Fortune 1000 companies than ever before.
- Myria Research posts that over 60% of Global 1000 companies will include a Chief Robotics Officer.
- VC investments in robotics reached over $1B in the first two months of 2015.

Our 2015 conference theme frames the conversation around robotics as a major technology player in global markets and
Blue Ocean Robotics
International businesses
Genefke scale

a way to innovate and do strategic automation
Need for new development
(Gap in knowledge, competences)

The genefke Scale
Five categories … 1/15
Some characteristics

- Off-the-shelf solutions
- No process
- Singular robots
- No external axes
- Many references

The genefke Scale
Category 1; simple standard solutions ... 2/15
Some characteristics

- Off-the-shelf with adaptation to the specific task
- Process robots
- When multiple robots then no overlapping work zones
- No or few external axes
- Some references

The genefke Scale
Category 2; adapted standard solutions ... 3/15
The genefke Scale
Category 3; specialized solutions … 4/15

Some characteristics

- Solutions that first require new knowledge through practical pre-projects that aims at creating “break through demonstration” of critical elements
- Process is part of the solution
- Simple sensor input
- Multiple robots with overlapping work zone
- Cooperating robots, “standard controller”
- External axes
- No identical references but partial ones might exist in other solutions
The genefke Scale
Category 4; innovation … 5/15

Some characteristics
- Solutions being so complex that integrators need to team up with specialise centres to be able to run pre-project development
- Typically funded by EC or other agency
- Complicated process is integrated
- Simultaneous inputs from several sensors in semi-structured environments
- Cooperating robots, off-line programmed
- External axes
- No identical references but partial ones might exist in other solutions

The genefke Scale
Category 4; innovation … 5/15
The genefke Scale
Category 5; research … 6/15

Some characteristics
- Basic knowledge acquisition / technology development with long term industry interest
- Solutions are unlike ones seen before
- Cooperating robots, real-time programmed
- Mobile robots in open environments
- New types of sensors / sensor fusion
- No references
The *genefke* Scale

Robot integrators – DTI robot technology – researchers … 10/15

Need for new development (Gap in knowledge, competences)
Strategic automation

impact on productivity, jobs & skills
Denmark gets 15.2% productivity increase total

14,000 extra manufacturing jobs + derived jobs

On top of “do as the best do”
  - Strategic automation with 2½-3½ on Genefke Scale
  - New generation of “Robot Co-Workers”
Moderate growth in Europe and N-America
Substantial growth in Asia
Will the prediction last?
Unexplored potential for automation
No thanks!

We are too busy
The idea
- To have automation take its starting point in the strategy, customer- and market-needs of the company
- That suppliers and expert network contributes with process and risk-minimized solutions
- To have access to expert know-how in an easy way
- To visualize the decisions and argumentations (business case) for the company
Global Supplier & Expert Network
Project for strategic solution
VISION GUIDED ROBOTS

Adapting to position & orientations of parts/Objects
TrueView Vision-Guided Robotics

ABB and Braintree markets TrueView, Vision-Guided Robotics System
TECHNOLOGY DESIGNED BY HUMANS AND IMPLEMENTED TO HUMAN BENEFIT
Scape Technologies – bin-picking

World’s most advanced industrial bin-picker solutions
Scape Technologies – bin-picking

World’s most advanced industrial bin-picker solutions; rotocan at Grundfos

Scape Bin-Picker controls a KUKA KR 16 robot
TECHNOLOGY DESIGNED BY HUMANS AND IMPLEMENTED TO HUMAN BENEFIT
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CREATE

INCUBATE

INNOVATE
Scape Technologies – bin-picking

World’s most advanced industrial bin-picker solutions
TECHNOLOGY DESIGNED BY HUMANS AND IMPLEMENTED TO HUMAN BENEFIT
Robot Co-workers

Personal assistive robots - Cobots
TECHNOLOGY DESIGNED BY HUMANS AND IMPLEMENTED TO HUMAN BENEFIT
TECHNOLOGY DESIGNED BY HUMANS AND IMPLEMENTED TO HUMAN BENEFIT

CREATE

INCUBATE

INNOVATE
Robot co-worker for assembly

Cat. 4 modular-assembly-robot in collaboration with safe, lightweight robot arms
Technology designed by humans and implemented to human benefit
Baxter – at Rethink Robotics

Cat. 1. low cost, versatile, easy to install and use – new pioneering co-worker robot

About Baxter for the US

- 22,000 USD
- Simple Handling tasks
- Easy to program/instruct
- 300,000 US manufacturing companies with <500 employees and no robots
Technology designed by humans and implemented to human benefit

CREATE

INCUBATE

INNOVATE
Task-based robot controller

Direct physical human-robot interaction
TECHNOLOGY DESIGNED BY HUMANS AND IMPLEMENTED TO HUMAN BENEFIT
AsCoBot

Assembly Co-worker in progress (EU proposal)
AsCoBot

world's first off-the-shelf industrial Assembly Co-worker robot
AsCoBot

world’s first off-the-shelf industrial Assembly Co-worker robot
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world's first off-the-shelf industrial Assembly Co-worker robot
Technology designed by humans and implemented to human benefit.
Robot Business Design
What is Robot Business Design?

With Robot Business Design we create specialized robot solutions in niche areas.

DEKO – robot for installation of glass walls

AXA Power – robot for power cable insertion on planes

LM Wind Power – robot for blade inspection
TECHNOLOGY DESIGNED BY HUMANS AND IMPLEMENTED TO HUMAN BENEFIT
1. Konceptevaluering
Gennemgang af monteringsprocedure del. 1

**Operational functions and movements**

- Robot tilts forward
- Robot assists backwards tilting
- Telescopic column lowers and raises
- Telescopic column raises
TECHNOLOGY DESIGNED BY HUMANS AND IMPLEMENTED TO HUMAN BENEFIT
2. Currently a prototype is made
Wing inspection robot

- LE: 23.500
- Between webs: 28.000
- TE: 32.500

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<th>LE</th>
<th>Between webs</th>
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Wing inspection robot

- Bevæg retning
- Trykslange
- Sugekop
- Pneumatisk stempel
- Roterende Scanner & kamera

- Limfuge
- Hjul
- Sugekop

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The Big Picture

- Robot Business Design
- Robot Business Prototype
- Robot Business Production
Development process

Stage 1: Project Start
Stage 2: Product Definition
Stage 3: Existing Solution Assessment
Stage 4: Business Development
Stage 5: Prototype Project Development Plan
Stage 6: Product Concept
Business Plan
DEKO Example
Robot Business Design

**Pipeline**

- AXA Power
- LM Wind Power
- Welfare Tech
- Odense Maritime Technology

![Diagram showing the pipeline and various company logos]
Implications of RBD

- Closer and more concrete cooperation with companies
- Structured and value-add projects for students and companies
- Business-related follow-ups
- More relevant educations for students
- Focus on creating value for companies
- More and better research proposals

Thomas Solupajev-Ronlev, Sales Director
Mobile: +370 685 35 145
E-mail: tsr@blue-ocean-robotics.com
Skype: tsr.blue-ocean-robotics.com
Web: www.blue-ocean-robotics.com
Thank you for your attention

John erland østergaard

Founder, Partner & Director
Mobile: +45 2510 5432
E-mail: jeo@blue-ocean-robotics.com
Skype: jeo.blue-ocean-robotics.com
Web: www.blue-ocean-robotics.com

Remember RoboBusiness in Milan, Italy in April 2015