ROBERT BOSCH VENTURE CAPITAL GMBH (RBVC) STRATEGY AND SUCCESS STORIES

Dr. Ingo Ramesohl Managing Director RBVC

Laszlo Kishonti CEO AlMotive
RBVC Strategy and Success Stories

Agenda

1. RBVC Strategy and Overview

2. Portfolio Company introduction: AI Motive
Bosch – a global network

Four business sectors

- Mobility Solutions
- Industrial Technology
- Energy and Building Technology
- Consumer Goods
# Bosch – Four business sectors

## Key Figures 2015*

<table>
<thead>
<tr>
<th>Bosch Group</th>
<th>70.6 billion euros in sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility Solutions</td>
<td>374,778 associates</td>
</tr>
<tr>
<td>One of the world’s largest suppliers of automotive technology</td>
<td>59% share of sales</td>
</tr>
<tr>
<td>Industrial Technology</td>
<td>Leading in drive and control technology, packaging, and process technology</td>
</tr>
<tr>
<td>Energy and Building Technology</td>
<td>Leading manufacturer of security technology</td>
</tr>
<tr>
<td></td>
<td>Global market leader of energy-efficient heating products and hot-water solutions</td>
</tr>
<tr>
<td>Consumer Goods</td>
<td>Leading supplier of power tools and accessories</td>
</tr>
<tr>
<td></td>
<td>Leading supplier of household appliances</td>
</tr>
<tr>
<td></td>
<td>41% share of sales</td>
</tr>
</tbody>
</table>
## Bosch – Four business sectors
### Markets and figures for 2015*

<table>
<thead>
<tr>
<th>Region</th>
<th>2015 Sales (mrd. billion euros)</th>
<th>Associates</th>
<th>Manufacturing Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bosch Group</strong></td>
<td>▶️ 70.6 mrd. billion euros in sales</td>
<td>▶️ 374,778 associates</td>
<td>▶️ 223 manufacturing sites¹</td>
</tr>
<tr>
<td><strong>Europe</strong></td>
<td>▶️ 53% share of sales</td>
<td>▶️ 229,599 associates</td>
<td>▶️ 134 manufacturing sites¹</td>
</tr>
<tr>
<td><strong>Americas</strong></td>
<td>▶️ 20% share of sales</td>
<td>▶️ 41,037 associates</td>
<td>▶️ 33 manufacturing sites¹</td>
</tr>
<tr>
<td><strong>Asia Pacific</strong></td>
<td>▶️ 27% share of sales</td>
<td>▶️ 104,142 associates</td>
<td>▶️ 56 manufacturing sites¹</td>
</tr>
</tbody>
</table>

* As of 12.15
RBVC Overview

Strategic focal points – shaping change

BOSCH
Invented for life

Electrification  Automation  Connectivity  Energy efficiency  Emerging markets
### RBVC Overview

#### RBVC focus areas

<table>
<thead>
<tr>
<th>Services / business models (partially across industries)</th>
<th>Automation &amp; Electrification</th>
<th>Energy Efficiency</th>
<th>Enabling Technologies</th>
<th>Healthcare Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Automation &amp; Electrification</strong></td>
<td>Electronics</td>
<td>Local energy generation &amp; harvesting</td>
<td>Connectivity</td>
<td>Medical devices and components (e.g., renal or diabetes care, cardiology, etc.)</td>
</tr>
<tr>
<td></td>
<td>Sensors, actuators, MEMS devices</td>
<td>Efficiency of energy conversion</td>
<td>Signal processing and interpretation</td>
<td>Molecular diagnostics (in particular “Lab-on-chip”)</td>
</tr>
<tr>
<td></td>
<td>Electric systems incl. Robotics</td>
<td>Battery and local energy</td>
<td>Human-Machine-Interface (HMI)</td>
<td>Connected devices for health, safety etc.</td>
</tr>
<tr>
<td></td>
<td>Autonomous &amp; Cognitive systems</td>
<td>Energy management</td>
<td>Software technologies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental technologies</td>
<td>Web / internet based business models</td>
<td></td>
</tr>
</tbody>
</table>

**Components and technologies for:**

- Electronics
- Sensors, actuators, MEMS devices
- Electric systems incl. Robotics
- Autonomous & Cognitive systems
- Local energy generation & harvesting
- Efficiency of energy conversion
- Battery and local energy
- Energy management
- Environmental technologies
- Connectivity
- Signal processing and interpretation
- Human-Machine-Interface (HMI)
- Software technologies
- Web / internet based business models
- Medical devices and components (e.g., renal or diabetes care, cardiology, etc.)
- Molecular diagnostics (in particular “Lab-on-chip”)
- Connected devices for health, safety etc.

**Current Focus Areas:** AI / Deep Learning, IoT, Autonomous Driving, Analytics, next Generation Computer Architecture, AR / VR, Mobility Solutions
RBVC Overview

Investment charter RBVC ¹)

▪ Corporate Venture Capital Arm of Bosch
▪ Organized like an institutional VC

RBVC Investment criteria and benefit

▪ Strategic fit to Bosch Search areas
  ‒ Complementary to Bosch activities
  ‒ Peripheral new business opportunities
  ‒ Supporting Start-ups with operational experience and worldwide Bosch company network
  ‒ Networking with Start-up community on a worldwide basis (Universities, Accelerators, other VC’s and Startup’s)
▪ Breakthrough Innovation in Technology or Business Model
▪ Risk adequate financial returns

¹) RBVC = Robert Bosch Venture Capital GmbH = 100% subsidiary of Robert Bosch GmbH
RBVC Overview

Investment charter RBVC ¹)

I. **Areas:** 24 VC focus areas in 4 search clusters.

II. **Investment Targets:** Mostly start-ups; also "theme funds" w/ strong deal overlap.

III. **Geographic scope:** Worldwide – starting in EU, NA, IL, then AP.

IV. **Investment stage:**
   “Balanced stage fund” (from early- to late-stage financing rounds); participation in follow-on investment rounds of successful portfolio companies.

V. **Amount invested in each portfolio company:**
   Initial investment of up to EUR 500k in Seed Round; EUR 1-4m in Round A financing, in follow-on rounds reaching typical aggregate investment of EUR 6-10m, for typically 10-20% equity position in each portfolio company.

VI. **Investment volume:**
   EUR 420m under management (from 01/2016), working on “virtual fund basis”.

¹) RBVC = Robert Bosch Venture Capital GmbH = 100% subsidiary of Robert Bosch GmbH
RBVC Overview

Deal flow RBVC by region / search cluster

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EE: Energy Efficiency</td>
<td>98</td>
<td>93</td>
<td>111</td>
<td>119</td>
<td>67</td>
<td>81</td>
</tr>
<tr>
<td>ET: Enabling Technologies</td>
<td>215</td>
<td>262</td>
<td>322</td>
<td>308</td>
<td>462</td>
<td>358</td>
</tr>
<tr>
<td>A&amp;E: Automation &amp; Electrification</td>
<td>84</td>
<td>127</td>
<td>331</td>
<td>461</td>
<td>667</td>
<td>744</td>
</tr>
<tr>
<td>HS: Healthcare Systems</td>
<td>152</td>
<td>287</td>
<td>300</td>
<td>181</td>
<td>300</td>
<td>181</td>
</tr>
</tbody>
</table>

Other Services

## RBVC Overview

### Portfolio companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Country</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYNAPSENSE</td>
<td>US</td>
<td>End-to-end solution provider for Wireless Sensor Networks; unique SW architecture for <strong>seamless integration</strong>; multi-hop network</td>
<td></td>
</tr>
<tr>
<td>LIGHT BLUE OPTICS</td>
<td>UK</td>
<td><strong>Holographic Laser Projection</strong> (HLP) technology for small and portable solutions; two-dimensional sequential holograms switched with high frequency</td>
<td>06.09</td>
</tr>
<tr>
<td>Green Peak</td>
<td>BE</td>
<td><strong>Low-power ASIC</strong> for RF applications in consumer electronics and homes (RF4CE)</td>
<td></td>
</tr>
<tr>
<td>energy</td>
<td>US</td>
<td>Panel-attached DC/DC booster box for DC-bus solar system with higher output; high-efficiency DC/DC topology with implemented MPPT tracker</td>
<td></td>
</tr>
<tr>
<td>Nextreme</td>
<td>US</td>
<td>Chip-scale highly efficient <strong>micro thermoelectric coolers</strong> and power generators; bumps directly integrated into a semiconductor package/chip</td>
<td></td>
</tr>
<tr>
<td>Cheetah Medical</td>
<td>US</td>
<td><strong>Non-invasive</strong> cardiac output and hemodynamic monitoring system using it's proprietary BIOREACTANCE® Technology</td>
<td>03.10</td>
</tr>
<tr>
<td>AETHON</td>
<td>US</td>
<td>Autonomous mobile robot for healthcare supply chain logistics and workflow solutions, automating the movement of goods</td>
<td>03.10</td>
</tr>
</tbody>
</table>
## RBVC Overview

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<th>Country</th>
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<th>Date</th>
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<tbody>
<tr>
<td>DE</td>
<td>IDENT Technology AG</td>
<td>Ultra low power proximity sensing and 3D gesture recognition technologies for Human Machine Interaction</td>
<td>DIVESTED</td>
</tr>
<tr>
<td>BE</td>
<td>EpiGaN</td>
<td>GaN on Silicon and SiC epitaxial material solutions for top performance devices</td>
<td>07.11</td>
</tr>
<tr>
<td>US</td>
<td>FLY BY</td>
<td>Mobile, location based, Augmented Reality Platform for users to share life’s moments</td>
<td>DIVESTED</td>
</tr>
<tr>
<td>DE</td>
<td>TORQUEEOO</td>
<td>Electric outboard systems provider for marine applications</td>
<td>01.12</td>
</tr>
<tr>
<td>NL</td>
<td>INTRINSIC ID</td>
<td>Hardware intrinsic security SW for embedded systems, mobile devices and cloud</td>
<td>03.12</td>
</tr>
<tr>
<td>UK</td>
<td>PYREOS</td>
<td>Provider of low cost, uncooled, MEMS based pyroelectric IR sensor and spectroscopy technology for environmental sensing, CE and healthcare</td>
<td>05.12</td>
</tr>
<tr>
<td>IL</td>
<td>Unilight</td>
<td>Non-contact printing of high aspect ratio PV metallization allowing significant cost reduction</td>
<td>08.12</td>
</tr>
</tbody>
</table>
## RBVC Overview

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<tr>
<th>Portfolio companies</th>
<th>Country</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movidius</td>
<td>UK</td>
<td>Low power multi-core <strong>imaging processor</strong> for array and light-field cameras</td>
<td>05.13</td>
</tr>
<tr>
<td>Alpine Data Labs</td>
<td>US</td>
<td><strong>Big Data</strong> analytics platform for enterprises</td>
<td>06.13</td>
</tr>
<tr>
<td>Pebbles Technologies</td>
<td>IL</td>
<td>High Resolution, 3D <strong>gesture control</strong> technology based on IR pattern</td>
<td>DIVESTED</td>
</tr>
<tr>
<td>Flybits</td>
<td>CA</td>
<td><strong>Mobile context aware</strong> computing platform for smart city, Internet of Things and others</td>
<td>06.14</td>
</tr>
<tr>
<td>Xmos</td>
<td>UK</td>
<td><strong>Multicore microcontroller</strong> that delivers scalable, real-time, programmable computing</td>
<td>06.14</td>
</tr>
<tr>
<td>Setem Technologies Inc.</td>
<td>US</td>
<td>Signal Separation technology that addresses the ability to focus on a <strong>specific speech</strong> source</td>
<td>02.14</td>
</tr>
<tr>
<td>ROB•ART</td>
<td>AT</td>
<td><strong>Autonomous mobile robots</strong> for consumer and industrial applications based upon its AICU (Artificial Intelligence Control Unit) technology</td>
<td>12.13</td>
</tr>
<tr>
<td>Country</td>
<td>Company</td>
<td>Description</td>
<td>Date</td>
</tr>
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</tr>
<tr>
<td>SGP</td>
<td>Rotimatic</td>
<td>Rotimatic is world’s first AI-based robotic cooking technology which makes low carb whole wheat flatbreads in minutes.</td>
<td>07.15</td>
</tr>
<tr>
<td>DE</td>
<td>GNA Biosolutions</td>
<td>Laser based, ultrafast, pathogen diagnostic instruments which enable physicians to diagnose bacterial diseases within minutes.</td>
<td>06.15</td>
</tr>
<tr>
<td>DE</td>
<td>AdasWorks</td>
<td>Seed investments: automotive computer vision, artificial intelligence and navigation technologies for Advanced Driver Assistance.</td>
<td>07.15</td>
</tr>
<tr>
<td>FIN</td>
<td>Optomed</td>
<td>Hand held high precision – low cost mobile retinal camera and software solutions. (Optomed Smartscope)</td>
<td>08.15</td>
</tr>
<tr>
<td>FR</td>
<td>Chronocam</td>
<td>Seed Investment: Machine vision sensors and systems for applications in all fields of artificial vision, inspired by biological eyes.</td>
<td>05.15</td>
</tr>
<tr>
<td>Company</td>
<td>Country</td>
<td>Description</td>
<td>Date</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>WaveOptics</td>
<td>UK</td>
<td>Lightweight, see-through augmented reality displays that make wearable smart glasses attractive (Size, Power, Weight, Form Factor and Display Quality).</td>
<td>11.15</td>
</tr>
<tr>
<td>PubNub</td>
<td>US</td>
<td>Secure, low-latency, global Data Stream Network (DSN) with API that enables customers to connect, scale, secure and manage real-time applications and IoT devices.</td>
<td>09.15</td>
</tr>
<tr>
<td>MOD.CAM</td>
<td>SE</td>
<td>Intelligent camera sensor platform for video analytics.</td>
<td>09.15</td>
</tr>
<tr>
<td>Emperra</td>
<td>DE</td>
<td>First solution provider of a certified diabetes management closed loop system, has already reimbursement status in Germany.</td>
<td>12.15</td>
</tr>
<tr>
<td>CelLink</td>
<td>US</td>
<td>Seed Investment: CelLink’s interconnect Aluminium backplane overcomes the manufacturing, efficiency, and cost limitations of existing technologies e.g. in battery or LED industry.</td>
<td>11.15</td>
</tr>
</tbody>
</table>
## RBVC Overview

### Latest Direct Investments in 2016

<table>
<thead>
<tr>
<th>Company</th>
<th>Country</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CropX</td>
<td>IL</td>
<td>Automated differential irrigation planning using Ag-Analytics.</td>
<td>02.16</td>
</tr>
<tr>
<td>Unispectral</td>
<td>IL</td>
<td>Camera Colour Filtering using a MEMS based tuneable filter.</td>
<td>04.16</td>
</tr>
<tr>
<td>AMotive</td>
<td>DE</td>
<td><strong>Series B investment</strong>: automotive computer vision, artificial intelligence and navigation technologies for Advanced Driver Assistance.</td>
<td>04.16</td>
</tr>
<tr>
<td>FogHorn</td>
<td>US</td>
<td>Software Platform-as-a-Service (PaaS) for the industrial IoT space that utilizes fog computing to bring in multiple feeds of sensor data, then enrich and provide complex event processing on the data, along with applications and analytics running locally at the edge on a gateway device.</td>
<td>05.16</td>
</tr>
</tbody>
</table>
### RBVC Overview

#### Latest Direct Investments in 2016

<table>
<thead>
<tr>
<th>Country</th>
<th>Company</th>
<th>Description</th>
<th>Year</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>Graphcore</td>
<td>Intelligent Processor Units (IPU) optimized for machine learning tasks in the cloud and embedded applications.</td>
<td>05.16</td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>TetraVue</td>
<td>TetraVue was founded to create 3D camcorders that provide a simple way of capturing high resolution 3D data and imagery (HD 3D).</td>
<td></td>
<td>Investment finalizing</td>
</tr>
<tr>
<td>FR</td>
<td>Chronocam</td>
<td>Innovative extreme fast machine vision sensors and systems for applications in all fields of machine vision.</td>
<td></td>
<td>Investment finalizing</td>
</tr>
</tbody>
</table>
RBVC Strategy and Success Stories

Agenda

1. RBVC Strategy and Overview

2. Portfolio Company introduction: AlMotive
Almotive has developed an innovative, Artificial Intelligence (AI) based, full software stack which runs on an embedded processing platform to deliver a complete spectrum of autonomous driving capabilities.

Our modular product suite delivers the robust technology required to operate autonomous vehicles in all conditions and adapts to different driving styles real-time.

We have leveraged our team’s extensive experience in embedded systems to create a hardware agnostic, scalable neural network solution that is highly efficient (superior performance, low power consumption).
### Almotive at a Glance

**COMPANY**
- Founded in 2015 by Laszlo Kishonti
- Incorporated in Germany

**DEVELOPMENT**
- 4 Offices across 3 continents: Budapest (Hungary), Helsinki (Finland), Mountain View (USA) and Tokyo (Japan)
- 4 testing locations: Hungary, Finland, Silicon Valley and Japan
- 3 self-driving test car models: Toyota Prius, Volvo XC90 and Mercedes C180

**TEAM**
- 125+ passionate for shaping the future of mobility
- 100+ engineers, of which 50+ fully dedicated to Artificial Intelligence

**EXPERTISE**
- In-house developed AI algorithms and framework
- 10+ years in High Performance Embedded Programming
- 5+ years in Computer Vision

**INVESTORS**
- High quality investors: Robert Bosch VC / Nvidia / Inventure VC / Draper Associates / Day One Capital / Samsung Catalyst Fund / Private Investors
Our Masterpiece: The Technology...

aiDrive
Artificial Intelligence – based full stack software suite for Level 5 autonomous vehicles
- Recognition Engine
- Location Engine
- Motion Engine
- Control Engine

aiKit
Complete set of training and testing tools essential to build the aiDrive suite, enabling faster time to market
- Calibration Tool
- Data Collection Tool
- Semi-Supervised Annotation Tool
- Training Tool
- Real-Time Simulator
- Verification Tool

aiWare
Neural network accelerator IP that helps chip companies build low power, high performance AI optimized hardware
...Already the Most Advanced Solution on the Market

- An AI-based Recognition Engine which recognizes 100+ object classes, including road surface, sidewalk, lane, traffic light, traffic sign, pedestrian, vehicle, bicycle, and motorbike detection in daylight, night, rain, and snow
- Both pixel-wise segmentation and bounding box outputs are supported
- AI-based object distance estimation using mono-cameras
- 360-degree 3D reconstruction of surroundings enabling true intelligent understanding of environment
- AI-based trajectory planning based on routing, inputs from object recognition, and object behavior prediction
- Translation of the planned trajectory into the car’s commands, including steering, acceleration, braking, and indicators

- An end-to-end set of tools, the aiKit enables much faster and more resource-efficient time to market of the aiDrive
- The aiKit Simulation Tool can be employed to create photorealistic videos with complex traffic situations, driving behavior, pedestrian behavior, in all kinds of weather conditions and with multiple sensor inputs
- Used to train and test aiDrive in various virtual traffic scenarios, reducing the need to capture or recreate corner case data in real life

- A Neural Network Accelerator IP to enable performance at much lower power consumption. Our FPGA reference design demonstrates that the solution is already working and is highly efficient
- Initial estimates indicate 20x more efficiency than current top GPUs
- The complete solution includes a low-level driver and an advanced state-of-the-art SDK (Emulator, low level driver, NNEF Standard)
Extensive Partnership Base with Numerous Ongoing Commercial Developments

**Partners**
- Volvo
- HERE
- KYOCERA
- BOSCH
- QNX
- ARM
- ADEA
- NVIDIA
- CEVA
- Intel
- QUALCOMM
- NXP
- ThyssenKrupp
- WABCO
- Green Hills

**Projects**

**aiDrive – Autonomous Driving:**
- 6 camera based intelligent object detection system for European OEM
- Full stack of self-driving software and toolset for global technology company

**aiDrive – Driver Assist:**
- Intelligent reversing camera application for Tier 1 / Automotive OEM

**aiWare:**
- FPGA based AI accelerator design for Hardware OEM

**Memberships & Awards**

**Membership Activity:**
Khronos Group
- Initiated the creation of a Neural Network Exchange Format working group

Embedded Vision Alliance

The International Wireless Industry Consortium

**Recent Awards:**
- ICT Innovation of the Year
- Finalist Red Herring’s Top 100 Europe
- CB Insight AI 100
Our Self-Driving Platform Is Already Running on our Test Vehicles Across 3 Continents

- **Mountain View**
  - California, USA
  - 2 Employees
  - Sales & BD, customer support
  - TESTING LOCATION

- **Helsinki**
  - Finland
  - 2 Employees
  - Sales & BD
  - TESTING LOCATION

- **Budapest**
  - Hungary
  - 120+ Employees
  - R&D, Sales & BD, Admin
  - TESTING LOCATION

- **Tokyo**
  - Japan
  - 1 Employees
  - Sales & BD, customer support
  - TESTING LOCATION
Our mission and technology take us where others can’t reach

Our partners and investors help us get there fast

www.aimotive.com
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Tel: +1 650 320-1542
THANK YOU

Your success is our goal.