Rationale for strong investment in innovative solutions

Markus Rossi
Head of Innovation Office, VP
ams AG

ams at-a-glance

Sensing is life.

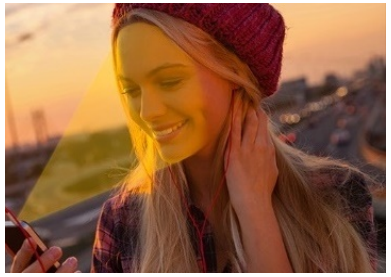
High performance sensor solutions for leading OEMs, focused on sensor-rich markets

Key figures

2.086 bn USD revenues 2019	**32%** Revenue growth year-on-year	**8,000** Customers
9,000 Employees	**1,100** Engineers	**>3,000** Patents granted and applied

Our markets (FY 2019)

Consumer



Automotive, Industrial, Medical



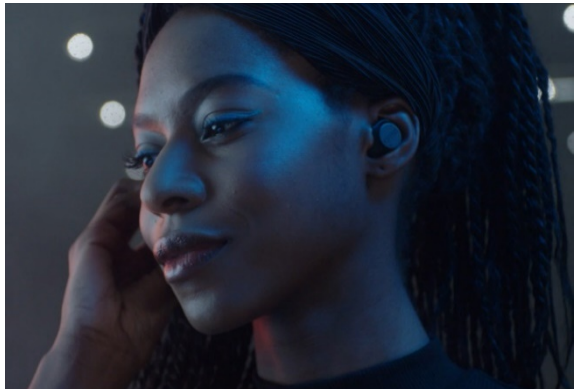
Our technology

ams creates technology for a better lifestyle

Sensing is life.

Optical, Imaging, Audio Technology



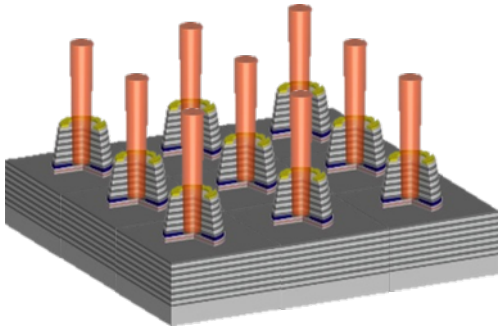
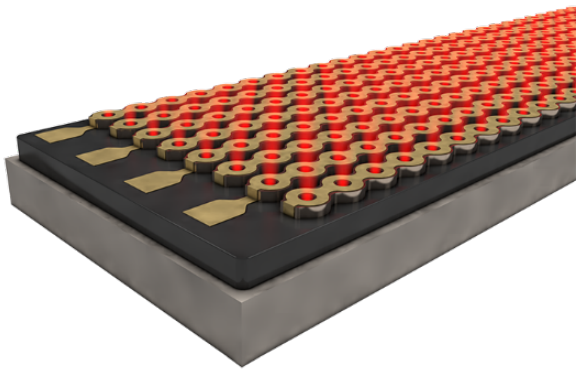



Industry Leading 3D Technology

Structured Light

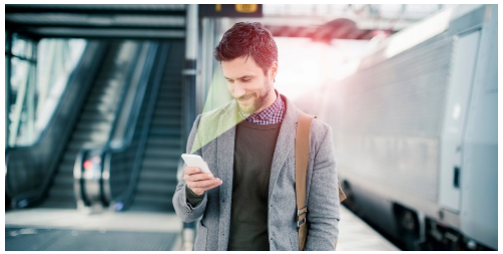
Time-of-Flight

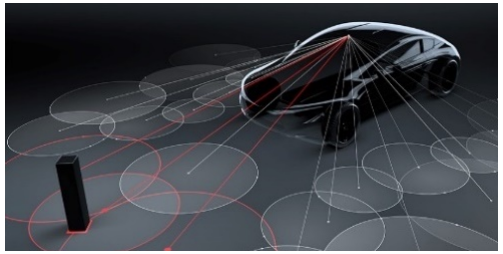
Active Stereo Vision

ams leading in 3D sensing across application areas

Leading 3D technology for front- and world-facing applications





Active Stereo Vision (ASV) full ams system solution for consumer 3D, automotive 2D/3D in-cabin sensing, emerging industrial applications (household devices, access)

Behind OLED 3D (BOLED) development to move front-facing 3D sensing for authentication invisibly behind the display based on ASV technology ongoing

High-performance Near Infrared (NIR) image sensors with SmartSens partnership with state-of-the-art quantum efficiency of up to 40% incorporating ams illumination expertise and core IP in global shutter technology

dToF 3D: leading know-how in upcoming 3D technology with outstanding performance for difficult lighting conditions and longer distances

3D LiDAR for high-performance true solid-state scanning: combining advantages of non-scanning/flash + mechanical/MEMS scanning

Long distance multi-zone Time-of-Flight (ToF) for high quality distance measurement, object detection

Pioneering optical and spectral sensing solutions

ams pioneers technologies for the applications of tomorrow

A worldwide leader in light sensing solutions

- Leading in optical sensing: sensors, illumination solutions, high performance optical systems
- High quality optical sensing solutions at top consumer OEMs
- Upcoming growth markets in Automotive + Industrial

Broad portfolio: display management, proximity, BOLED

- Innovative behind OLED display management with ALS, color sensing, proximity sensing
- Ultra-small proximity for wireless earbuds
- Camera Auto White Balance (AWB) for highest smartphone image quality

Technology leadership for new markets and applications

- Bio-sensing: high quality blood pressure + health data measurement
- Spectral sensing: bio/medical sample analysis, lateral flow tests for fast high-quality point-of-care readout (e.g. COVID-19)
- Spectral sensing to identify properties of materials (moisture, floor material composition, fabric composition for recycling)

Leading image sensing capabilities

Pioneering technologies medical, industrial, consumer, computing & automotive applications

Leading in advanced image sensing for Industrial

- Leading vendor in global shutter technology for advanced industrial applications
- Global shutter CMOS imaging for high-speed machine vision, inspection, factory automation
- X-Ray and CT image sensor solutions for industrial and security applications

Leading in advanced image sensing for Medical

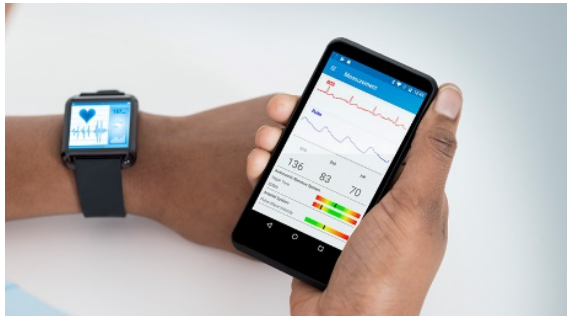
- High performance cost-optimized systems for computed tomography (CT) and digital X-Ray: clearer images at lower radiation doses for improved diagnostics
- Fully integrated high-performance CT solutions reaching from ultra high-end to volume market
- NanEye micro cameras: versatile solutions ≤1mm^2 for disposable medical endoscopy

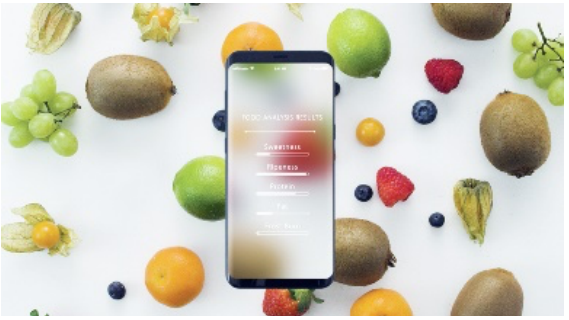
High-performance high QE NIR image sensing for 3D optical sensing

- Ultra-sensitive NIR sensors, state-of-the-art low-light sensitivity in combination with a high quantum efficiency (QE)
- Integrating NIR sensors into complete ams 3D system solutions targeting consumer (facial authentication), industrial (access) and automotive (driver monitoring) applications

Photonics: key technologies for consumer applications

- **Photonic** components, modules & systems have penetrated **consumer applications** over the last years
  - image sensors, miniature optical sensors, 3D sensing technology, spectral sensors, vital sign sensors, …
- **Swiss** industries and universities have been very successful
  - **many success stories**: VCSELs, 3D and 2D image sensors, miniature optics, packaging, precision coating, software, …
- **Mandatory** to keep the lead and stay competitive:
  - strong technology and product roadmaps, **close connection between both**
  - Continuous funnel of new innovations (materials, processes, HW & SW developments, …)



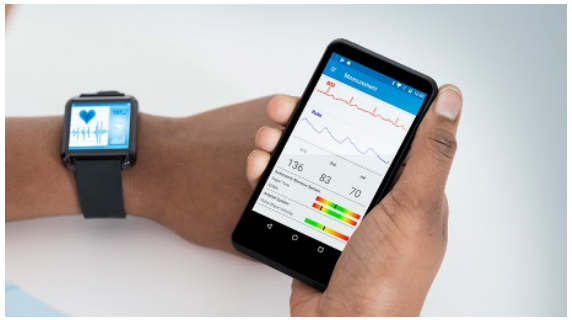


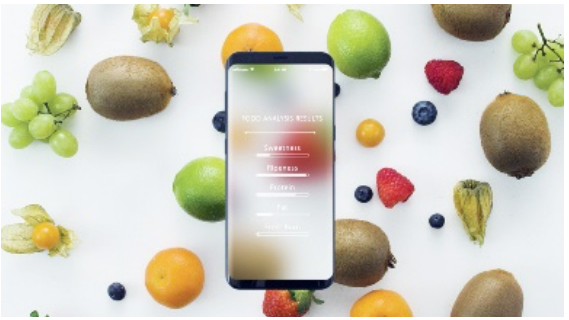
Photonics: key technologies for consumer applications

In high volume markets:

- Development is **moving at increasing speed**, will get even more competitive and highly interdisciplinary
  - Competition getting stronger very rapidly
  - New technologies are changing existing markets fundamentally (e.g., machine learning, AI)
  - System and application understanding, as well as solid ecosystem building are becoming crucial
  - Next generation products with photonics will include augmented reality, IoT, personalized medicine, precision farming, etc.

→ increasing need for **disruptive** innovation at **fast pace**





- The consortium for the **"NTN Innovation Booster Photonics"**
- **Swissmem Division Photonics** and **Swissphotonics**

Thank you!

Please visit our website
www.ams.com