MVTec Software GmbH

AGRICULTURE 4.0

Machine Vision Software for
Innovative Solutions in Agriculture

The Agricultural Industry

Productivity, efficiency, and sustainability are some of the critical factors driving the adoption of automation technology in today's agriculture industry. Smart farming comes from focusing ideas and efforts to respond more precisely to the needs of livestock, crops, the environment, and the demands of consumers and government regulations.

Automation results in higher yields, addresses on-going labor shortages, reduces operational costs, and enables more sustainable farming practices. Image processing technologies and digitalization play a crucial role in achieving these objectives. The use of imaging and sensing technology on farms makes it possible to collect and analyze a wide range of data from various production areas. This data helps farmers make informed decisions and enables them to meet the various challenges facing agriculture today.

Challenges of Today's Agriculture

- Feeding the growing world population
- Protection of the environment
- Fulfillment of governmental regulations
- Compensation of fast changing weather conditions
- Limited resources like water and agricultural area
- High production and labor costs
- Lack of skilled workers
- Increasing consumer demands

Machine Vision in Agriculture Applications

Machine vision is part of many automation and robotics applications used in agriculture and the number of applications is increasing rapidly. Tractors drive autonomously and the cultivation of fields can be carried out precisely and plant-specifically. Drones or Unmanned Aerial Vehicles (UAV) record the condition of the soil and crops from the air in order to provide the farmer with data for proper management. In livestock farming, robots assist in milking, feeding, and monitoring the health of the animals. Robots are also used in greenhouses for harvesting and quality monitoring of fruit, vegetables, or flowers. The inspection of seeds and produce for quality and grade is also performed with image processing technologies.

MVTec's machine vision software helps farmers realize these and other applications and confidently face many of today's modern agriculture challenges.

Efficient Plant Protection with Machine Vision

Plant protection is an important component of crop cultivation to ensure high yields and best quality. Growing objections and increasingly strict regulations of traditional protection methods are challenges that have to be faced – today and in the future. Therefore, it is necessary for crop protection products to be put to particularly efficient use. With the help of industrial image processing, it is possible to distinguish between crops and weeds in real time during the spraying process and to precisely apply the agent.

YOUR ADVANTAGES
in using MVTec Software

- Use MVTec's deep-learning-based object detection to quickly and robustly localize weeds
- Label and manage your images with the MVTec Deep Learning Tool
- Train and deploy your neural network with a single, dedicated IDE (Integrated Development Environment)
- Profit from fast, robust, and industry-proven algorithms
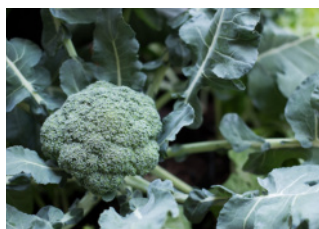- Use MVTec's software on small, power efficient embedded devices – out of the box

WATCH OUR VIDEO
about efficient plant protection with machine vision

BENEFITS OF YOUR SOLUTIONS
powered by MVTec Software

- Reduction of environmental pollution
- Cost-efficient use of resources
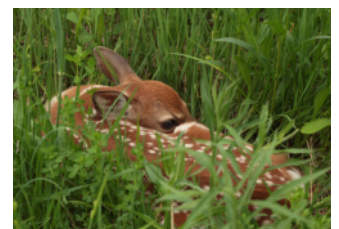- High yields and best quality

FARMING MACHINERY
Further Application Examples

HARVESTING

SOIL TILLAGE

DETECTION OF WILDLIFE

Automated Monitoring and Harvesting with Machine Vision

The automation of processes in greenhouses using machine vision technologies makes it possible to better meet the increasing demand and requirements for quality, hygiene, and food safety. On the one hand, automation compensates for the lack of qualified workers who perform extremely monotonous, physically demanding tasks under the challenging climatic conditions required for growth. On the other hand, automation promotes efficient and sustainable crop production in greenhouses. With the help of machine vision, harvesting robots precisely detect, classify and cut ripe crops. In addition, multispectral imaging and deep learning technologies enable early detection of nutrient deficiency or signs of disease to ensure best quality yields.

YOUR ADVANTAGES
in using MVTec Software

- Reliably detect a wide range of objects like fruits, vegetables, and flowers thanks to flexible algorithms
- Profit from a comprehensive toolset including latest machine vision technologies, such as 3D vision and deep learning algorithms – readily available in one package
- Label, train, and manage your training data easily with the MVTec Deep Learning Tool
- Run MVTec's software on the target platform of your choice – on embedded devices, IPCs or cloud-based

WATCH OUR VIDEO
about greenhouse automation
with machine vision

BENEFITS OF YOUR SOLUTIONS
powered by MVTec Software

- Precise harvest time ensures best quality
- High availability reduces personnel bottlenecks
- Reliable and objective monitoring helps ensure early detection of diseases and thus reduces the use of harmful substances

GREENHOUSE AUTOMATION
Further Application Examples

SEEDLING CULTIVATION

QUALITY CLASSIFICATION

PRECISE NUTRITION

MVTec's Key Technologies
# for Innovative Agriculture Solutions

MVTec software enables you to offer high-tech solutions for agriculture applications. For all machine vision challenges in modern agriculture scenarios, the software products of MVTec pave the way for innovative technologies and best-in-practice solutions. The flexibility and high quality of MVTec software contribute decisively to your sustainable economic success.
The software architecture allows fast development of all kinds of machine vision applications and thus facilitates the development of new automation solutions. For you, this results in cost savings and an improved time to market.

Characteristics of MVTec's Software

- Professional and comprehensive machine vision toolbox featuring:
  Deep learning | Matching | 3D vision | Measuring | and many more
- Fast, accurate, and robust machine vision methods
- Available for a multitude of platforms, also for: Embedded devices | IPCs | Cloud
- Supports hundreds of industrial cameras, frame grabbers, and all common vision standards
- Dedicated machine vision IDE (Integrated Development Environment) HDevelop

MVTec Offers a Wide Range of Services for Companies with Different Needs

- Access to our worlwide network of integration partners
- Trainings and workshops
- Porting to your device and platform
- Free application evaluation
- Feasibility studies
- Customer-specific projects

Hardware | Implementation | Machine Vision Applications | Software
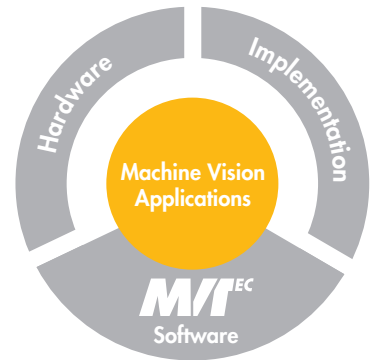
MVTec's machine vision software is the key component to next generation farming – hardware-independant and readily available for many platforms. Our worldwide network of integration partners assists in implementing the software into your application.

MVTec – Your Partner for Machine Vision Software in Agriculture Applications

FARMING MACHINERY

GREENHOUSE AUTOMATION

PRECISION FARMING

SEEDS & PRODUCE

LIVESTOCK FARMING

Products and Services

MVTec Teaches Machines How to See

As a number one supplier of machine vision software technologies, MVTec takes a leading role in understanding how machines can learn to see. MVTec's product portfolio is developed by highly qualified machine vision experts. With more than 30 years of experience, we are well positioned to support customers with innovative technologies.

Depending on factors like time to market, complexity, and size of the application, or the user's programming skills, either HALCON, MERLIC, or even a combination of both products offer the best solution for a given task. Combined with the Deep Learning Tool and a wide range of services, MVTec supports you with your machine vision application.

HALCON

MVTec HALCON is the comprehensive standard software for machine vision with an integrated development environment (HDevelop). It enables cost savings and improved time to market. HALCON's flexible architecture facilitates rapid development of any kind of machine vision application.

www.halcon.com

MERLIC

MERLIC is an all-in-one software for quickly building machine vision applications without programming. It is based on MVTec's extensive machine vision expertise and combines reliable, fast performance with ease of use. This leads to time and cost savings.

www.merlic.com

DEEP LEARNING TOOL

Labeling training data is the first crucial step towards any deep learning application. The quality of this labeled data plays a major role when it comes to the application's performance, accuracy, and robustness. The MVTec Deep Learning Tool offers you a comprehensively smooth deep learning experience, perfectly integrated into HALCON.

www.mvtec.com/deep-learning-tool

SERVICES

We offer a wide range of services in machine vision for companies with different needs. Our services include free evaluation of machine vision applications, feasibility studies, customer-specific projects, customized trainings, and porting our software to customer-specific platforms. This enables you to deploy successful machine vision projects.

www.mvtec.com/services

Shaping the Future of Agriculture with MVTec on Campus

A Program to Improve Image Processing in Agricultural Research and Teaching

With the MVTec on Campus program we aim to pass on our experience and expertise and to help promote research on innovative machine vision technologies in agriculture. In order to accelerate research results, we strive for a mutually supportive partnership with universities. Therefore we are providing professors and lecturers with MVTec HALCON free of charge.

www.mvtec.com/mvtec-on-campus

MVTEC'S MACHINE VISION SOFTWARE – THE KEY TO NEXT GENERATION FARMING

Find out more at
www.mvtec.com/agriculture

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